Capacity Pricing Schemes to Implement Open-Access Rail in Tanzania

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Motivation

Tanzania

1. Tanzania's government committed to the implementation of one of the first open-access railway systems in the world in 2013
2. The government's objective is twofold: a) ensure that efficient companies can access the infrastructure and operate trains, and b) provide resources through access charges to keep the system operative in the future

International

1. In the last 15 years, the use of shared and open-access railway systems has been proposed to improve infrastructure utilization and increase efficiency in the industry
2. The use of infrastructure by multiple companies requires coordination between the infrastructure manager and the train operators

Objectives

The objective of this research is to understand the implications of capacity pricing schemes designed to recover maintenance and financial infrastructure costs and to ensure that train operators can viably operate (positive profits) for different stakeholders in Tanzania
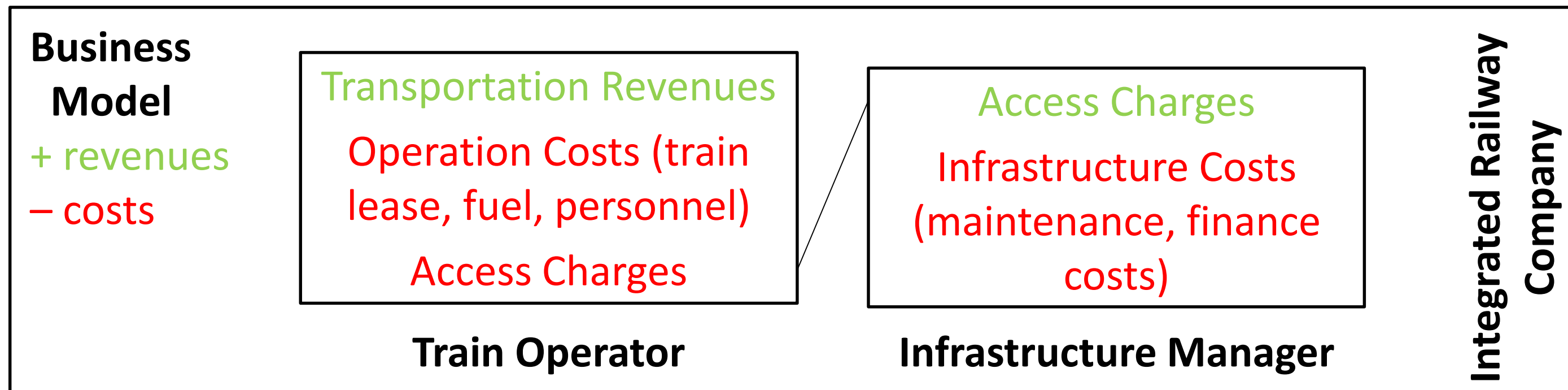
Capacity Pricing Schemes

This research considers two main price-based capacity pricing schemes (Gibson, 2003)

1. Variable access charges   *(i.e. $0.01 per ton-km operated on the infrastructure)*
2. Fixed access charges   *(i.e. $10.5million annual lump sum to operate)*

Model

We use a financial model developed following (World Bank, 2014) to determine the annual operating margin and cash flow for separated and integrated railway companies.

Business Model
+ revenues
− costs

Train Operator:
- Transportation Revenues
- Operation Costs (train lease, fuel, personnel)
- Access Charges

Infrastructure Manager:
- Access Charges
- Infrastructure Costs (maintenance, finance costs)

Integrated Railway Company

*Due to the strong competition from trucks, railway companies have low control over the shipping rate and the demand that would likely shift to rail.

Generalizability

Tanzania's railway system provides a useful case to illustrate multiple important concepts to be considered when implementing a pricing scheme in more complex railway systems

Tanzania's rail system characteristics:

1. Focus on freight traffic
No analysis of passenger services
2. Independent corridors
No network effects
3. No capacity constraints
Every operator should have access
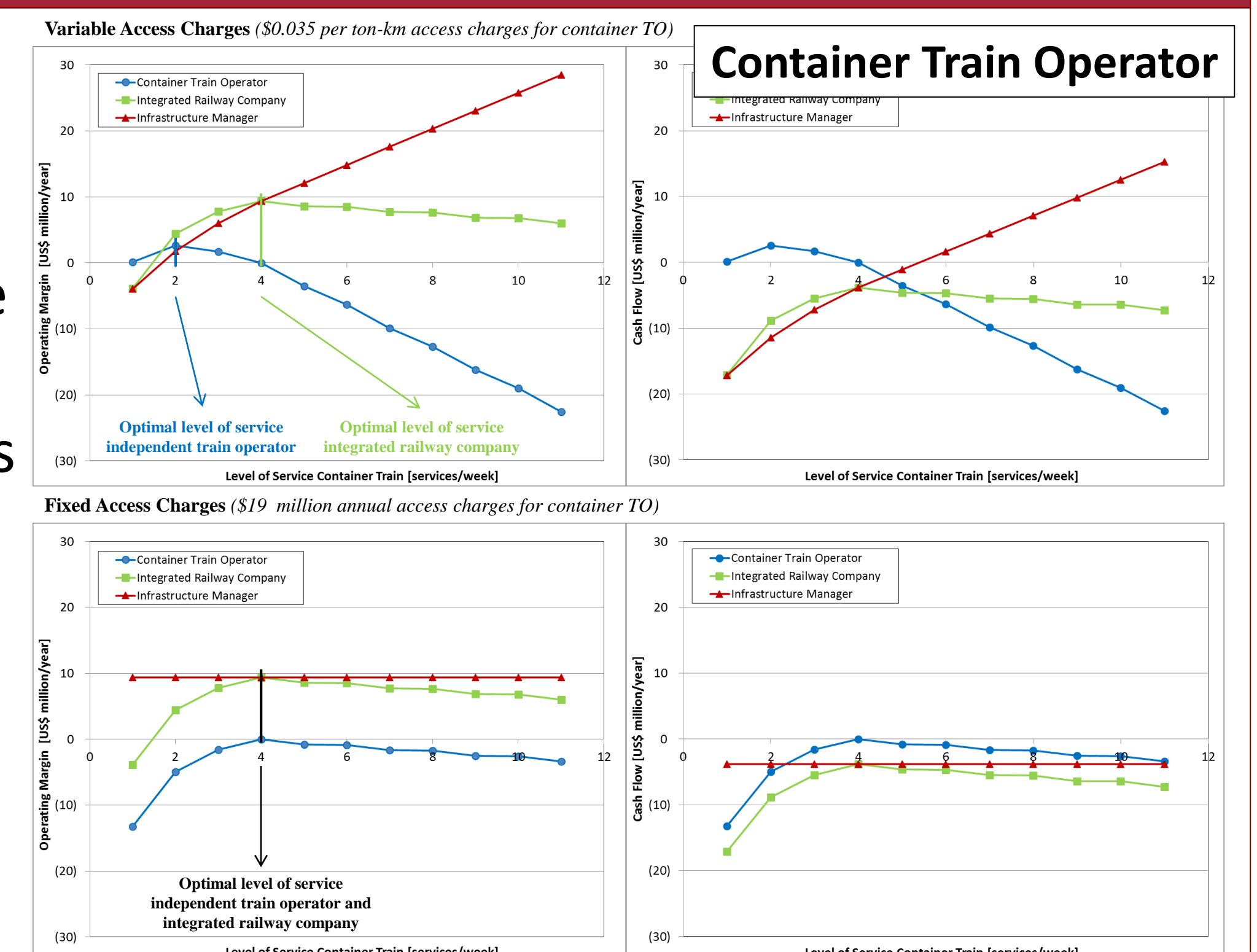4. Limited institutional capacity
Need for simple pricing schemes

Image source: (World Bank, 2014)

Results

Results show that train operators have incentives to operate fewer trains than integrated companies with variable access charges because infrastructure costs are perceived as variable costs

Variable Access Charges ($0.035 per ton-km access charges for container TO)

Container Train Operator

Fixed Access Charges ($19 million annual access charges for container TO)

Container and General Cargo Train Operators

Variable Access Charge ($0.02 and $0.01 per ton-km access charges for container and general cargo TOs respectively)

Fixed Access Charges ($12.4 million and $10.5 million annual access charges for container and general-cargo TOs respectively)

Legend
CTO - Container Train Operator / GTO - General-Cargo Train Operator
IM - Infrastructure Manager / IRC - Integrated Railway Company
Equilibrium / Social Optimum / Infeasible

It is also shown that in Tanzania it is not possible to recover infrastructure costs with only one type of train operators and viable access charges

Different combinations of fixed track access charges for container and general cargo train operators would improve level of service with respect to variable charges while enabling infrastructure cost recovery

Conclusions

1. The use of variable access charges widely used in the railway industry may create incentives for rational train operators to operate fewer trains than an integrated railway company (social planner).
2. Regulators need considerable information about the sector to determine adequate access charge levels that train operators can viably pay
3. Discriminate pricing may be needed to be able to recover infrastructure costs when different types of train operators face very different levels of cost and revenues

4. The use of fixed access charges aligns the behavior of vertically separated firms with the behavior of an integrated railway company
5. The level of service offered by TOs is robust for a wide range of fixed access fees, thus relaxing the regulator needs of information
6. Different fixed access charges can be designed by the regulator with different objectives.

References

Gibson S. (2003), Allocation of capacity in the railway industry, *Utilities Policy*, 11
World Bank (2014), *Project Appraisal Document for Intermodal and Rail Development Project*, (U.S.: The World Bank Group)

Acknowledgements