Policy Research Working Paper 8894

Lifelines: The Resilient Infrastructure Opportunity

Background Paper

Well Spent

How Governance Determines the Effectiveness of Infrastructure Investments

Martin Kornejew
Jun Rentschler
Stéphane Hallegatte

WORLD BANK GROUP
Climate Change Group
Global Facility for Disaster Reduction and Recovery
June 2019

Policy Research Working Paper 8894

Abstract

This study explores the role of governance in improving infrastructure reliability. It estimates that increasing infrastructure spending and improving governance in parallel is six times more effective at enhancing transport system performance than increasing spending alone. It also estimates that under current fiscal budgeting, every $1 spent on infrastructure maintenance is as effective as $1.5 of new investments in many OECD economies. Overall, the evidence in this study demonstrates that it is the quality rather than the quantity of infrastructure spending that determines the quality of infrastructure services.

This paper is a product of the Global Facility for Disaster Reduction and Recovery, Climate Change Group. It is part of a larger effort by the World Bank to provide open access to its research and make a contribution to development policy discussions around the world. Policy Research Working Papers are also posted on the Web at http://www.worldbank.org/prwp. The authors may be contacted at martin.kornejew@uni-bonn.de and jrentschler@worldbank.org.

Well spent:
How governance determines the effectiveness of infrastructure investments

Martin Kornejew[1,2], Jun Rentschler[1], Stéphane Hallegatte[1],
[1]Global Facility for Disaster Reduction and Recovery, World Bank, Washington DC, USA
[2]Bonn Graduate School of Economics, University of Bonn, Germany

Acknowledgements: This background paper contributes to the World Bank's flagship report *Lifelines: The Resilient Infrastructure Opportunity*. It has benefited from helpful comments, feedback, and inputs by Asif Islam, Marie Hyland, Jason Russ, and Joshua Wimpey.

JEL classification: H54, D73, O17

Keywords: governance; infrastructure; investment

1. Introduction

By one estimate, governments in low and middle income countries around the world are investing around US$ 1 trillion (or between 3.4% to 5% of GDP) in infrastructure every year (Fay et al., 2019). Still, the quality and adequacy of infrastructure services varies widely across countries. Millions of people – especially in the fast-growing cities in developing countries – are facing the challenging consequences of substandard infrastructure, and often at a significant cost. Underfunding and poor maintenance are some of the key factors resulting in unreliable electricity grids, water and sanitation systems, and overstrained transport networks. Natural hazards are often a leading cause of disruptions in these already fragile systems.

Yet, in principle, infrastructure providers have a wide range of options at their disposal to increase the quality and resilience of infrastructure services. Strengthening the physical quality of assets, incorporating redundancy in infrastructure networks, using nature-based solutions, or increasing the funding for asset management and maintenance – these are readily available and often cost-effective measures to increase the quality of infrastructure services and users. This raises the question of why these options are not always implemented and why infrastructure systems so often are prone to frequent disruptions and unable to cope with natural hazards – not rarely despite significant spending.

A government's ability to implement resilience-building options depends on whether it has effective systems in place to implement, finance, manage, and maintain infrastructure assets. Strong institutions, clear assignment of responsibilities, and transparent and reliable financing mechanisms are all crucial to ensuring the effective provision of public services. Using a range of infrastructure spending and performance data, this study explores the role of governance in determining the efficiency of infrastructure spending.

The remainder of this study is structured as follows. Section 2 describes major empirical patterns and introduces the literature on governance and infrastructure quality. Section 3 presents empirical evidence on the importance of governance in determining the provision of high quality infrastructure. Section 4 concludes.

2. Governance and infrastructure quality: A review of the evidence

Measures of governance and infrastructure quality suggest a close relationship

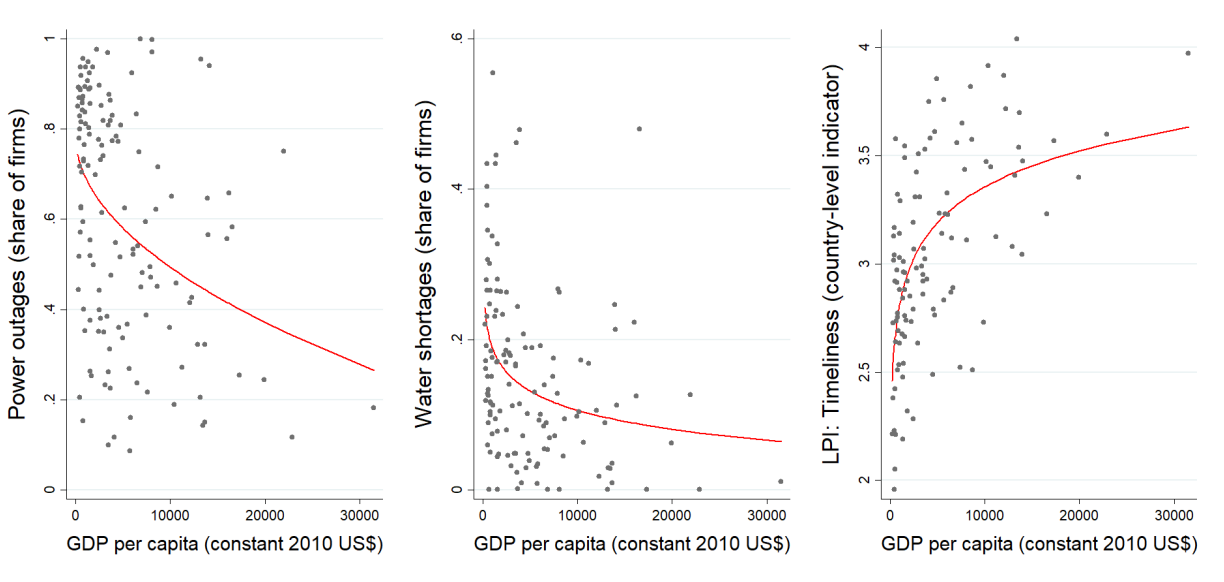
Rentschler et al. (2019) have shown that the quality of public infrastructure has wide-ranging implications for the competitiveness of firms. Households that rely on firms for income, goods, and services, thus rely on infrastructure indirectly – as well as directly for their own use. Unsurprisingly, governments spend significant resources on providing and maintaining public infrastructure. OECD member countries spend on average 0.79% of GDP on transport infrastructure investment and maintenance (OECD, 2019).[1] In Fiji – which is exposed to considerable natural hazards from coastal erosion, storm surges, landslides, and cyclones – this public spending on roads is as high as 30% of GDP (Government of Fiji & World Bank, 2017).

[1] Estimates of all inland transport infrastructure investments in 2016 in 21 OECD countries. Inland transport infrastructure includes road, rail, inland waterways, maritime ports and airports and takes account of all sources of financing.

In a selection of low- and middle-income countries from Latin America and Sub-Saharan Africa (covered by the World Bank's Open Budgets Portal; World Bank, 2018b), investments in infrastructure amount to 1.3% of GDP on average.

The data shows clearly that poorer countries tend to have lower infrastructure quality and experience more disruptions of their water, transport, and electricity systems (Figure 1). However, these figures also illustrate that quality infrastructure does not have to be reserved for rich countries. In fact, the data suggest significant differences in infrastructure quality for countries at the same income level. At low income levels, the difference is particularly large. For example, the reliability of electricity in Bhutan (GDP per capita, $2,500) is comparable to that of many emerging and developed economies, whereas Nigeria (GDP per capita, $2,476) has some of the most frequent power outages of all countries.

Figure 1 Disruptions: One dot per country, using the most recent year for which data is available. The first and the second panel are based on firm-level data (Enterprise Surveys), aggregation to national level using stratification weights. The rightmost panel (Logistics Performance Index: Timeliness) plots a national indicator of transport reliability and thus an inverted measure for transport disruption frequency.



The causal mechanisms underlying Figure 1 are complex. Not only does resilient and effective public infrastructure wield first-order effects on firms' and thus national productivity. Conversely, GDP per capita, a proxy for income levels, is also an indicator for a range of factors which are likely to influence the quality of infrastructure. These factors include governance, public investments in infrastructure provision and maintenance, and others. The evidence presented in this section shows that the quality of infrastructure is heavily dependent on the transparency and governance standards of a country's public sector.

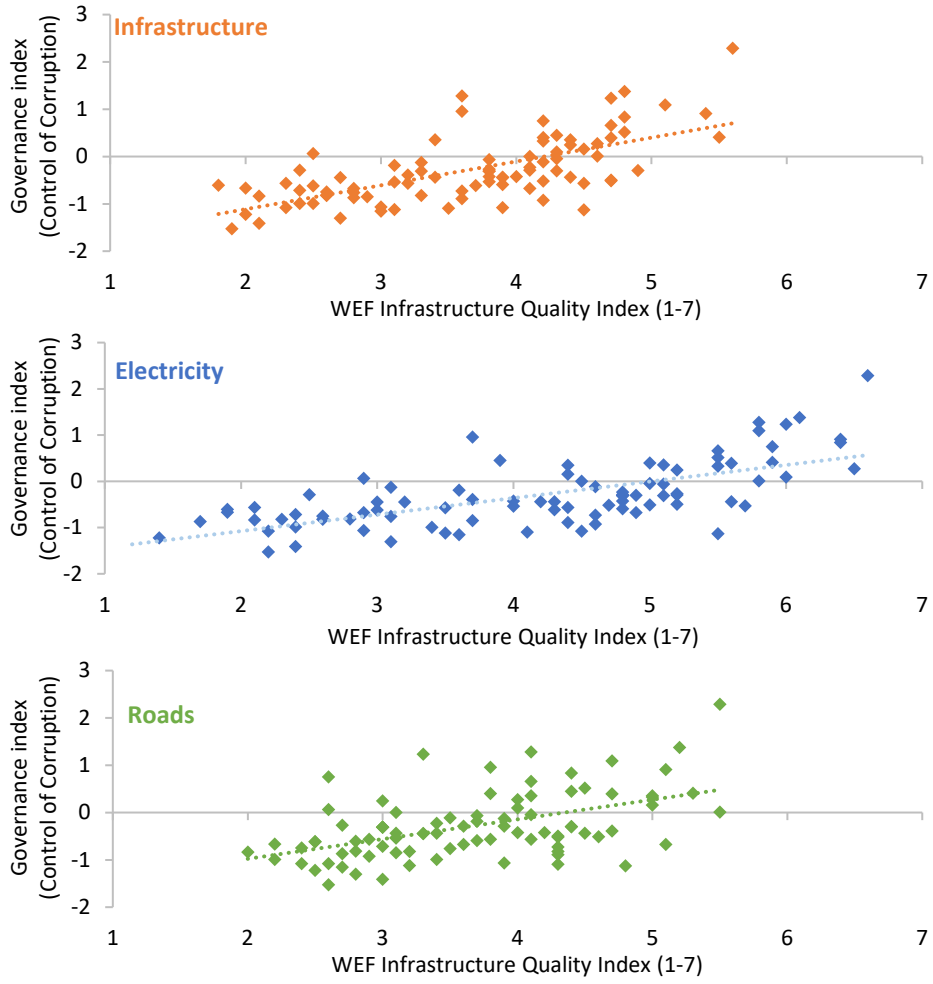
A government's ability to provide reliable, effective, and high-quality infrastructure will depend on whether it has effective systems in place to implement, finance, manage, and maintain infrastructure assets. Strong institutions, clear assignment of responsibilities, and transparent and reliable financing mechanisms are all crucial to ensuring the effective provision of public services (Acemoglu, 2005). More generally, the governance structures and accountabilities that determine infrastructure investments are crucial to ensure that resources are spent effectively and indeed deliver the services that people rely upon.

In principle, governance describes the processes and actors, such as government, economic forces, and civil society, that result in decision-making that is collectively binding in a society (van Asselt & Renn, 2011).

The Worldwide Governance Indicators (WGI) by the World Bank (2017) offer a consistent and quantifiable measure of governance standards. These indicators report estimated governance standards for over 200 countries and territories along six dimensions: (i) voice and accountability, (ii) political stability and absence of violence, (iii) government effectiveness, (iv) regulatory quality, (v) rule of law, and (vi) control of corruption. For each country, these governance indicators reflect surveys of a large number of enterprises, citizens, and experts, based on over 30 individual data sources.

To illustrate the correlation between infrastructure quality and governance, Figure 2 presents the relationship between the WGI sub-index on corruption, in comparison to the Infrastructure Quality Index of the Global Competitiveness report (WEF, 2018). The same positive correlation between corruption and infrastructure quality can be observed for infrastructure in general, electricity, and roads. Similar patterns can be observed for different WGI sub-indices.

Figure 2 Infrastructure quality correlates strongly with governance standards. The WEF Infrastructure Quality Index ranks countries on a scale from 1 (worst) to 7 (best). (Data source: WEF, 2018)



Governance standards determine the volume and effectiveness of infrastructure spending

Increasing resilience in the face of natural shocks can be achieved by investing in new or improved infrastructure. The effectiveness of such public infrastructure expenditure crucially depends on, amongst other important factors, the quality of governance in a given country.

When governance standards are high, evidence suggests that authorities may be more inclined to allocate significant funding to the installation and maintenance of infrastructure. For instance, Arimah (2005) finds that municipal infrastructure spending is positively correlated with increased control of corruption in a set of 114 cities in Africa, Asia, Latin America, the Caribbean, the Middle East, and economies in transition. The study suggests that exercising strong control over corruption has the highest impact on infrastructure expenditure in African and Asian cities.

However, while significant resources are spent on the upgrading of roads, electricity systems, water, sanitation, and ICT systems, not all public expenditure necessarily translates into better service quality for infrastructure users, i.e. firms and households. “White elephant” investments are one such example: Without transparent decision-making processes and financing frameworks, large investment projects may be adopted that are considered prestigious or satisfy influential interest groups, but that do not deliver sufficient benefits to justify their costs. In such a context, improving governance in the form of greater accountability can provide an effective way to achieve better infrastructure investments (Flyvbjerg, 2009). Another implication of inadequate expenditures in transport infrastructure is that women and disabled persons face numerous restrictions to their intraurban movements. For example, the design of public transportation systems often assumes male labor patterns, prioritizing travel to and from periurban areas and city centers during “peak hours.” This factor neglects women’s engagement in domestic, informal, and part-time work in zones out of the city center, nonpeak journeys, and the disproportionate household and care burdens that require “trip chaining”—multipurpose, multistop excursions (Boulin 2006; Kunieda and Gauthier 2007; Levy 2013a, 2013b; Schmink 1986; UN-Habitat 2009).

Therefore, good governance may not only increase infrastructure investment volumes, but more importantly may also improve the effectiveness of infrastructure spending. Rajkumar & Swaroop (2008) use data from 91 countries and three years between 1990 and 2003 to investigate the relationship between governance and public expenditure into education and health. They find that public spending is significantly more effective when an index of corruption within the political system is lower and an index of the quality of a country’s bureaucracy is higher. If this result is to be extended to infrastructure investments, infrastructure spending would be more effective in delivering high service value to users if governance standards are high. Indeed, in an analysis of infrastructure in Latin America and the Caribbean, Cerra et al (2016) reach the diagnosis that fiscal policy and strong institutions are crucial for improving countries’ infrastructure networks.

3. What can be done to improve infrastructure reliability?

And more precisely, to what extent better governance can improve the efficiency of infrastructure spending? Analysis of government expenditures in electricity, water and transport assets in conjunction with their quality in a large panel of country suggests that infrastructure quality is strongly linked to indicators of good governance, as well as to the attention to the trade-off between investment and maintenance.

3.1. Investing in infrastructure is important, but what matters is to spend it well

Data on infrastructure investment and maintenance are difficult to obtain. Few fiscal authorities disclose granular expenditure data and if so, they often lack common or harmonized public accounting standards, such that specific infrastructure expenditure items can be mixed with other expenditure types. Especially in developing countries the level of transparency varies, and more generally the definition of – for instance – "infrastructure maintenance" spending differs. Moreover, the sectoral disaggregation of public spending data is difficult due to the organization of public budgets – including distribution across federal and regional entities -- thus making it difficult to distinguish public spending on water, electricity or transport infrastructure respectively. Rather than relying on nationally published budget figures, we tap two international sources of investment data in order to compile a consistent panel of public transport expenditure.[2]

From the OECD International Transport Forum database we obtain transport infrastructure investment spending for 57 middle and high income countries, covering the time from 1995 to 2016 (OECD, 2018). This is complemented by public infrastructure investment data from the World Bank's BOOST initiative, available through the Open Budgets Portal (World Bank, 2018b). Together, these yield a panel of 603 individual country-year observations from 85 countries, covering all income groups.[3]

In addition, information on the reliability of the transport infrastructure is proxied by a measure of the quality of logistic services provided by the Logistics Performance Index (LPI), a benchmarking tool created to help countries identify the challenges and opportunities they face in their performance on trade logistics (World Bank, 2018a). The LPI 2018 allows for comparisons across 160 countries, and offers country specific scores along six dimensions: (i) customs, (ii) infrastructure, (iii) international shipments, (iv) logistics competence, (v) tracking and tracing, and (vi) timeliness. The infrastructure sub-indicator aggregates a quality scoring of ports, railroads, roads, and information technology. The timeliness sub-indicator measures reliability rather than quality per se. By scoring timeliness of shipments in reaching destination within the scheduled delivery time, this sub-indicator is a measure of unexpected transport disruptions – rather than the average performance. All LPI indicators are scored on a scale from 1 (worst) to 5 (best).

The resulting country-year panel allows us to exploit dynamic and cross-sectional variation to relate infrastructure spending to the quality of transport infrastructure, while controlling for all major confounders. Specifically, we conduct pooled Ordinary Least Squares regression analysis, including country-level fixed effects and clustering standard errors at the country level. In our main specification, the LPI Timeliness sub-indicator is regressed on the logarithm of per capita public road spending (including both maintenance and investment) and a series of control variables.[4] Control variables include population density, urbanization, GDP growth and governance indicators.

Annex A.1 presents estimates for the main model and variants thereof. The spending coefficient turns out significant and – like other controls -- shows the expected signs and a reasonable magnitude; the goodness of fit measure obtains as $R^2 = 71\%$.[5] However, the key result emerges by toggling the governance control: Increasing public road spending improves transport reliability significantly –only if governance standards are strengthened at the same time. That is, fixing governance by introducing the corresponding control

[2] Unfortunately, data on other infrastructure types are too sparse for systematic empirical analysis.

[3] The sample is reduced to 313 country-year observations, when controlling for disaster events.

[4] The results are robust to using alternative dependent variables, including the LPI:Overall or LPI:Infrastructure indicators.

[5] When introducing additional controls for disaster events, the overall fit as well as point and error estimates remain largely unaffected.

variable, the spending coefficient collapses, becoming undistinguishable from zero. Statistically, the interaction is driven by a positive correlation between spending and governance quality, aligning with what has been documented in the literature.

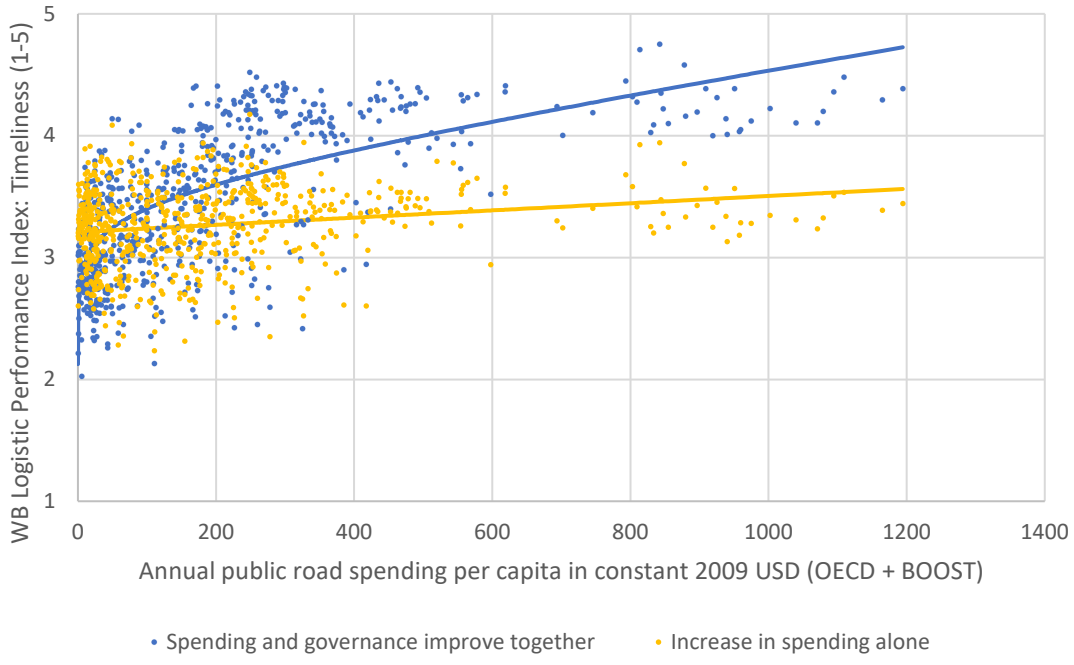
Quantitatively, these effects are considerable. Doubling spending is estimated to significantly increase transport infrastructure performance as measured by the LPI:Timeliness by roughly 0.27 index points. For example, this corresponds to improving the transport service reliability of Mozambique to that of Cambodia. However, keeping governance fixed statistically, the effect on transport reliability of one additional dollar of public spending is reduced by a factor of 6 Evaluating effect sizes through standardized coefficients reveals that governance quality actually explains the bulk of statistical variation in transport reliability.

In other words, increasing spending and improving governance in parallel enhances transport system performance on average 6 times faster than increasing spending alone. Figure 3 illustrates the strength of this interaction, i.e. how the marginal effect of public road spending per capita melts once governance quality is taken into account. Statistically, results suggest that only about 8% of variation in transport reliability may be explained by investment spending, while about 44% is explained by a country's governance quality.

Apart from that, population density and high rates of urbanization are significantly associated with better transport infrastructure resilience while dynamic economies, as measured by GDP growth, show more transport service irregularities.

To conclude, various empirical specifications, across infrastructure types, suggests that governance quality is a major determinant of infrastructure quality. Often enough, it outweighs the relevance of natural risk or socio-economic factors.

Figure 3: Relation between transport resilience and public road spending per capita



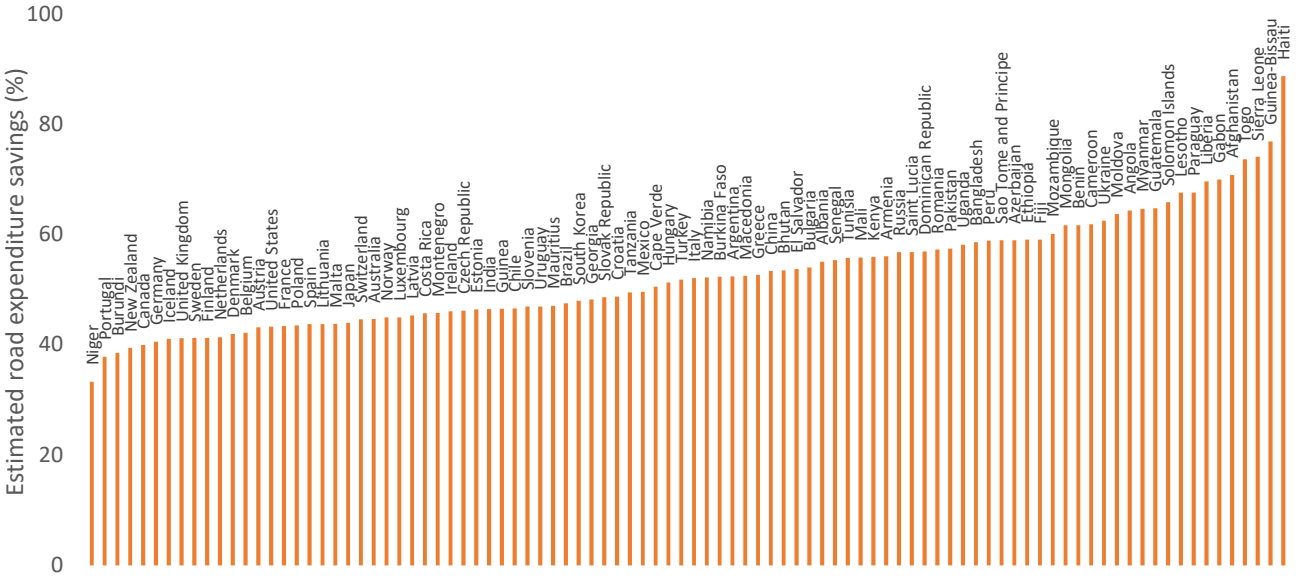
3.2. What is the cost of bad governance?

Building on the empirical model described above, this section estimates fiscal savings from governance reforms lifting the effectiveness of public spending. Specifically, we assess by how much public spending can be reduced while maintaining transport reliability given a certain increase in governance quality.

We benchmark an *effective but feasible governance reform* as follows. 10% of all the sample's country-year observations exhibit at least a +0.23 index points increase of the WGI "Government Effectiveness" over a three-year period (e.g. Ecuador 2010-13, Egypt 2006-09). Thus, +0.23 might be regarded as exceptional but feasible reform result. By hypothetically implementing similar reforms in each and every country at the current edge of the data, the model allows to compute by how much public transport infrastructure spending could be reduced without harming transport service quality.[6]

According to the model, savings from improved governance – illustrated in Figure 4 – are substantial. Improving governance as effectively as Ecuador did between 2010 and 2013 allows to cut expenditure by 30 % to 90 %. Relative savings are the highest for countries with poor governance quality but relatively high levels of per capita spending.

Figure 4: Potential road spending savings from governance reforms



Apart from inflating costs, poorly governed infrastructure investments can also have negative impacts on people's well-being and on important policy objectives. Construction of infrastructure can force people to move, lose their livelihood, and generally see their well-being suffer. Fossil fuel power plants and roads and highways contribute to harmful air quality and greenhouse gas emissions. Construction of transport infrastructure (roads, railways, airports, ports, and inland waterways) can have negative impacts on ecosystems and biodiversity and facilitate the overexploitation of natural resources. While not all of these

[6] Specifically, we modify the model of the previous section by interacting log per capita road spending with "Government Effectiveness". This is necessary to generate meaningful variation across countries, which the model shown in the appendix cnnot: Due to linearity, a +0.23 increase in governance would yield the exact same spending decrease in each and every country. An interaction term provides sufficient non-linearity to capture heterogeneous effects across countries.

adverse effects can always be avoided, strong governance is critical to ensure that their potential consequences are minimized.

3.3. The investment-maintenance trade-off

While governance and spending appear to be strong complements, investment and maintenance spending are substitutes when it comes to infrastructure quality. That is, whatever the level of institutional quality, fiscal authorities have to allocate financial funds optimally between new projects and maintaining existing infrastructure. This matter has received increased attention in high governance countries and OECD data allows us to explore this trade-off for the case of transport infrastructure in 40 countries (and 292 country-year observations).

We investigate the substitutability of maintenance and investment spending using a second-order trans-log production function for transport quality. The LPI:Infrastructure index is taken to measure the latter, maintenance and investment spending enter in logs and per capita terms. The trans-log model includes controls on governance quality, total GDP, baseline demographics, the output gap and is fitted using pooled OLS.

The overall fit of the model is impressive. Investment and maintenance variables alone, including second order terms and an interaction, explain more than 50% of the cross-country variation. This further increases to 82% when controls are introduced. With the estimated model coefficients at hand, it is straightforward to compute marginal rates of substitution between maintenance spending and investment using country-specific data.

Figure 5: Build or repair? Marginal Rate of Substitution between public road maintenance and investment spending. The red line marks the 1:1 ratio; e.g. economies above could save road investment coasts by shifting funds towards maintenance. (based on OECD road spending data)

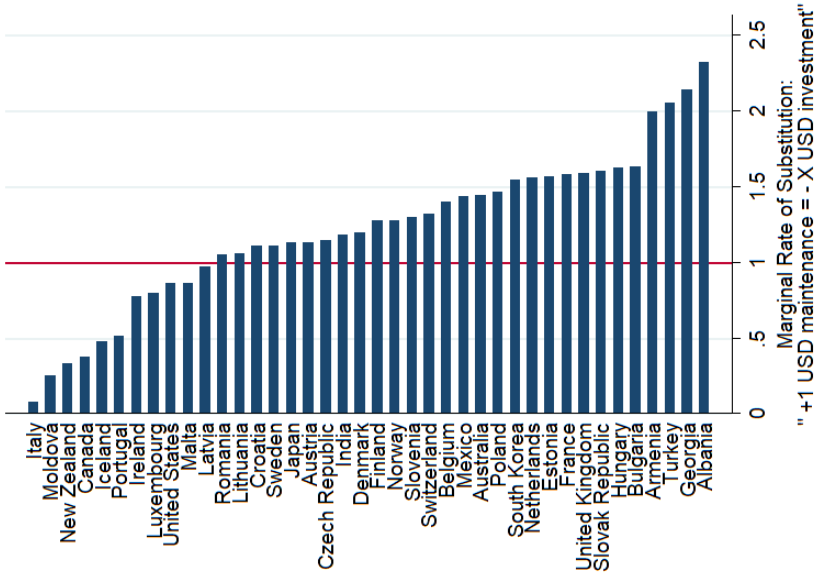


Figure 5 shows country-specific marginal rates of substitution (MRS), that is how much investment could be saved relative to a marginal increase in maintenance spending while leaving overall infrastructure quality unchanged. Importantly, for most economies the MRS is larger than one, implying that investment funds could be more productively used for maintenance purposes in those economies. Thereby, overall road infrastructure spending could be reduced without loss of transport service quality. In only a few

countries, the MRS is smaller than unity, most notably in Italy, where however the budget is more skewed towards maintenance.

4. Conclusion

Reliable infrastructure, critical for businesses effective operation and household welfare, does not only rely upon government expenditure: governance matters. Indeed, high levels of governance —e.g. low corruption or high government effectiveness — are associated with high quality of electricity, water and transport networks.

This link between governance and infrastructure reliability provides a new lever for improving infrastructure. By ensuring better accountability and limiting flawed investments, infrastructure networks can be improved in the medium term without inflating fiscal budgets. We even find that improving governance as effectively as for example Ecuador did between 2010 and 2013 — what we define as exceptional but feasible governance reform — would allow to cut public expenditure by 30 % to 90 % in the transport sector, with highest savings for countries with poor governance quality but relatively high levels of per capita spending.

Wise budget allocation is another expression of good governance and participate in improving the overall infrastructure resilience. In most countries, maintenance of infrastructure assets is disregarded, due to lack of monitoring or because investments in new projects are more visible and therefore may serve electoral purposes. However, for most economies included in our analysis, we find that investment funds could be more productively used for maintenance purposes than if invested in infrastructure expansion. Thereby, overall road infrastructure spending could be reduced without loss of transport service quality.

In summary, meeting international and domestic policy objectives in terms of infrastructure quality and inclusion requires more than just investing in any infrastructure. It requires investing in the right type of infrastructure and taking into account a wide range of considerations and objectives.

References

Acemoglu, D (2005). Politics and Economics in Weak and Strong States. Journal of Monetary Economics, 52, 1199–1226. https://doi.org/10.1016/j.jmoneco.2005.05.001

Arimah, B. C. (2005). What Drives Infrastructure Spending in Cities of Developing Countries? *Urban Studies*, *42*(8), 1345–1368. https://doi.org/10.1080/00420980500150680

Boulin, J.-Y. (2006). *Local Time Policies in Europe*. *Gender Divisions and Working Time in the New Economy*. Edward Elgar Publishing. Retrieved from https://ideas.repec.org/h/elg/eechap/3591_12.html

Cerra, V., Cuevas, A., Goes, C., Karpowicz, I., Matheson, T., Samake, I., & Vtyurina, S. (2016). Highways to Heaven: Infrastructure Determinants and Trends in Latin America and the Caribbean. *IMF Working Paper*, *16*(185), 40. https://doi.org/10.1089/cap.2006.16.671

Fay, M., Hallegatte, S., Vogt-Schilb, A., Rozenberg, J., Narloch, U., & Kerr, T. (2015). Decarbonizing Development: Three Steps to a Zero-Carbon Future.

https://doi.org/10.1017/CBO9781107415324.004

Flyvbjerg, B. (2009). Survival of the unfittest: why the worst infrastructure gets built—and what we can do about it. *Oxford Review of Economic Policy*, *25*(3), 344–367. https://doi.org/10.1093/oxrep/grp024

Government of Fiji & World Bank. (2017). *Climate vulnerability assessment : making Fiji climate resilient*.

Kunieda, M., & Gauthier, A. (2007). Gender and Urban Transport: Smart and Affordable. *GTZ: Eschborn*. Retrieved from http://www.sutp.org

Levy, C. (2013a). Transport, Diversity, and the Socially Just City: The Significance of Gender Relations. *DPU,UCL & Universidad Nacional de Colombia (Medellín Campus)*, *Urban Mobi*.

Levy, C. (2013b). Travel choice reframed: "deep distribution" and gender in urban transport. *Environment and Urbanization*, *25*(1), 47–63. https://doi.org/10.1177/0956247813477810

OECD. (2018). International Transport Forum - OECD.Stat. Retrieved February 11, 2018, from https://stats.oecd.org/

OECD (2019), Infrastructure investment (indicator). doi: 10.1787/b06ce3ad-en (Accessed on 06 June 2019)

Rajkumar, A. S., & Swaroop, V. (2008). Public spending and outcomes: Does governance matter? *Journal of Development Economics*, *86*(1), 96–111. https://doi.org/https://doi.org/10.1016/j.jdeveco.2007.08.003

Rentschler, J., Kornejew, M., Hallegatte, S., Obolensky, M., & Braese, J. (2019). Underutilized potential: The business costs of unreliable infrastructure in developing countries. *World Bank Policy Research Working Paper*.

Schmink, M. (1986). The "Working group" approach to women and urban services. *Women and Space in Human Settlements*. Athens Center of Ekistics. https://doi.org/10.2307/43621947

UN-Habitat. (2009). *Planning sustainable cities : global report on human settlements 2009*. Retrieved from https://unhabitat.org/books/global-report-on-human-settlements-2009-planning-sustainable-cities/

van Asselt, M. B. A., & Renn, O. (2011). Risk governance. *Journal of Risk Research*, *14*(4), 431–449. https://doi.org/10.1080/13669877.2011.553730

WEF. (2018). *The Global Competitiveness Report 2017-2018*. Cologny: World Economic Forum.

World Bank. (2017). Worldwide Governance Indicators (WGI). Retrieved from http://info.worldbank.org/governance/wgi/#home

World Bank. (2018a). Logistics Performance Index. Retrieved from https://lpi.worldbank.org/

World Bank. (2018b). Open Budgets Portal - BOOST initiative. Retrieved February 11, 2018, from http://boost.worldbank.org/

Annex A.1 Determinants of disruptions: Country-level

Dependent:	Blackouts	Water disruption	LPI: Timeliness	LPI: Timeliness	LPI: Timeliness	LPI: Timeliness
Model variables	Baseline	Baseline	No governance, no spending	No governance	Baseline	With country FE
Output Gap *HP residual as % of HP trend*	-21.4333 *(21.6779)*	-21.1625 *(19.5278)*	0.0138*** *(0.0053)*	0.0075 *(0.0082)*	-0.0006 *(0.0066)*	-0.0093* *(0.0055)*
GDP Growth *annual, in %*	7.4593 *(7.2893)*	8.5404 *(6.0843)*	- 0.0128*** *(0.0033)*	-0.0160*** *(0.0041)*	-0.0065* *(0.0035)*	0.0014 *(0.0021)*
Electrification *% of population*	-2.8383 *(3.6982)*	-2.6508 *(2.1407)*	0.0003 *(0.0017)*	-0.0054* *(0.0030)*	-0.0020 *(0.0025)*	0.0012 *(0.0045)*
Water access *% of population*	-8.4012 *(7.0578)*	1.3151 *(1.8621)*	0.0070** *(0.0034)*	0.0077 *(0.0054)*	0.0016 *(0.0049)*	-0.0286* *(0.0169)*
Population *in mil*	0.8897** *(0.3648)*	-0.0201 *(0.0729)*	0.0001*** *(0.0000)*	0.0002 *(0.0002)*	0.0001 *(0.0002)*	-0.0038 *(0.0033)*
Population density *in 1/km^2*	-0.1565 *(0.1601)*	-0.1126 *(0.0873)*	0.0006*** *(0.0001)*	0.0005*** *(0.0001)*	0.0004*** *(0.0001)*	0.0015 *(0.0014)*
Urbanisation *% of population*	4.8294 *(4.9504)*	2.7502 *(3.5266)*	0.0088*** *(0.0019)*	0.0104*** *(0.0025)*	0.0045* *(0.0027)*	0.0369 *(0.0354)*
WGI: Government Effectiveness *Index, standard normal*	-184.0429** *(79.3588)*	-27.6857 *(42.7362)*			0.3525*** *(0.0435)*	0.2625* *(0.1342)*
Public road spending *per capita, in constant 2009 USD, log*				0.1574*** *(0.0291)*	0.0384 *(0.0262)*	0.0315 *(0.0339)*
Country FE						YES
N (country-years)	207	207	1233	556	556	556
R^2	0.18	0.05	0.45	0.60	0.71	0.91

Estimated with OLS. Standard errors in parenthesis, clustered on countries. Public road spending includes both investment and maintenance expenditures. Significance levels: *** 0.01, ** 0.05, * 0.10.