LEVERAGING EXTRACTIVE INDUSTRY INFRASTRUCTURE INVESTMENTS FOR BROAD ECONOMIC DEVELOPMENT: REGULATORY, COMMERCIAL AND OPERATIONAL MODELS FOR RAILWAYS AND PORTS

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About the VCC

Since early 2010, the Vale Columbia Center on Sustainable International Investment (VCC) has been tackling the challenge of using extractive resources to propel sustainable development for resource-rich but cash-poor countries. A joint center of the Earth Institute and Columbia Law School, the VCC brings law, economics, environment and development practice perspectives together for a holistic and interdisciplinary view to this persistent challenge.

The project for this working paper, arose out of VCC work performed in Mozambique that identified the potential for and limitations of leveraging extractive industry investments for regional economic development and diversification.[1]

Rationale

The core of this research agenda relates to finding ways to leverage extractive- industry-related infrastructure investments in developing countries for the broader benefit of the national and regional community. According to the Africa Infrastructure Country Diagnostic conducted by the World Bank, Africa faces an annual infrastructure funding gap of US$31 billion; leveraging extractive-industry-related investment could help fill this gap. The World Bank estimates that African investment needs in infrastructure would cost US$93 billion per year, half of which is for the power sector, followed by water and transport.[2] The current level of spending is US$62 billion; the highest sector spending is in transport, followed by telecommunications and energy.[3]

To be beneficial for a country's development, non-renewable resource extraction needs to be leveraged to build long-term assets, such as infrastructure, that will support sustainable and inclusive growth. It can be for instance by capitalizing on the resource taxation potential and reinvesting the tax revenues in all-weather roads but it can also be by requiring shared use of the resource infrastructure.

However, natural resource concessionaires have traditionally adopted an enclave approach to infrastructure development, providing their own power and transportation services to ensure that the basic infrastructure needed for their operations is reliably available.[4] Hence, large investments in physical infrastructure are often uncoordinated with national infrastructure development plans. The country therefore misses the opportunity to promote shared use of the

[1] Vale Columbia Center for Sustainable International Investment, Zambezi Valley Development Study, available at: http://www.vcc.columbia.edu/content/zambezi-valley-development-study.

[2] C. Briceño-Garmendia, K. Smits, V. Foster, "Financing Public Infrastructure in Sub-Saharan Africa: Patterns, Issues, and Options," Africa Infrastructure Sector Diagnostic Background Paper No. 15 (Washington D.C.: The World Bank, 2008).

[3] V. Foster, C. Briceño-Garmendia, eds., *Africa's Infrastructure: A Time for Transformation* (Washington, D.C.: The World Bank, 2010).

[4] See H. Singer, "The distribution of gains from trade and investment—revisited," 11(4) *Journal of Development Studies* 376 (1975), pp. 376–382.

infrastructure and to take advantage of potential synergies. Shared use with both mineral and non-mineral users (such as agriculture and forestry) should be beneficial for Africa: with the former for reasons of scale economies and with the latter for reasons related to diminishing the cost of transportation on long haul that right now impedes the potential of the cost-sensitive commercial agriculture.

As the World Bank's report on Liberia states: "the interface with national infrastructure planning is not well developed (…) the contracts do not give the sense of the concessionaires operating within or accommodating themselves to a pre-existing national plan."[5]

If companies and Governments consider the potential shared use through expansion of the private sector's planned investments at the design phase, then the incremental capital cost on the economy and environment could be minimized while the impact on sustainable development is optimized. *This requires investigation of regulatory, commercial and operating models that facilitate wider use of mining investments beyond the needs of the mine operator for the broader benefit of the country.*

The potential of leveraging infrastructure investments in extractive industries for national and regional development is gaining prominence among policymakers. The World Bank, the African Development Bank and the African Union, along with various other development agencies, have endorsed the concept, recognizing that private sector involvement is required to meet the vast infrastructure funding gap in developing countries.[6]

This working paper aims to develop an economically, legally and operationally rational framework to enable shared use of resource-based infrastructure, which is critical for the integration and diversification of the economy.

Basic situation and definitions

Our starting point is a new mine development which requires new or upgraded rail and/or port infrastructure to reach export markets. While the need to leverage infrastructure investments applies to all types of assets (road, railways, ports, telecommunications, energy, waste water treatment facilities), this working paper only covers rail and ports. Key terms are defined as follows:

Infrastructure assets: the physical railway and/or port connecting the mine to the coastal loading point for export.

Infrastructure services: the rail freight carriage and/or ship loading/unloading using the *infrastructure assets*.

Mine investor: the party wishing to make the new mine development.

[5] World Bank, "Leveraging investments by natural resource concessionaires," Infrastructure Policy Notes, World Bank for the Republic of Liberia (Washington D.C.: The World Bank, 2011).

[6] See Masuma Farooki, "The infrastructure and commodities interface in Africa: Time for cautious optimism?," 24 *Journal of International Development* (2012), p. 216.

Shared use: the provision of *infrastructure services* to both *the mining investor* and other parties. These other parties can be either mineral users or non- mineral users.

Third party access*:* the provision of *infrastructure services* by a party other than the owner of the *infrastructure asset.*[7]

Research Questions

This working paper focuses on the following question: Which regulatory and commercial models best enable *shared use*?

- What are the main barriers currently hindering shared use?
- To what extent can these barriers be addressed through regulation?
    - What are the types of access regimes available?
    - Should the *infrastructure assets* be owned by a separate entity to the *mine investor*?
    - Would Government ownership of the *infrastructure assets* best preserve shared use/third party access?
    - What mechanism can be set to coordinate shared use among parties to maximize throughput when the mine owner does not own the entire rail-port logistic chain?
    - What legal requirements should apply to the owner of the *infrastructure assets*?
- What are the incentives to ensure that infrastructure assets are designed to sufficient capacity for public use or use by other mineral users?

Later research will seek to extend the analysis to other forms of infrastructure as well as to answer other operational implications of shared use, such as:

(1) What is the trade-off between maximizing operational efficiency of the mine investor and facilitating shared use?

- What is the loss in efficiencies due to shared use? Due to third party access?
- How to solve the operational complexity of having mixed use of minerals and non- minerals on the same line?
- To what extent does the primary owner need to be compensated for loss of efficiency where shared use or third party access is mandated?
- What should be the commercial terms for shared use?
- Who is responsible for providing compensation? What form should it take (higher access charges, Government subsidies)?

(2) Special case of land-locked countries: how can land-locked countries ensure shared use in neighboring-country ports? What commercial terms for their commodities can they require?

[7] The user of the services being then either the services provider or a customer of the services provider.

PRELIMINARY FINDINGS

Freight mode choice for mineral commodities

The transportation mode for commodities follows standard transport economics, where the ***value*** of what is being transported is related to the transport costs of the mode being used. Commodities strictly carried by rail have the lowest value per ton, while those carried by trucks tend to have a higher value.[8] For instance in 2002, freight carried by truck in the US was about 4 times more valuable than the freight carried by rail. [9]

The following table analyzes the total world production quantity and the value per unit of selected mineral commodities in the US, with the commodities listed in order of average price per unit, lowest to highest. We can see that on one hand, there are minerals like manganese, phosphate rock, coal or iron ore that are bulky and low-value commodities that are relatively well suited to be transported by rail, while on the other hand, commodities like gold or platinum are much higher in terms of value and not bulky.

Mineral	Unit	World Production (2010)[10]	Average price per unit (2010, in dollars)[11]
Manganese (gross weight)	1 metric ton	13,000,000	8
Bauxite, Alumina	1 metric ton	211,000,000	27
Phosphate Rock	1 metric ton	176,000,000	50
Iron Ore (usable)	1 metric ton	2,400,000,000	90
Coal	1 metric ton	7,243,779,430[12]	165[13]
Chromium (gross weight)	1 metric ton	22,000,000	230
Graphite (crude)	1 metric ton	1,100,000	667
Lead (contained)	1 metric ton	4,100,000	2,337
Copper (contained)	1 metric ton	16,200,000	7,694
Cobalt (contained)	1 metric ton	88,000	46,297
Diamond (natural industrial)	1 metric ton	11	1,050,000
Gold (contained)	1 metric ton	2,500	38,580,896
Platinum	1 metric ton	183	51,441,195

[8] "The Geography of Transport Systems," available at: http://people.hofstra.edu/geotrans/eng/ch3en/conc3en/valuetonusshipments.html

[9] U.S. Department of Transportation, Bureau of Transportation Statistics, based on data from the preliminary 2002 Commodity Flow Survey data, January 2004.

[10] 2010 world production figures for all commodities except coal, generally based on Platts Metal Week North American prices, see source for more pricing details, from U.S. Geological Survey, Mineral Commodities Summaries, annual, January 2011, available at: http://minerals.er.usgs.gov/minerals/pubs/mcs/

[11] 2010 average price per unit figures for all commodities except coal from U.S. Census Bureau, Statistical Abstract of the United States: 2012, Table 905, available at: http://www.census.gov/compendia/statab/2012/tables/12s0905.pdf

[12] "Total Primary Coal Production" from U.S. Energy Information Administration, "International Energy Statistics," available at: http://www.eia.gov/cfapps/ipdbproject/iedindex3.cfm?tid=1&pid=7&aid=1&cid=regions&syid=2010&eyid=2010&unit=TST

[13] Coal price information from "Global coking coal prices to rise sharply," available at: http://www.constructionweekonline.in/article-6329-global_coking_coal_prices_to_rise_sharply_crisil/

It is worth noting that a modern railcar has a gross capacity of about 125.5 tons in trains of 100 cars or more, resulting in a total carrying capacity of about 12,500 tons. An old train dating back to the 1950s, often still used in Africa, has a carrying capacity of 4,440 tons[14]. Based on these numbers and those of the table above, it appears that few commodities will generate enough demand for a single mine to afford and build railways dedicated to its own products. Although the table above does not present the bulk density of commodities, this is also another factor in commodity transport decisions[15].

Iron-ore and coal mines are typically the mines for which the challenges of shared use presented in this working paper are the most applicable. The mines targeted by this working paper are also far from the export point, since in addition to value, volume, or density, distance is another prominent factor in commodity transport decisions. Trucks are predominantly used for short trips. Also, some commodities have time constraints or service guarantees; for these commodities, trucks are typically preferred over rail due to speed, flexibility, and reliability.[16]

Key barriers to achieving shared use

Desktop research of mineral railways and port systems around the world shows the existence of several common barriers that hinder the incidence of shared use models in practice:

1. Monopolistic behavior by infrastructure owners who perceive shared use as a competitive threat;
2. Operating efficiency tends to decrease with more users on the system due to high coordination costs; hence, mine owners are reluctant to allow shared use. The case is worsened when railways are single-track;
3. Non-mineral users tend to be crowded out by mineral users, given that mineral carriage tends to be the most profitable use of the line as it is high volume but concentrated in a couple of mines. By contrast, non-mineral users are generally low volume and dispersed, making shared use uneconomic;
4. Mine investors generally have little incentive to construct assets with greater capacity than their mine's production;
5. Even where regulations mandate shared use or third party access, Governments faced with monopolistic structures rarely have the bargaining power or the willingness to impose such terms, and seldom is there an efficient statutory access regime to refer to to regulate the monopolies;
6. Finally, weakly drafted contractual language between states and private investors has proved ineffective in ensuring shared use or third party access, particularly when the designated infrastructure such as railways is capacity constrained.

[14] "Railway Capacity Background & Overview," available at: http://www.quorumcorp.net/Downloads/Papers/RailwayCapacityOverview.pdf

[15] Copper, for instance, takes on varying values of bulk density, depending on how the commodity has been handled. Copper concentrate, with about 25-35% copper along with various sulfides of copper and iron, has been shown to have a bulk density of about 35 (pounds per cubic foot). However, copper fines that have undergone a refining process, have a bulk density of about 101 (pounds per cubic foot) see for instance "Bulk Density and Gravity Chart," available at: http://www.asiinstr.com/technical/Material_Bulk_Density_Chart_C.htm . The significant increase in bulk density after refining may make it reasonable to use rail transport later in the copper production process, whereas it may not have made sense in the earlier stages of mining and smelting.

[16] "Analysis of Freight Movement Mode Choice Factors," The Center for Urban Transportation Research at the University of South Florida, p.8, available at: http://www.dot.state.fl.us/rail/Publications/Studies/Planning/ModeChoiceFactors.pdf.

Key recommendations to promote shared use

To promote effective shared use, each of the barriers described above must be mitigated to the extent possible. Our analysis of case studies covering mineral railways and ports in the United States, Australia, Africa (South Africa, Zambia, Burkina Faso, Cameroon, Ivory Coast, Guinea, and Madagascar), Brazil and India suggests the following recommendations:

1. Create a structural barrier to monopolistic behavior by a) either separating ownership of mine, rail and port assets; or b) considering a Government's golden share in the project when Government's monitoring mechanisms are efficient;
2. To maximize throughput and economic efficiency along the supply chain, a) develop an effective coordination mechanism in a non-fully integrated situation, b) require a double-track system in all situations;
3. Apply regulation related to shared use so as to ensure financially sustainable models: freedom to set tariffs, a last resort arbitration mechanism, take or pay contracts; and specifically to shared use with general cargo :subsidies, cross-subsidization and open-access service roads;
4. Require the mine owner to build infrastructure with excess capacity, and consider various financing options for this excess capacity;
5. Carefully draft legal provisions mandating shared use which are clear, precise, based on objective criteria and simple to adjudicate, with a clear legal remedy for their breach, and access to a forum for resolving disputes.

We will now consider each of these recommendations in turn. Some of these recommendations can be mutually exclusive (such as #1 and #4) and therefore constitute different alternative solutions to the problem.

Recommendation One: Create a structural barrier to monopolistic behavior by a) either separating ownership of mine, rail and port assets; or b) consider a Government's golden share in the project when Government's monitoring mechanisms are efficient

Any railway-port system exhibits natural monopoly features: constructing the asset involves high fixed costs, which are usually sunk, while there are relatively low operating costs. As a result, the marginal cost is much below the average cost and both decline as output expands. [17] It causes a problematic economic situation where prices cannot be set at the marginal cost as required by social efficiency because "for an activity to be commercially viable, prices must be at least equal to the average cost." [18] In this situation, introducing competition will be wasteful if duplicative facilities are constructed and the lowest possible average cost[19] cannot be achieved. In other words, it is generally most efficient for one firm to supply all of the market's demand.

[17] Higher costs will result if more than one producer supplies the market, as each producer will have to spread its fixed costs over smaller output volumes.

[18] Paul Collier, "Building an African infrastructure," 48 (4) *Finance & Development* (2011), available at:http://www.imf.org/external/pubs/ft/fandd/2011/12/collier.htm

[19] In the case of monopolies, the average cost is already above the marginal cost and only the marginal cost is socially efficient (affordable by a maximum of users).

Under such circumstances, however, a policy of awarding a monopoly concession in order to minimize costs may result in exclusive access or monopoly pricing for railway and port infrastructure services, especially if the concession is awarded to a mining company. Indeed, mines use rail and ports as part of an integrated mine-rail-port production system which is a source of great competitive advantage; allowing shared use of the rail or port assets is seen by the mine investor as providing an advantage to potential competitors, in addition to generating high coordinating costs.

The reluctance of mine investors who also own rail and port infrastructure to allow shared use has clearly been visible in the Pilbara iron ore region of Western Australia (see Box 1).

Box 1: The Pilbara iron ore region: monopoly effects on competition

The Pilbara region has immense iron ore deposits, but they are located at some distance from the sea, and constructing a new railway and port facility is a massive capital undertaking. This capital cost is a large barrier for potential new entrants. For this reason, the two companies (BHP Billiton and Rio Tinto) that separately own the existing rail /port lines have dominated the industry. Indeed, the only way junior miners had been able to obtain access to the railways and ports controlled by BHP Billiton or Rio Tinto in the past had been by selling part of the project to those companies in exchange for use of their rail.[20]

This duopoly was challenged in court in the early 2000s when Fortescue Metals Group (FMG) sought to enter the market, having acquired large, attractive mining leases in the region. In 2004, FMG requested access by filing a complaint before the Australian Competition Tribunal under the Trade Practices Act of 1974 (now replaced by the Competition and Consumer Act of 2010). The Australian Competition Tribunal refused. The case has been appealed and a final decision is expected by next year. In other terms, FMG's third party rail access claims have been largely unsuccessful, despite the existence of State and Federal laws promoting third party access. BHP Billiton and Rio Tinto strongly resisted open access. Although they primarily cited operational efficiency grounds that the Tribunal concurred with (the Tribunal explained that access would induce the owner to incur significant costs, including logistical and commercial constraints, constraints on expansion plans and delays due to the change in operating practices, all of which would lead to lost export revenues for the nation[21]), the desire to prevent competitors from entering the market was also a potential factor.[22] Ultimately, FMG had to build its own railway and port infrastructure at a cost of US$ 2.5 billion to develop its mine deposits. Interestingly, FMG did so under an open access regime, but charging very high access fees.[23]

[20] Mark Fagan, "Introducing competition into natural monopoly industries: an evaluation of mandated access to Australian freight railroads," Regulatory Policy Program Working Paper (Cambridge, MA: Mossavar-Rahmani Center for Business and Government, John F. Kennedy School of Government, Harvard University, 2007).

[21] In the Matter of Fortescue Metals Group Limited [2010], June 30, 2010, available at: http://www.ncc.gov.au/images/uploads/DERaFoTD-001.pdf.

[22] See, e.g., National Competition Council, "Application for declaration of a service provided by the Mt Newman railway line under section 44F(1) of the Trade Practice Act of 1974: final recommendation," where the Council found that monopoly access to rail lines in the Pilbara by BHP Billiton and Rio Tinto limited competition for development of new iron ore tenements, giving those companies incentives to exercise market power to keep prices "artificially low" (at paragraphs 7.184-7.210) (March 2006).

[23] In the Matter of Fortescue Metals Group Limited [2010], June 30, 2010, available at: http://www.ncc.gov.au/images/uploads/DERaFoTD-001.pdf. See also Peter Ker, "New Rail Line Plan for Pilbara", *The Age*, April 26, 2012, available at: http://www.theage.com.au/business/new-rail-line-plan-for-pilbara-20120425-1xlho.html?skin=text-only; and Andrew Burrell, "Iron Ore Junior Breaks Stranglehold with 'historic' deal," *The*

(1) Consider separating ownership

Separating ownership of the mine, railway and port infrastructure is a strong structural solution to combat potential monopolistic behavior by infrastructure owners that hinders shared use. In short, if the owner of the infrastructure assets is different from the mine investor, the owner is incentivized to maximize traffic, (provided that there is sufficient capacity), which should naturally result in shared use.[24]

To achieve this, the Government could prohibit mine investors from controlling ownership of the infrastructure assets (i.e. the rail network or the principal port). Instead, the infrastructure assets would be owned by separate entities, either Government-owned or private, which deal with the mine owners on an arms-length, contractual basis. Infrastructure services could either be provided by the infrastructure asset owners (under a "common-carrier" model)[25], or by the mine investors themselves under a third party access regime.

Separating the ownership is particularly necessary in the cases in which:
1) the Government is faced temporarily with one mining investor in a promising rich mining area that is bound to attract many other miners (example of Liberia with Arcelor Mittal);
2) the Government is faced with major companies that can afford the total infrastructure costs, that do not see a business case for sharing the upfront capital costs (example of Mozambique with Vale, Australia with BHP and Rio Tinto).

Observed infrastructure asset ownership structures

There are a number of different ownership models in operation around the world, from fully integrated systems where the mine investor owns the entire mine/rail/port system (as in Pilbara), to fully separated systems, where separate entities own the mine, rail and port.

The following table indicates the ownership structure observed in various case studies. The letter code indicates the owners/operators of each particular asset; if a letter is repeated, it means same entity, a different letter means a different entity:

System	Description of model	Mine owner	Rail owner	Rail operator	Port owner	Port operator	Shared use realized?
West Australia iron	Fully integrated	A	A	A	A	A	No

Australian, February 25, 2011, available at: http://www.theaustralian.com.au/business/mining-energy/iron-ore-junior-breaks-stranglehold-with-historic-deal/story-e6frg9df-1226011619901.

[24] Theoretically, the same effect could be achieved under common ownership but separated operational management. For example, a single company may both own the mine and the rail, but by clearly separating the two functions internally, the rolling stock operations operate at arms-length from the below-rail infrastructure division, on equal commercial footing with competing rolling stock operators. In the European Union, for example, no separate ownership is required from the rail and train owners but member states have to require at least the separate accounting and operation of railway infrastructure, See E.U. Directive 91/440/EEC *on the development of the Community's railways*, 95/18/EC *on the licensing of railway undertakings*, 95/19/EC *on the allocation of railway infrastructure capacity and the charging of infrastructure fees.*

[25] See recommendation 3 for a discussion on this model

ore (Pilbara)		Private	Private	Private	Private	Private	
Hunter Valley coal (NSW, Australia)	Partially integrated (mine/port)	A	B	C	A (consortium of certain miners and customers)	A	Yes
		Private	Gov.	Private	Private	Private	
Richards Bay (South Africa)	Partially integrated (mine/port)	A	B	B	A(coal terminal) B (general freight)	A	With general freight only – the only users are the mine owners
		Private	Gov.	Gov.	Private (coal) Gov.(general freight)	Private	
Queensland coal	Fully separated	A	B	C	D	E	Yes
		Private	Private	Private	Private	Private	
SETRAG (Gabon)	Partially integrated (mine/rail)	A	B	A	B	C	No but required by the contract
		Private	Gov.	Private	Gov.	Private	
Zambia Railways (Zambia)	Fully separated	A	B	C	B	B	Yes
		Private	Gov.	Private	Gov.	Gov.	
Mbalam Railway (Cameroon)	Fully integrated	A	A	A	A	A	Yes in theory upon strong commitment of the company[26]
		Private	Private	Private	Private	Private	
Simfer SPV (Guinea)	Partially integrated (mine/rail/port)	A	A/B[27]	A/B	A/B	A/B	Yes
		Private	Private/ Gov.	Private/ Gov.	Private/Gov.	Private/ Gov.	
Marampa-Pepel (Sierra Leone)	Partially integrated (mine and rail and port operations)	A	B	A	B	A	Yes
		Private	Gov.	Private	Gov.	Private	
Fort Dauphin (Madagascar)	Partially integrated (mine and port operations)	A	NA		A/B	A	Yes
		Private			Private/Gov.	Private	
Vitoria-Minas Railway (Brazil)	Fully integrated (mine/rail/port)	A	A	A	A (in consortium)	A	Yes[28]
		Private	Private	Private	Private	Private	
Krishna-patnam	Partially Integrated	A&B&C [29]	A	A/B/D	D	D	Yes

[26] See Box 14. This is the situation of a fully integrated system whereby the mine owner sees a business case in sharing its logistic chain.
[27] A/B designates two different types of owners and is characteristic of a joint-venture ownership in this table.
[28] In Brazil, although the same owner controls mine, rail and port (Vale), it is also required by regulation to allow other users to access the railway, so it also carries non-Vale traffic (see Box 2).
[29] A/B/D also designates a joint-venture arrangement; A&B&C designates 3 different owners of mines.

Railway Company Limited (India)	under Government ownership	Private/ Gov./	Gov.	Private/ Gov.	Gov.	Private	

As can be seen, a number of countries have opted for partially integrated models that allow some (but not complete) consolidation of ownership. These systems have a mixed record of achieving shared use in practice.

- For example, in Richards Bay (South Africa), while the railway is Government owned (Transnet), the coal terminal at the port is owned by the major coal mine investors, and it is therefore difficult for other coal producers to obtain capacity allocations at the port. Consequently, those other coal producers do not seek access to the railways, so shared access is not achieved in practice. By contrast, in the Hunter Valley coal chain (Australia), a consortium mainly consisting of mining companies owns the coal terminal at the port, but Government regulation obliges it to make capacity available for other users (see Box 8), and shared use is achieved in practice.
- In Africa, the partially integrated model where the mine owner has been granted the vertically integrated concession of the railways (and thus is responsible for all the capital expenditure as well as the operations and maintenance of the assets) has not been successful either in achieving shared use. This type of vertically integrated concession[30] where the state keeps the ownership of the infrastructure assets has generally not allowed the preservation of "national interest[31]" as the concession arrangements generally claim. Indeed when 1) investors are both shippers and rail service operators while incurring the main capital costs and 2) this conflict of interest has not been thoroughly addressed in transaction design[32], the after-the-fact regulatory efforts are doomed to failure, even in countries with strong institutional settings (see Australia's case study, Box 6 and Box 19). Therefore keeping the ownership of the tracks[33] in Africa hasn't been a salutary option. By contrast, designing a golden share provision as in Brazil (see section below) or keeping a strong equity stake in the project when the government can afford it as in Guinea or in India (see Box 17 and Box 16 respectively) are more promising solutions in situation of partially/fully integrated model.

As stated above, the safer solution is separated ownership and in particular having a "third party commercial operator with core competence in infrastructure but without mining interests."[34] It has been the case in the copper belt in Zambia with the company Railway Systems of Zambia[35] and now with the reinstatement of the Zambian North West Rail Company (NWR). With the recent outpouring of FDI in the minerals of the Zambian North Western region, a new 405km

[30] The case of Mbalam in Cameroon is an exception to the traditional African arrangements: this is a greenfield project, and the ownership of the infrastructure assets has been given to the mining company. (see Box 14)
[31] In this situation the term "national interest" is used as opposed to "monopoly power."
[32] See Recommendation 5, related to the need for specific and efficient legal language.
[33] In the case of Sitarail (Abidjan-Ouagadougou railway concessionaire), the first private railway concession in West Africa, the concession was established under an *affermage* structure as a means to better preserve the national interest against the risk of monopoly by the concessionaire. The Government is also the owner of the existing rolling stock (in addition to the infrastructure) and is responsible for the maintenance, which is financed by the concessionaire through annual payments, and for raising the required finance for the investment program for new rolling stocks. The cost of serving debt finance is borne by Sitarail in exchange for the ownership of the new rolling stock.
[34] Paul Collier, op. cit.
[35] Unfortunately this company has underperformed.

railway line linking this region to the rest of Zambia has been designed with the financial support of an expert in supply chain optimization, the US Tagos Group, and to be operated by NWR.[36]

(2) Consider the golden share as a monopoly power limitation:

Brazil has taken a different approach from the African concession structure to preserve the national interest: it consolidated ownership of rail and port infrastructure assets in the mining company Vale, but when Vale was privatized in the 1990s, the Government retained twelve golden shares which allow it to influence key strategic decisions (see Box 2).

A "golden share" is a nominal share conferring special voting rights that are established by law. A golden share is typically a single share granting its owner up to the minimum amount of shares of voting rights necessary for a shareholder to block board decisions. Golden shares are generally only used in "strategic industries", for public interest reasons. Possible rights ("special powers") attached to a golden share are detailed in the articles of incorporation of the companies. They can range from a limited veto right to a right to consent to everyday management decisions and can vary in the breadth of their scope, in their duration, and in the manner by which state powers are exercised. The golden share allows the state to benefit from a controlling or majority interest despite very little investment in the company. The state also has the flexibility to define the rights that it will be granted with such golden share, depending on the state's needs.

For example, the Indian Government has recently decided to adopt this device to keep control over its railway despite privatization, taking a golden share in the railway management company SPV L&T Metro Rail Hyderabad.[37]

Similarly, the Government of Argentina retained one golden share in the railway company Belgrano Cargas after awarding the railway concession.[38] The golden share gives the Government of Argentina the right to elect one director who has a decisive say in the decisions of the company regarding the types of services offered and the fixing of trip fares. The golden share has allowed the Government of Argentina to ensure that the railway keeps long-distance passenger services as well as commuter rail services, which had been abandoned for a number of years prior to the concessioning.

The golden share can be an efficient policy tool, depending on the scope of rights that it provides to its holder and on the specificity of the goals that it seeks to achieve, e.g. the provision of passenger services or general cargo on reasonable terms, open access to other private operators on a non-discriminatory basis, or the creation of a tool for company monitoring.[39]

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[36] As said above, the copper belt is however an easier case than coal, iron ore and manganese corridor where those very high volume commodities generate the need for high capacity dedicated lines that miners can easily afford as opposed to copper mine owners.

[37] In exchange for the golden share, the Government is entitled power to veto, purchase the company's own shares, or reduce the company's share capital among others. See V. Rishi Kumar, "L&T Metro Rail hands over 'Golden Share' to Andhra Pradesh Govt," *The Hindu Business Line*, February 11, 2012, available at: http://www.thehindubusinessline.com/companies/article2882253.ece.

[38] Republic of Argentina, Decree Law 1037/99 approving the concession contract between the Ministry of Economy, Public Works and Public Service and the company Belgrano Cargas S.A.

[39] This device, for example, would also allow parties to overcome situations where the concessionaire refuses monitoring, such as in the case of Zambia Railways. In this case where the Government of Zambia doesn't have any

Box 2: Golden share in Vale Brazil

After being privatized in 1997, Vale decided to focus exclusively on the mining business. However, the company kept several strategic assets in the energy and logistics sectors that it previously held, primarily to reduce the costs and the risks of the company's mining operations. Therefore, Vale still owns both the Vitória-Minas railway and several terminals of Tubarão Port Complex as parts of its integrated production model, and it was granted in 1997 the concession to operate and develop the railway for 30 years.

While privatizing Vale, the state retained control through special class preferred shares (the "golden shares") and a combination of ordinary and preferential shares. State pension funds have a majority interest in Valepar which holds a majority of the voting shares in Vale. This control has been used to ensure that Vale keeps its lines open access. For instance, major contracts have been signed between Vale and Gerdau Açominas, Belgo Siderurgia, Usiminas or Cenibra to transport mostly iron ore (80%), other mining and steel products (pellets, pig iron, steel products), but also coal and coke (import), and round wood, cellulose, limestone, agricultural products, containers and vehicles. However, given the production capacity of Vale relatively to the limited line capacity , the railway is mainly used to carry ore extracted from Vale's own mines (80% of the annual freight volume), while only 20% is related to third parties' activities (300 different clients in total[40]). Vale also operates rail passenger service on this line (1 million passengers annually).[41]

The golden share is however not an efficient mechanism if Government's monitoring mechanisms are deficient or limited by information asymmetry. For instance, in Malaysia, the Government failed to effectively use its golden share to control market entry and supervise tariffs in the railway, airways and telecommunications sectors because of information asymmetry between the state and the operator.[42]

Recommendation Two: To maximize throughput and economic efficiency along the supply chain, a) develop an effective operating coordination mechanism in a non-fully integrated situation, b) require a double-track system in all situations.

While separating ownership of mine, rail and port assets reduces the potential for monopolization of infrastructure, it also increases the difficulty of coordinating between users and maximizing throughput of the system as a whole. The situation is even more acute when the ownership of the

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golden share., the concession agreements stipulated that the concessionaire, Railway Systems of Zambia (RSZ), would submit quarterly reports to Zambia Railways Limited, the Government asset manager but RSZ has submitted no legal reporting and the Government of Zambia is currently seeking ways, so far in vain, to cancel the concession. See Trademark Southern Africa, "Aid-for-Trade case story: Revamping the regional railway systems in Eastern and Southern Africa" (WTO/OECD, 2011), available at: http://www.oecd.org/dataoecd/27/63/47407233.pdf
. See also "Cancel concession Zambia Railways," *Lusaka Times*, February 6, 2012, available at: http://www.lusakatimes.com/2012/02/06/cancel-concession-zambia-railways-tiz/

[40] Pré Sal, Ferrovias, available at: http://pre-sal.info/index.php?option=com_content&view=article&id=115&Itemid=98

[41] PriceWaterHouseCoopers, "Annual independent audit report on Vale-Estrada de Ferro Vitória-Minas" (PWC, 2010) .

[42] Ashoka Mody, "Infrastructure strategies in East Asia: the untold story" (Washington D.C.: The World Bank, 1997).

assets is separated from the service provider[43]. One must recognize that shared use can impair operating efficiency and strategic planning of the infrastructure assets.

Accordingly, it is important to develop an effective coordinating mechanism that can optimize the mine/rail and rail/port interfaces for all users of the system, both in the short-term (day to day coordination of train scheduling, loading, maintenance, etc), and in the long-term (conducting system wide capacity planning).

One potential mechanism to achieve this is to establish a supply chain coordinator. This is an independent entity that communicates with all participants in the supply chain to maximize overall throughput. Moreover, the coordinator can also, through careful contracting between all participants in the supply chain (mine investors, infrastructure asset owners and infrastructure service providers), act as an arbiter that allocates responsibility for any lost production to the appropriate party.

Box 3: The Hunter Valley Coal Chain Coordinator[44]

In the Hunter Valley coal chain, capacity constraints were encountered as early as the 1990s.[45] The bottleneck has generally been the rail infrastructure. However, poor operational linkages at the mine/rail and rail/port interfaces were also identified as reducing overall system capacity. Accordingly, the Hunter Valley Coal Chain Planning Group (HCCPG) was established in 2003 as a trial between Port Watarah Coal Services (PWCS), the port owner, and Pacific National, the rail operator, to optimize planning and scheduling of coal train movements and shipments, as well as to coordinate maintenance. This evolved into the Hunter Valley Coal Chain Logistics Team (HVCCLT) in 2005, and membership expanded to include QR National as the other train operator, ARTC as the track owner and Newcastle Port Corporation as the port authority. The HVVCLT had responsibility for day-to-day coordination as well as long-term system wide capacity planning, to avoid misalignments between mines, rail and port. Its role was essentially to act as one manager who has responsibility to act in the interest of the entire coal chain to increase transport chain efficiency through improved scheduling practices and train productivity, optimizing the rail network and maximizing stockpiles and throughput at the export ports. It was established through a Memorandum of Understanding among the parties.

Ultimately, in 2009, the HVCCLT evolved into the Hunter Valley Coal Chain Coordinator (HVCCC), an independent entity that also included representation from the coal miners. The HVCCC has an independent CEO and Chairman. Its responsibilities now include determination

[43]Gomez-Ibanez shows how the division between ownership of the rail tracks and ownership of the trains led to a lack of investment and to the subsequent deterioration of the quality of the tracks. The separation of ownership hampered coordination and the feasibility of agreements on network improvements - Jose A. Gomez-Ibanez, "Regulating Coordination: British Railroads," in Regulating Infrastructure: monopoly, Contracts, and Discretion (Harvard University Press, 2003) and Moran and Pengilley add that the fact that the ownership of the tracks is independent from the ownership of the rolling stock fails to provide an incentive to the rolling stock owner to economize on the infrastructure owned by the track owner.
Alan Moran and Warren Pengilley, "Access to facilities: Is the court or a regulator the best adjudicator?" in Regulation of Infrastructure: Its Development and Effects (Melbourne, Australia: Institute of Public Affairs, 2007), available at: http://ipa.org.au/library/MORAN_PENGILLEY-Infrastructure.pdf

[44] Hunter Valley Coal Chain Coordinator, www.hvccc.com.au/AboutUs/Pages/History.aspx.

[45] Fred Affleck, "Exploration of some factors contributing to under-provision of infrastructure capacity: Coal railway networks in Queensland and the Hunter Valley of New South Wales" (Perth, Australia: Planning and Transport Research Centre, 2005).

of actual capacity usage and making findings as to fault if system losses occur, with financial implications.

The HVCCC model is generally seen as successful due to its broad stakeholder representation, independent leadership and its legal powers. The model has been substantially duplicated in the Queensland coal chain through the establishment of the Integrated Logistics Centre established in 2009 as a coordinating body between the port owner, port operator, rail owner, rail operators and coal producers.

In addition, *developing and requiring a double track system is much more conducive to a shared use system* since it reduces the operational bottlenecks that can occur due to the combination of inbound and outbound trains on a single-track. In Box 4, the World Bank demonstrates the economic irrationality of building single-track lines parallel to the Arcelor Mittal line in Liberia.

Box 4: World Bank report makes the case for a double-track system in Liberia

"The operational and financial benefits of a double track system over development of two parallel lines are unambiguous. A simulation of these two possible scenarios – two parallel single track systems versus one integrated double track system – serves to illustrate the economic issues that arise. First, the investment costs of the integrated double track system are significantly lower at US$629 versus US$826 million: a saving of 24 percent. Second, moving up to three million tonnes of iron ore per month on a single track line is a challenging task involving carefully planned operations, since it could easily entail 15 train rotations per day implying at least 30 train crossings (of inbound and outbound locomotives) that need to be planned and monitored. A double track system avoids all the operational difficulties associated with crossing of inbound and outbound trains on a single track system. As a result, trains can move faster, with the average velocity rising from 60 to 70 kilometers per hour. Third, for the same reason, longer trains can be used with locomotives pulling 105 rather than only 70 wagons each. As a result, fewer locomotives and drivers are needed on a double track system, leading to significant savings in operating costs as well as capital costs. Fourth, track maintenance costs from a double track system are substantially lower than on two parallel tracks, even accounting for the more intensive use of the double track. When the investment and lifetime operating cost savings are fully taken into account, the double line generates savings of US$313 million over and above the two single lines."[46]

Recommendation Three: Apply regulation related to shared use so as to ensure financially sustainable models: freedom to set tariffs, a last resort arbitration mechanism, take or pay contracts; and specifically to shared use with general cargo: subsidies, cross-subsidization and open-access service roads

Creating a financially sustainable economic model is critical for the long-term success of the infrastructure system. The owner of the infrastructure assets and provider of the infrastructure services must be able to generate sufficient revenue to justify their upfront investment and ongoing involvement. Generally, this means granting maximum flexibility to set tariffs and allowing long-term contracts, subject to competition laws. If socially beneficial traffic is unable

[46] World Bank, "Leveraging investments by natural resource concessionaires," Infrastructure Policy Notes, World Bank for the Republic of Liberia (Washington D.C.: The World Bank, 2011).

to pay its own way, then Government subsidies may be needed. If Government subsidies are unaffordable, cross-subsidization and open access service roads can be a solution. This section will first give a broad panorama of access management regimes and then develop the key considerations in access regulation.

(i) Observed access regimes

Our study has shown that a variety of different access regimes have been developed around the world, from access control through state-ownership of the designated infrastructure, to blanket access regimes where the regulator generically determines access rules on all types of natural monopolies, industry-specific access regimes, case-by-case public-private arrangements, or contract-based private endeavors.

First, one way to ensure access to resource-based transportation infrastructure has been through state ownership of the infrastructure or state ownership of a golden share in the capital of the infrastructure as explained in Recommendation 1.

A second possible regulatory framework for access management is through a blanket access regime, encompassing all kinds of national infrastructure-related matters. This has been the solution adopted by the Australian government. Indeed, Australia is a unique case since the country has a National Access Regime since 1975, as per Part IIIA of the Competition and Consumer Act of 2010[47] (see Box 15 and Box 19). This model inspired New Zealand, which chose a similar generic system to regulate access to all natural monopoly industries.[48] This framework has also been proposed to other countries, as some Australian officials together with the World Bank have advised countries such as Mongolia on the implementation and development of specific mining infrastructure access regimes.[49] Here, adjudication can be made either through the judicial system or by a specialized administrative agency.[50]

A third access management regime has been to regulate infrastructure through industry-specific laws. In the United States, for example, a mining company owning a railway operating in interstate commerce would fall under the authority of the Surface Transportation Board[51] (see Box 7) whereas its port would fall under the laws applicable to maritime infrastructure, e.g. the

[47] Part IIIA of the Competition and Consumer Act of 2010 (formerly referred to as Part IIIA of the Trade Practices (National Access Regime) Act of 1975). See also John Feil, "Third party access to infrastructure – Why, when and why?," Eleventh Annual Global Iron Ore and Steel Conference, National Competition Council (2008), available at: http://www.ncc.gov.au/images/uploads/STPA-002.pdf.

[48] Bryan N. Gundersen, "Understanding the open access regime," Paper presented at the 1998 New Zealand Petroleum Conference, available at: http://www.nzpam.govt.nz/cms/petroleum/conferences/conference-proceedings-1998/understanding-the-open-access-regime.

[49] John Feil, on behalf of the Australian National Competition Council for a presentation organized by the World Bank in Southern Mongolia, "Third-Party access to infrastructure" (2008), available at : http://siteresources.worldbank.org/INTMONGOLIA/Resources/5_National_Competition_Council_Third_party_access_to_infrastructure.pdf.

[50] See discussion in Recommendation 5.

[51] 49 CFR § 1000–1332 (2012). See also OECD, "Roundtable on Ensuring Access to Key Capacity for New Entrants – United States," Working Paper No. 2 on Competition and Regulation, No. DAF/COMP/WP2/WD(2006)10 (Paris: OECD, 2006), available at: http://www.ftc.gov/bc/international/docs/EnsuringAccessKeyCapacity-UnitedStates.pdf

Federal Maritime Commission where it is involved in foreign commerce.[52] Australia and New Zealand also have industry-specific access laws in addition to their generic access regime.[53]

Both in the US and in Australia, the access regime is based on an antitrust doctrine and as such open access can only be requested by competitors: companies that are not operating on the same market segment, such as small commercial, industrial or agricultural businesses, are therefore not entitled to request access under this regime. In Australia however, the framework has recently been expanded in order to apply not only to competing companies, but to all businesses,[54] although so far courts have been reticent to generally force open access.[55]

A fourth access management regime is contract-based, and therefore realized on a case-by-case basis according to market rules. The case of the Mbalam Iron Ore project is a good example (Box 14).

An additional way to ensure access has been through case-by-case public declarations, like in Australia (see Box 15). Depending on the type of asset considered, the owner can be imposed access regulations by the government, either through a contract or through a specific act or declaration.[56] This solution can have the advantage of being tailored to the specific nature of the infrastructure considered as well as to the needs of the parties, provided that both parties have sufficient bargaining power to negotiate their terms. But as a case-by-case approach it also induces a high level of uncertainty.

Each of those models has advantages and disadvantages, and they can co-exist within the same jurisdiction. But some elements are key common considerations throughout the spectrum of those regulatory regimes, such as defining tariff policies and determining the duration of the access agreements between customers and infrastructure owners.

(ii) Setting tariffs

The infrastructure owners must be able to charge sufficient fees to users to recoup the upfront capital costs of rehabilitation (for brownfield projects) or construction (for greenfield projects) and their ongoing operation costs, along with a reasonable profit margin.

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[52] 46 CFR § 501–565 (2012).

[53] For a review of industry-specific access regimes in Australia, see Productivity Commission, *Review of the National Access Regime*, Report No. 17 (Canberra: Productivity Commission, 2001), available at: http://www.pc.gov.au/__data/assets/pdf_file/0020/18173/access.pdf. For a review of industry-specific access regimes in New Zealand, see Gundersen, op. cit.

[54] See Preambule of the Competition Principles Agreement (as amended to 13 April 2007) ("apply[ing] to all businesses in Australia regardless of ownership") and Clause 6(1)(c) of the Competition Principles Agreement (as amended to 13 April 2007) (referring to the fact that the facility must be "of national significance … to constitutional trade or commerce.")

[55] John Feil, "Third party access to infrastructure – Why, when and why?," Eleventh Annual Global Iron Ore and Steel Conference, National Competition Council (2008), available at: http://www.ncc.gov.au/images/uploads/STPA-002.pdf

[56] In Australia, this process is referred to as "declaration". A claimant first sends a request for access to a designated facility to the National Competition Council. The latter then sends its recommendation to the government as to whether the government should "declare" the facility as subject to access. See Productivity Commission, op. cit.

Of course, a sustainable financial model requires customers who are able and willing to pay the tariffs determined. This depends critically on the economic profile of the area where the infrastructure is located (density of mines in the area, other potential rail/port users) as well as the availability of alternative transport options (in particular, competition from road haul). The prospects for financial stability are best where there are many potential users and little competition from road, and worst where there are few potential users and significant competition from roads.

Assuming the economic profile is favorable, there are certain tariff models that seem to work better in practice.

One option, used throughout Australia, is a light touch *"negotiate-first, arbitrate-later"* regulatory model whereby the infrastructure owner and customers independently contract on prices. Under such a system, one possibility is that the owner publishes a "reference tariff" for haulage that sets the baseline for negotiations. Variations from this price may only be permitted to reflect differences in costs (direct or indirect) or risks, and hence prices will be broadly similar for similar customers. The alternative is that the owner, while being free to set the prices for access, must charge its own downstream business unit the same price as it charges other users.

Where customers are unhappy with the prices being offered, and feel that the owner is charging monopolistic prices, they should be able to complain to an independent body (i.e. the regulator) that would then investigate the issue and determine a fair price, after conducting a detailed examination of costs[57].

An alternative system, used in the EFVM railway in Brazil, is more burdensome on the infrastructure service provider, as *it requires contracts to be pre-approved by the regulator to prevent monopolistic pricing* (see Box 5).

Box 5: Requirement imposed on the concessionaire in Brazil

According to the concession contract, the concessionaire is required to operate "mutual traffic". If for any reason the concessionaire cannot operate mutual traffic, it must concede open access to other interested third-party users through bilateral contracts defining fees, rules and volumes. These contracts must be submitted to the concession grantor (the Federal State), to be approved and to prevent abuse of economic power (Clause 9, XXI – Concession Contract of Vitorias e Minas).

In the case of an impasse, the applicable tariff is determined by the regulator based on an assessment of operational costs. This system may be more appropriate in the particular EFVM context, where the railway is operated at full capacity and owned and operated by the same private entity (Vale), and hence there is a greater risk of monopolistic behavior.

Even the light-touch negotiate-arbitrate model can be burdensome where there are large differences between the parties (see Box 6).

Box 6: Potential issues with the negotiate-arbitrate model

[57] See Recommendation 5 for a discussion on the topic.

Capital expansion plans at the Dalrymple Bay Coal Terminal in Queensland, Australia, were delayed almost two years due to a standoff over prices between terminal users and the terminal operator. In 2003, Prime Infrastructure, the then-operator of the port facility proposed an increase in the coal tariff from A$2.08 to A$2.77/tonne, based on an asset valuation of A$1.1 billion. By contrast, the mining customers wanted a reduction in tariff to A$1.00/tonne, as they claimed the port was worth less than A$500 million. An impasse followed, requiring the regulator to arbitrate the matter. The arbitration process took two years, with the draft decision released in April 2005. The regulator blamed the long timeframe on the "wide divergence" in views between the parties, as well as "material errors in submitted documents" and the lack of a "detailed asset register for the terminal."[58] Eventually, the regulator authorized a price of A$1.72/tonne.

The issue described above illustrates the difficulty faced by a regulatory power in monitoring the legitimacy of tariffs set by the regulated infrastructure owner. Those tariffs should rightly cover costs but those costs are not easily auditable by the regulatory power. *Costs can be inflated by the regulated entity and disputed by the regulatory power endlessly, which makes the regulation inefficient, which is why a light-touch model (i.e. not engaging the regulatory power at first) is encouraged.*

A solution that has been found in the United States to cope with this regulatory issue is to impose the burden on the proof on the "captive shipper"(see Box 7).

Box 7: The United States railway regulator and the burden of the proof on the captive shipper

Outside of a merger review, where a new railway acquirer can be imposed trackage rights on public interest grounds, the Surface Transportation Board (STB) regulating the railways sector can regulate access rates on a railway infrastructure where it is seized by a "captive shipper", i.e. a company willing to transport its freight that has no other choice but to use the designated infrastructure. Under U.S. federal law, a company can file a request to challenge a railway rate.

The shipper needs to prove[s] first that the rail carrier is in a situation of "market dominance"[59] to transport the traffic. Here, a railroad will be found to have "market dominance" where its revenue "meets or exceeds 180 percent of its variable costs for the traffic to which the rate applies."[60]

Second, the STB must decide whether the rate was reasonable. The test for reasonableness has been developed in the STB's rate guidelines.[61] First, the STB recognizes that charges can be higher for captive shippers, which have inelastic demand, than for competitive shippers, which

[58] Queensland Competition Authority, "Dalrymple Bay Coal Terminal Draft Access Undertaking: final decision" (April 2005), p. v-vi.

[59] Interstate Commerce Commission (ICC) Termination Act of 1995, 49 U.S.C. 1010 *et seq*., PUBLIC LAW No. 104–88 (1995), §§10701, 10704(b), 10707 [hereinafter ICC Termination Act], available at: http://www.gpo.gov/fdsys/pkg/PLAW-104publ88/pdf/PLAW-104publ88.pdf

[60] ICC Termination Act, §10707(d)(1)(A). The method applied here to calculate variable costs is either the "Uniform Rail Costing System" or an "adequate substitute." See ICC Termination Act, §10707(d)(1)(B); Adoption of the Uniform R.R. Costing Sys., 5 I.C.C.2d 894, 1989 WL 246927 (1989).

[61] The Revenue Shortfall Allocation Method (RSAM) used by the STB to test the reasonableness of rail rates is developed in the *Rate Guidelines-Non-Coal Proceedings* 1 S.T.B. 1004 (1996), and in the *Coal Rate Guidelines*, Nationwide, 1 I.C.C.2d 520, 1985 WL56819 (1985).

have alternative shipment routes and which would therefore divert their traffic from the designated railway if they do not benefit from competitive prices.[62] But the STB asserts that a captive shipper should not have to pay for services from which it does not benefit, and should not cross-subsidize other shippers.[63] To verify this, the STB resorts to the Stand-Alone-Cost method. Under this method, one determines the rate that would be applied for shipment on a hypothetical railroad, the Stand-Alone Railroad (SARR), that would serve the same railway route and that would be optimally efficient.[64] This amount, "plus a reasonable and economic profit or return (or both) on capital employed in the business,"[65] is the maximum amount that the railroad may collect from its shippers. A rate above that threshold will be considered unreasonable.

In 2009, for instance, the STB found that the rail-route configuration for the railways owned by BNSF Railway Company (BNSF) in Wyoming, which transport an annual volume of 8 million tons of coal from mines in Wyoming's Powder River Basin to Moba Junction, Wyoming, gave BNSF market dominance over its captive shippers, Western Fuels Association, Inc. and Basin Electric Power Cooperation.. The STB found the rate charged for the transportation was six times higher than the variable cost for the provision of such service. As a result, the STB ordered BNSF to pay US$ 345 million in reparation and rate reductions, which is the largest penalty that has been imposed in the history of US captive shipper litigation. The STB concluded that the burden of the proof was met by the captive shippers. But the award is subject to final re-assessment, as the case has been appeal by BNSF.[66]

Generally the burden on the proof put on the shipper limits the application of the open access regime.

(iii)Duration of contracts between customers and infrastructure owners

The duration of contracts between infrastructure service providers and customers depends not only on private negotiations, but also on the Government's policy objectives.

One option is to mandate "common carrier" provisions, which require the rail or port owners to accept all customers on a first-come, first-served basis, for example, according to monthly contracts. *This reduces the potential for large customers (like mining companies) to buy up the bulk of long-term supply, and allows smaller companies a better chance of acquiring access to the infrastructure.* Rail freight providers often operate on a common carrier basis.

Alternatively, regulations may allow providers and customers to enter into long-term contracts. This is generally preferred by infrastructure service providers as it provides more certainty. *Long-term contracting is the norm in systems requiring capacity expansion.*

[62] *.Rate Guidelines-Non-Coal Proceedings* 1 S.T.B. 1004 (1996), at 2–5.
[63] See *Coal Rate Guidelines*, 1 I.C.C.2d at 523-24; BNSF Ry. Co. v. STB, 453 F.3d 473, at 476–77. (D.C.Cir.2006).
[64] See PPL Mont., LLC v. STB, 437 F.3d 1240, 1242 (D.C.Cir.2006).
[65] ICC Termination Act, §10704(a)(2).
[66] See Western Fuels Association, Inc. and Basin Electric Power Cooperation v. BNSF Railway Company, STB Docket No. 42088 (2009), available at:
http://www.stb.dot.gov/decisions/readingroom.nsf/WebDecisionID/39709?OpenDocument

Indeed, where capacity expansion is required, the investment cost must be recoverable and revenue streams sufficiently definite into the future to enable the owner to obtain financing on reasonable terms. Moreover, the cost of capacity expansion should be spread across all users (even the non-owners),[67] not just new users. Otherwise, new entrants would be penalized.

If capacity expansion is likely, allowing long-term "take or pay" contracts (whereby the customers commit to buying a minimum amount of capacity from the owner over a longer period) provides more certainty for infrastructure owners to commit to capacity expansions. This is usually necessary to obtain financing for the investment required. *However, such contracts also risk locking out small producers who cannot support such contracts on their balance sheet.*

Furthermore, even where take-or-pay contracts are available, regulation may be required to force infrastructure asset owners to upgrade capacity where there is sufficient demand. This is particularly the case where the asset owners may otherwise have reasons to keep capacity constrained (e.g. to retain a competitive advantage). Recent arrangements concluded in Australia provide interesting examples of obligations on asset owners to conduct capacity expansion, where certain criteria are met (see Box 8).

Box 8: Requirement to expand port capacity in certain cases in Hunter Valley Coal Chain

In the Hunter Valley of Australia, the port terminal owner is required to expand the facility where there is sufficient demand from users who are willing to commit to long-term contracts.[68]

Originally, a common user obligation imposed on the port owners prevented them from entering into long-term take-or-pay contracts with customers who were willing to commit to sufficient volumes to justify expansion. These issues may have led to a slow expansion in capacity during the mid-2000s when prices increased sharply.

Capacity expansion problems have largely been resolved through the long-term Capacity Framework Arrangement (CFA), which replaces the common user model. The CFA, approved in 2009, provides for:

- the allocation of capacity to customers under long-term contracts;
- an obligation on the port operator[69] to conduct expansion where there is sufficient contracted demand;
- alignment of capacity and contractual incentives across the supply chain (particularly with rail); and
- potential to impose a levy on all customers to fund capacity expansion, so that new entrants are not penalized with a higher charge while existing customers can enjoy low legacy charges.

The CFA was developed following long negotiations with industry and enjoys broad support.

(iii) Specific regulatory solutions for shared use with disperse, low- volume general cargo

[67] This is the case of Port Watara in the Hunter Valley Coal Chain in Australia.

[68] Capacity Framework Agreement signed between New South Wales government, Port Waratah Coal Services (PWCS) and the Newcastle Coal Infrastructure Group (NCIG) on June 29, 2009, authorized by the Australian Competition and Consumer Commission on December 9, 2009, Authorization No. A91147, available at: http://www.accc.gov.au/content/index.phtml/itemId/879882/fromItemId/401858

[69] In Australia, the port operator is responsible for the capital investment. In other settings, it can be the port owner, depending on the agreement.

If the Government wishes to provide access to services that cannot pay their own way (passengers, low-volume general cargo),[70] then there must be a mechanism for providing revenue support. It is important to realize that the burden of providing these services will either be borne by the Government (if subsidies[71] are paid), or by other users (through higher access charges). In either case, the infrastructure owner will pass on the costs.

Open access to passenger services, in the African concession arrangements is typically granted through Public Service Obligation (PSO) schemes. These schemes require the concessionaire to operate, for a given subsidy and for the duration of the agreement, a specified service of public transport that is not profitable enough to be submitted to free market rules. Other similar schemes can be stipulated for general cargo. The track record is that PSO or other subsidies are generally not implemented in the African cases that we reviewed, because states cannot afford it. "Even if a Government were to provide subsidy, it might actually deter investors because of the Government's limited long term creditability."[72]

If subsidies are unaffordable by the Government and no other solution is devised, it might be uneconomic to impose shared use with general cargo on the mining railways, as scattered carloads related to dispersed farmers (or passenger stations) complicate the economics of the rail.

If the road transportation can be a temporary good alternative for passenger services, the road considerably locks in the potential of commercial agriculture in Africa especially on long-haul. This is therefore important to devise solutions that will enable the open-up of the African agriculture by the railways. Here are possible options:

1) Under the model of separated ownership prescribed in Recommendation 1, one option is to contractually require from the third party commercial operator to apply price discrimination among users and cross-subsidization between the higher-profit mining industry and the price-sensitive agriculture industry: the agriculture industry will pay the affordable marginal cost while the mineral industry will pay the difference between the marginal cost and the average cost.[73] Even under this model, the dispersion of farmers' car loads is problematic for the railway economics. Therefore individual carloads bound for the port should be delivered to and consigned at locations where they are assembled onto trains, so that they only proceed to the port when they constitute a full train and the access charge is therefore shared by all the owners of the carloads.

2) If the Government fails to impose shared use and no logistic solution is in place to cope with the dispersion of farmers, the Government could require the infrastructure owner (be it the mine owner or a third party) to render the good-quality service roads, built for the maintenance of the railways, open access to the rural economy.

[70] The pricing of the railway access above the marginal cost pricing is a deterrent to passenger and agriculture cargo services. (as explained in Recommendation 1)
[71] These subsidies are typically designed under a Public Service Obligation structure, as detailed further.
[72] Paul Collier, "Building an African infrastructure", 48(4) *Finance & Development* (2011), available at: http://www.imf.org/external/pubs/ft/fandd/2011/12/collier.htm
[73] Paul Collier, op. cit.

Recommendation Four: Require the mine owner to build infrastructure with excess capacity, and consider various financing options to finance this extra-capacity

A recurring issue for Government is how to encourage infrastructure asset owners to construct or at least design the asset with sufficient capacity for future growth, rather than "just big enough" for the primary user. The likelihood of the infrastructure asset being built with limited capacity is increased where the infrastructure owner is also the mine owner, and it fears that building or even designing extra capacity will invite a requirement for shared use, increasing competition and/or reducing operational efficiency.

In these circumstances, there may be a strong case for the Government to require the asset owner to design the infrastructure such that it has capacity larger than is immediately required to ensure sufficient capacity for future shared use (as in the proposed Putu development in Liberia – see Box 9 below).

Box 9: Section 6 of the Putu Contract stipulates that "the Railroad shall be designed so that it can be expanded on a commercially feasible basis to carry on a continuing basis twice as much traffic as is anticipated initially, but the Company is under no obligation to build such capacity." If a third-party wants access it has to pay for the expansion of the railroad.

Defining how much extra capacity should be required in the design from the concessionaire is a difficult exercise for which two approaches can be adopted: a fixed contract approach (capacities and duration are determined by the infrastructure owner and the users and the infrastructure is built accordingly), or an anticipatory approach (the infrastructure owner or the Government anticipates the demand for infrastructure and builds it accordingly, which triggers a higher business risk since the demand is not secured at the outset).

In the absence of a fixed contract approach, the anticipatory approach needs to be adopted, which requires a difficult exercise of planning. The Indian model is a model of good practice (see Box 10 below) of Government-level planning capacity.

Box 10: The planning capacity of state-owned Indian Railways
Almost all mine-port railway connectivity projects in India are joint ventures between private and public stakeholders together with Indian Railways (IR), the national railway company owned and controlled by the Government of India via the Ministry of Railways. Prior to forming a Special Purpose Vehicle (SPV) for new line and/or gauge conversion projects, project development is undertaken by IR by hiring consulting firms to establish project design and cost, land acquisition requirements, other project component requirements, as well as project bankability and viability.[74]

As stated above, depending on the concentration of economic activity and distances, all-weather roads can be sometimes a better solution to open up agriculture potential than requiring shared use and increase capacity. Determining this however requires a planning effort and to this end Columbia University has suggested to the Government of Mozambique, the realization of a

[74] India Ministry of Finance, "Road rail connectivity of major ports," Report of the Committee of Secretaries (The Secretariat for the Committee on Infrastructure, India Ministry of Finance), available at : http://www.pppinindia.com/reports-policy-documents.php.

detailed, aspirational, ambitious, long-term infrastructure map for transportation, energy and information and communication technology (ICT), coordinating and guiding public and private infrastructure investments (see Box 11).

Box 11: An aspirational 10-year map to plan the infrastructure needs and capacity expansion[75]

In order to be a meaningful tool for long-term infrastructure development along the corridors of economic development, the map should be an aspirational 10-year plan, indicating all the infrastructure necessary for national development by 2020 (including power, roads, rail, energy, ports, fiber-optic cables, and mobile telephone networks). This map would indicate how the various infrastructure networks (transport, ICT, energy), overseen by different ministries, interact to promote corridor development. A clear understanding of the spatial distribution of current and potential economic activity as well as of the geographic and demographic features along the corridor can strategically inform infrastructure priorities.

This policy instrument would help identify the potential for shared infrastructure platforms between natural resource concessionaires and other users; identifying shared infrastructure platforms can promote economies of scale, potentially reduce environmental disruption, and create the basis for engaging other partners, designing cost-sharing arrangements or informing policy. A 10-year ambitious plan might lead to the constitution of a special fund to facilitate more investment in rail, roads, ports, and other critical infrastructure to support the workforce and jobs in regional and mining communities, and along transport corridors.

The map would also help anticipate the demand for various forms of infrastructure along the corridors, by assessing the potential economic activity and its related potential infrastructure demands. Anticipating necessary infrastructure upgrades before reaching capacity gridlocks can help to ensure that capacity constraints do not block potential growth. Finally, the map would help identify the projects that, although critical for the development, are stalled or neglected for various reasons, including disagreements between stakeholders or lack of financing.

To finance the additional cost of extra capacity, potential third party financing options could be considered. Several models have been observed.

In the first model, the mine owner retains 100% ownership of the infrastructure and opens it to other operators on a fee-for-service basis (usage fees), under Master Service Agreements. The initial operator specifies generic terms for the third-party access agreements in the master service agreement and then defines specific arrangements with each operator in subsequent agreements. There is a "first-mover advantage," since the first-mover company gets to set the direction and the terms of the agreement. The regulatory challenge here is to make sure that such usage fees are reasonable and fixed on a non-discriminatory basis. The Marampa mine in Sierra Leone is an illustration (see Box 12).

Box 12: Sierra Leone - the Marampa Iron Ore Project

The Marampa Iron Ore Project is a mining project located near the town of Lunsar in Sierra Leone, currently being evaluated for the production of a high-grade hematite iron ore

[75] Adapted from Vale Columbia Center for Sustainable International Investment, Zambezi Valley Development Study, available at: http://www.vcc.columbia.edu/content/zambezi-valley-development-study.

concentrate. The Marampa Project is known to have a mineral resource of 680 million tons. Through approximately 80 km of rail infrastructure, the Marampa Project is connected to an existing deep-water port, ship loader and stockpile area in Pepel. Inititally, African Minerals owned the entirety of the Marampa Iron Ore Project. [76] In November 2008, African Minerals obtained a lease from the Government of Sierra Leone for the railway from Marampa to Pepel and Pepel Port, giving the company the right to access and operate the existing rail and port infrastructure for an annual fee of US $250,000.[77] Notably, in the 99-year lease agreement, the government of Sierra Leone obligates third-party accessibility of the rail and port infrastructure after African Minerals upgrades the facilities, by stating "the Port and the Railway be made available at commercial rates to other users including mining companies and general cargo and passenger transporters." With the aforementioned lease, African Minerals undertook rehabilitation and reinstatement of the railway line, along with building a 120 km extension to new mines in the Tonkolili area, also in Sierra Leone. In 2009, Cape Lambert acquired the Marampa Iron Ore Project from African Minerals, allowing African Minerals to focus on the development of its flagship Joint Ore Reserve Committee-compliant Tonkolili project, known to have 5.1 billion tons of iron ores.[78]

Cape Lambert Resources, now with a 100% stake in the Marampa project, signed an agreement in April 2012 with African Minerals, gaining access to transport infrastructure.[79] In addition to providing access to the railway to transport iron ore concentrate to the operating Pepel Port, African Minerals will provide Cape Lambert with train sets and materials handling facilities at the port with the capacity to unload and stockpile up to 200,000 tons of the iron ore concentrate. It will also arrange for stockpile reclaiming and loading of iron ore concentrate onto transhipping vessels at Pepel Port. African Minerals' fees for the service of rail transportation, port handling, transhipping and ship loading of Marampa Concentrate are at a cost plus 20 percent basis.[80] The rail and port infrastructure requires further refurbishment and upgrading, but access to existing rail and port infrastructure reduces the project's capital investment and lead time for Cape Lambert. However, Cape Lambert will still need to design and build a 34 km rail spur line from the Marampa project to the existing railway.[81]

Cape Lambert is developing Marampa in two stages, separated by mode of transport. In the first phase, up to 4 million tons of hematite iron ore will be produced each year. The ore will be transported by rail to the operating port in Pepel. The second stage will entail an increase in production to at least 10 million tons each year, with the output to be pumped through pipelines to the deep-water port that is being developed by African Minerals.

[76] Railways in Sierra Leone, available at: http://www.sinfin.net/railways/world/sleone.html
[77] African Minerals Limited. Infrastructure Lease, available at: http://www.investegate.co.uk/article.aspx?id=20081112070502965 6H
[78] "Cape Lambert buys rest of Marampa project," available at: http://www.miningweekly.com/article/cape-lambert-buys-rest-of-marampa-project-from-african-minerals-2009-11-25
[79] Cape Lambert - Projects and Investments: Marampa Iron Ore, available at: http://www.capelam.com.au/irm/content/projects_marampa.html
[80] "Marampa Signs Binding Heads Of Agreement" April 16, 2012, available at: http://www.4-traders.com/CAPE-LAMBERT-RESOURCES-LI-6494262/news/Cape-Lambert-Resources-Limited-Marampa-Signs-Binding-Heads-of-Agreement-14272440/
[81] Cape Lambert - Projects and Investments: Marampa Iron Ore, available at: http://www.capelam.com.au/irm/content/projects_marampa.html

In the second model, one operator solicits other operators to get involved under a joint venture agreement: the ownership is shared. The initial operator sets up a company and then sells shares to external investors/operators, or all operators create a joint venture company. All the operators participate in the initial upfront investment costs and/or in the building and operating of the infrastructure. In exchange, each operator enjoys access rights to the shared assets. While operators compete initially for the market share, they end up cooperating to optimize the throughput. The regulatory challenge here is to make sure that other companies can enter later on, on a non-discriminatory basis and under fair financial terms. The greenfield Simandou Ore project in Guinea is an illustration of this model (see Box 13).

Box 13: Guinea: Simandou Iron Ore project

The Simandou railway will be a trans-guinean 650km railway linking iron ore mines at Simandou to a new port near Matakang. The first ore shipment is planned for mid-2015. Simfer S.A. is the mine owner of Simandou Blocks 3 and 4, or "Simandou South." Simfer S.A. is owned by Rio Tinto, the International Financial Corporation (IFC), and the Aluminium Corporation of China Limited (CHALCO). Under the settlement agreement signed between Simfer S.A. and the Government of Guinea on April 22, 2011, Simfer S.A. owns the port and railway. The settlement agreement provides that the Government of Guinea has the right to take a stake of up to 35 % in Simfer S.A. (the mine) and a 51 % stake in a special purpose vehicle (SPV) that will be set up to build, operate and own the mining infrastructure (the rail and port)[82]. Currently, the SPV is planned to be held at 51% by a joint venture between the state-owned investment company (Société Guinéenne du Patrimoine Minier) and African Iron Ore Group (now Severstal Liberia Iron Ore Ltd.), and at 49% by the entities owning Simfer S.A. (Rio Tinto, CHALCO, and the IFC).[83]

According to the terms of the settlement agreement, Simfer S.A. is to enjoy "priority use" as a "foundation customer." But the line will also be available for passenger and other freight trains, and Simfer S.A., as operator of the joint venture, may haul other mineral producers' ore subject to commercial agreements[84]. Other potential third-party operators, for now, are: BHP Billiton, Arcelor Mittal, and London Mining PLC. Third-party operators that are willing to participate in the infrastructure joint venture are required to fully fund their proportion of the infrastructure capital cost and their share in the joint venture will be proportional to their share in the capital cost.

After 30 years, the ownership of the infrastructure assets will revert to the Government. The management of the infrastructure will then be put to international tender and as a foundation customer, Simfer will benefit from lower access charges.

For the Sundance project, the model for third-party access is still undecided (see Box 14).

Box 14: Cameroon greenfield development - the Mbalam Iron Ore Railway

[82] Rio Tinto, "The Simandou Project," available at: http://www.riotintosimandou.com/documents/RT9462_GUINEA_FACT_SHEETS(ENG).pdf.
[83] "Simandou infrastructure joint venture sealed," *Mining Journal*, June 1, 2012.
[84] Rio Tinto, Media Release, April 22, 1011, available at: http://www.riotinto.com/media/18435_media_releases_20523.asp

The Mbalam iron ore railway is planned to be 510 km long and an integral part of the Mbalam Iron Ore Project, a mine operated by Sundance Resources Limited (Australia) ("Sundance").[85] The railway will be dedicated to the transport of iron ore from the deposits in Cameroon and Congo to the port of Lolabé, on the Atlantic coast of Cameroon. The railway will be owned and operated by Sundance, on the Cameroonian side through its subsidiary Cam Iron SA (90% of which is owned by Sundance) and on the Congolese side by Congo Iron SA (85% of which is owned by Sundance.)[86]

Sundance is currently discussing infrastructure sharing arrangements with five private mining operators with potential mining developments close to Sundance's proposed railway route. In May 2011, a non-binding preliminary agreement was signed between Sundance and Legend Mining Limited regarding the usage of Sundance's proposed rail and port infrastructure by Legend Mining Limited.[87] For now, the proposed arrangements with those five companies have been to either charge them access fees for the networks that remain exclusively operated by Sundance, under a master service agreement in which capacities would be determined in advance and for specific durations or make third-parties participate in the upfront costs through a joint build and operate agreement.

The CEO and MD of Sundance reportedly said that "as a first-mover in this emerging world-class iron ore region, the Company viewed it as very important to work in a spirit of cooperation with neighbouring resources companies for the mutual benefit of all stakeholders including the Government and people of Cameroon."[88]

In the case of greenfield projects, it is particularly important to define the financial and regulatory model that will encourage the infrastructure owner to design the infrastructure to accommodate excess capacity to enable shared use of the infrastructure. Encouraging (or mandating) excess capacity in the project planning phase would counteract the potential 'chilling' effect on new investment if owners anticipate that third party access may be mandated at a later stage. Without a clear framework at the outset, the fear of mandated shared access at a later stage incentivizes owners to build smaller than optimal facilities to create a capacity constraint, and thus avoid the threat of regulated access. Australia was faced with this issue in 2002 (see Box 15).

Box 15: Australia's third party access model – applicability to greenfield infrastructure

Part IIIA of the Competition and Consumer Act of 2010 (previously the Trade Practices Act of 1974) creates an explicit regulatory regime for "declaring" third party access to essential infrastructure which it is uneconomical to duplicate.

The regulatory regime was designed to apply to existing, mature infrastructure. The Productivity Commission's report in 2002 recognized that it may not be appropriate for greenfield investments. Gas pipeline companies have complained that: "we potentially face a situation in the future of 'spaghetti pipelines' across the country where pipelines are only built based on what

[85] Sundance Resources LTD, *2011 Annual Report,* "The Mbalam Iron Ore Project" (Sundance: 2011), available at: http://sdl.live.irmau.com/IRM/Company/ShowPage.aspx?CPID=2283&EID=88412214

[86] Sundance Resources Limited, www.sundanceresources.com.

[87] Sundance Resources Limited, *Sundance Annual Report 2011*, "Third-party access" (Sundance: 2011).

[88] Sundance Resources Limited, "Sundance Resources and Legend Mining sign access co-operation letter of intent," Company Release, May 11, 2011, available at: http://www.mineweb.com/mineweb/view/mineweb/en/page674?oid=126804&sn=Detail&pid=102055

the market will contract for today. The current regulatory regime offers no incentive to build a pipeline with spare capacity which takes a risk on the future market growth, and yet this is a time when it is most critical for the development of the Australian gas industry."[89]

More generally, the problem is uncertainty about future third party access, and the terms on which it may be granted.

There is evidence that this issue has in fact contributed to delays in construction of new railways in Australia. Financiers were reluctant to back the Alice Springs to Darwin rail project because of the threat that the railway would be declared open for third party access. This was true even though the risk was regarded as low, due to strong competition from road haulage.[90]

The Productivity Commission put forward several suggestions to make the regulatory regime appropriate for greenfield investments:

- Binding rulings: prior to construction, owners could ask the regulator for a determination on whether the infrastructure falls under the access regime or not.
- Framework undertakings: the owners draft an undertaking, which would detail the terms and conditions of access for the lifetime of the asset, and seek endorsement from the regulator.
- Allowing a higher rate of return for greenfield investments, reflecting the greater risk compared to established infrastructure.
- Access "holidays" and other exemption arrangements: allowing the owner of greenfield infrastructure to be exempt from third party access for a certain period after construction – either for a defined period, until the net present value of the project becomes positive, or for the lifetime of the asset.

A paper by Joshua Gans and Stephen King strongly argues in favor of access holidays for greenfield infrastructure to overcome the regulatory truncation problem,[91] as well as to encourage investors to bring forward investments rather than delay.[92]

Finally, when it can afford it, the Government itself may take an equity stake in the project. By participating directly in the building of the infrastructure, the Government can reduce the financial burden on the infrastructure owner, and also influence shared use through its equity stake. For example, all railway construction in India under the PPP/SPV model involves the Government as an equity partner, holding a minimum of 26 percent equity shares to ensure voting rights (see Box 16 below).

Box 16: PPP greenfield development-the Krishnapatnam Railway Company

In the wake of a massive PPP investment plan for the Indian rail sector to eliminate capacity bottlenecks, a Shareholders Agreement was signed on October 13, 2006 between Indian Railways's (IR) SPV, Rail Vikas Nigam Limited (30% equity ownership), Krishnapatnam Port Company Limited (30%), National Mineral Development Corporation (15%), the State

[89] Productivity Commission, op. cit., p. 75.
[90] Productivity Commission, op. cit., p. 292.
[91] The regulatory truncation problem is related to regulatory rate of return pricing models that generally cap returns to investors at a certain "fair" level; which means that the upside risk is capped, but the downside is not.
[92] Joshua S. Gans and Stephen King, "Access holidays for network infrastructure investment," 10(2) *Agenda* (Melbourne, Australia: 2003).

Government of Andhra Pradesh (13%), and Brahmani Industries Limited (12%) for the creation of an SPV, Krishnapatnam Railway Company Limited (KRCL), for implementation of the Obulavaripalle-Krishnapatnam New Railway Line Project in Andhra Pradesh. The main rationale for the project was to provide railway connectivity for the iron ore belt in the Hospet – Bellary area (in Karnataka state) to the Port; however, the railway is operated on the common carrier principle for public transportation of goods and passengers. The project is expected to transport 20 million tons of traffic, mainly comprising iron ore, barites, coal and food grains.[93]

Operation of this railway, as all railways in India, is controlled by Indian Railways (IR), who conducts traffic with its own rolling stock, acting as a common carrier. Use of dedicated non-IR rolling stock is permitted for a fee. For the duration of the concession period (33 years), KRCL is responsible for maintenance of the project line to make it "rail-worthy" at all times, including replacement/renewal of assets as per IR standards and specifications. Supervision and certification of these requirements is done by IR, with the specified charges paid by KRCL[94]. After the concession period, ownership of the project line reverts back to IR. All users of the tracks, whether they are stakeholders of the SPV or not, pay a fee to IR and annually IR reverses part of the fees to the SPV stakeholders in return for their investments. The SPV stakeholders, by law, cannot make more than an Internal Rate of Return of 14%.[95]

Financing an equity stake is a challenge for a Government facing major development needs. The Government of Guinea, for example, funds its 51% stake in its joint venture with Simfer S.A. through a special agreement with the African Iron Ore Group (AIOG) that involves a type of "resource-for-infrastructure deal" with the Chinese Government (see Box 17).

Box 17: Financing the Government of Guinea's stake in Simfer S.A.
On 30 November 2011, AIOG signed a joint venture agreement with the state-owned mining investment vehicle of the Republic of Guinea ("SOGUIPAMI") to participate in SPV Simfer. SPV Simfer is the special-purpose company responsible for building the rail and port infrastructure of the Simandou Blocks 3 & 4, or "Simandou South" project as mentioned in Box 13. AIOG will assist the Guinean Government to fund its commitment of 51% ownership of the infrastructure. AIOG is an iron ore miner specialist but also has expertise in capital mobilisation and marketing to enable rail and port infrastructure development related to mining projects in Central and West Africa. This expertise relies in particular on a partnership with China. AIOG's model is to be paid in iron-ore production proportionally to its investment in the capital cost of the infrastructure; this production would be resold to China. [96]

Resource-for-infrastructure deals are adopted more and more widely in Africa. They have however two main limitations: they mortgage Africa's economic mainstay and they are not

[93] National Mineral Development Corporation, *Annual Report* (Hyderabad, India: NMDC, 2009), available at: http://nmdc.co.in
[94] Government Of India Ministry of Railways (Railway Board), "Sub: Draft policy for private participation in rail connectivity and capacity augmentation projects" (January 2012), available at : http://www.indianrailways.gov.in/railwayboard/uploads/directorate/infra/downloads/draft%20policy%20letter.pdf
[95] Raghuram, G and Gangwar, Rachna. "Lessons from PPPs of Indian railways and way forward," Working Paper No 2010-08-02 (Indian Institute of Management, Ahmedabad, August 2010).
[96] African Iron Ore Group Limited, *Factsheet*, available at: http://www.aiog.com/wp-content/uploads/16689-AIOG-Factsheet_AW_PF1.pdf

accompanied by railway management and maintenance solutions. Therefore they should be adopted carefully[97].

Differently from Guinea, the Government of Madagascar found a special arrangement with Rio Tinto and the World Bank to fund its share in the Port in Ehoala: Rio Tinto directly signed an agreement with the World Bank, which is rare in the World Bank's typical dealings with governments.[98] The World Bank become involved in the project because it was concurrently undertaking a major regional development plan with the Government of Madagascar through the 'Integrated Growth Poles Project,' and the port was deemed integral to regional development in the area (see Box 18).[99] This project was ground-breaking in terms of revealing international willingness to move from mining enclave model to regional integration model.

Box 18: Financing the Government of Madagascar's stake in Ehoala

A joint venture between Rio Tinto (80%) and the Government of Madagascar (20%) has developed Madagascar's largest infrastructure project to date, an ilmenite mine and a new public port in Ehoala, southwest of Fort Dauphin, on the southern tip of the island. Rio Tinto funded 100% of the project's construction from 2006 until first production in 2009. At this point, the Malagasy government was due to fund its share of project costs or dilute its interest.[100] However, Rio Tinto signed an agreement directly with the World Bank, where the World Bank lent $35 million to the Government of Madagascar in their contribution towards construction of the port. Rio Tinto funded $240 million of the project. Construction started in January 2006; the first shipment of ilmenite was sent through the newly completed Port of Ehoala in May 2009.[101]

The deep-water Port of Ehoala was built not only to export ilmenite from the Rio Tinto/QMM operation, but also serve cruise liners, container ships, and refrigeration vessels, opening up new opportunities for the local economy.

Rio Tinto QMM currently manages the port operations. At the end of the life of the mine, roughly projected to be about 40 years, the port will be entirely owned by the government of Madagascar, falling under the jurisdiction of the Agence Portuaire Maritime et Fluviale (APMF).[102]

Despite the fact that Rio Tinto's operating port is designed to be multi-purpose, in effect it only serves Rio Tinto's needs. Indeed since the port is remote from all economic activities, container-shipping activity is extremely modest (15,000 TEU over the past three years)[103]. This example recalls that managing to require shared use from the mining investments is not necessarily effective. The requirement needs to stem from a national infrastructure plan assessing where the public-private coordination makes more sense (as seen in Box 11).

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[97] See Paul Collier, op. cit
[98] ICMM, "Mapping in-country partnerships." February 2010. p. 34.
[99] IDA, "Boosting the Business Environment – Madagascar," available at: http://web.worldbank.org/WBSITE/EXTERNAL/EXTABOUTUS/IDA/0,,contentMDK:22303219~menuPK:4754051~pagePK:51236175~piPK:437394~theSitePK:73154,00.html
[100] Rio Tinto, "Rio Tinto's involvement with the Malagasy government," available at: http://www.riotintomadagascar.com/english/aboutMalagasyGovernment.asp
[101] ICMM, pp. 32-34.
[102] Rio Tinto, "Rio Tinto's involvement with the Malagasy government," available at: http://www.riotintomadagascar.com/english/aboutMalagasyGovernment.asp
[103] Port d'Eohala, Madgascar website: http://www.ehoalaport.com/

Recommendation five: Carefully draft legal provisions mandating shared use which are clear, precise, based on objective criteria and simple to adjudicate, with a clear legal remedy for their breach, and access to a forum for resolving disputes

Legal language designed to ensure that competitors or other users have access to infrastructure must be very explicitly drafted. In Australia, clauses that require the infrastructure asset owner to provide shared use or third party access to other users "without unduly prejudicing or interfering with its operations" have proved ineffective, as owners consistently claim that shared use or third party access would interfere with its operations. Even competition regulation designed to force owners to open up infrastructure where it is "uneconomical to develop" (Australia) or "impractical to duplicate" (US) an "essential" infrastructure has not worked (see Box 19 and Box 21).

Box 19: Lack of effective open access regulation in Western Australia

The iron ore railways were constructed in the 1960s following the discovery of significant iron ore deposits in the remote Pilbara region. At the time, the State Government of Western Australia lacked the budget to construct the infrastructure required to build rail and/or port infrastructure in the Pilbara, and hence wanted to encourage private investors to commit the large sums of capital required for economic development of the region. To do this, the Government entered into agreements with mine developers[104] (ratified by Parliament) that set out the terms on which the companies would develop their mines and associated infrastructure. The terms included obligations on the state (e.g. making available necessary land for the mine, rail and port construction) as well as on the miners (e.g. royalty payments).[105]

Most relevantly, the agreements oblige the mine operator to carry the freight of the state and of third parties on its lines, where this does not interfere with its own operations. The specific provision reads:

"the Company shall operate its railway in a safe and proper manner and *where and to the extent that it can do so without unduly prejudicing or interfering with its operations hereunder*… transport the passengers and carry the freight of the state and of third parties on the railroad… for reasonable charges" (emphasis added).[106]

The requirement that third party haulage does not interfere with proprietary operations has, predictably, meant that no third party freight has ever been transported on private Pilbara lines.

Under separate federal legislation, the Minister, on recommendation from the Competition Council, may require the owner of certain essential private assets to make them available to third

[104]For example, the Iron Ore (Hamersley Range) Agreement Act of 1963 (WA), Iron Ore (Mount Goldsworthy) Agreement Act of 1964 (WA), Iron Ore (Mount Newman) Agreement Act of 1964 (WA), among others.

[105] Interestingly, the original Agreements contained variation clauses permitting joint infrastructure development by the mining companies, should they so agree. In reality, each company proceeded separately with its mine/rail/port infrastructure systems.

[106] See, e.g., *Iron Ore (Hamersley Range) Agreement Act* of 1963 (WA), First Schedule, clause 10(2)(a). Identical provisions are found in other Agreements.

parties where it is "uneconomical for anyone to develop another facility to provide the service."[107]

In 2011, the Federal Court ruled that "uneconomical" means "whether it is economically feasible for someone in the marketplace to develop an alternative to the relevant facility. It assesses whether it is, in fact, profitable for another person to duplicate the relevant infrastructure."[108] The question is to be resolved by industry evidence. Any evidence that shows it is profitable to privately duplicate the infrastructure is decisive, without needing to debate the relative productive efficiencies.

This interpretation narrows the scope of infrastructure that can be declared open access. Even if it is more efficient from society's perspective for infrastructure to be shared, as long as someone could duplicate the infrastructure and still profit, the court will not order access.

Additionally, the legislation only provides access to excess capacity. If there is no excess capacity, there can be no declaration of open access under the legislation.[109]

This case reflects the difficulty in imposing third party access on an integrated mine-rail-port system; as the system will generally be built only to the required capacity of the mine, there will seldom be extra capacity available to other parties. Legal language that grants rights of third party access where "reasonable" or "feasible" thus will seldom be operational.

Provisions in African concession agreements obliging the concessionaire to allow shared use of the asset have also generally proven ineffective due to vague language (see Box 20).

Box 20: Shared use and third party access regulations in select African countries

Ivory Coast

In Ivory Coast, article 72 of the Mining Code provides that transportation networks that belong to one operator and that "could possibly be used in common"(*susceptibles d'un usage commun*) can be used by neighboring operators and be opened to public use.[110] The Code mentions that this common usage should be defined in a convention signed with neighboring operators, but no particular mechanism is foreseen.

Cameroon

In Cameroon, article 80 of the Mining Code provides that any construction that is beneficial to several neighboring operators should be paid for by those operators in proportion to the benefit it gives them. Under article 82, the routes created by one operator can be used by other operators. There are two conditions. First, the third-party operators must send a request asking for such use. The Mining Code does not detail whether the request must be sent to a public entity or to the initial operator. Second, the use must not be prejudicial to the operator who owns them, or the

[107] Sections 44G(2)(b) and 44H(4)(b) of the Competition and Consumer Act of 2010, which replaced the Trade Practices Act of 1974.

[108] Allens Arthur Robinson, "Focus: Full Federal Court decision on access," May 16, 2011, available at: http://www.aar.com.au/pubs/comp/focompmay11.htm

[109] Holman Fenwick Willan, "Wheat export regulation: the end is nigh" (HFW, October 2011), available at: http://www.hfw.com/publications/client-briefings/wheat-export-regulation-the-end-is-nigh

[110] See article 72 of the Mining Code of the Republic of Côte d'Ivoire created by Law No. 95-553 of July 17, 1995.

operator must be properly compensated for such use.[111] But interestingly, the Mining Code provides that in all cases, the charge of maintenance costs is always born by the initial operator. Finally, the communication route can be declared of public interest (*déclaration d'utilité publique*) and subject to the relevant expropriation measures, but this is not a mandatory requirement to trigger shared use.

Burkina Faso

In Burkina Faso, shared use and third party access provisions in the regulatory framework are slightly more developed. Article 69 of the Mining Code has the same language as that of Ivory Coast. But such shared use is only possible if the owner of the transport network is not adversely affected (*à condition qu'il n'en résulte aucun inconvénient pour l'exploitant*) and if the owner is paid financial compensation as well as the costs of usage and maintenance.[112] This shared use must be subject to an agreement between the different operators, and the Ministry of Mines is in charge of defining the conditions and modalities for shared use. Importantly, article 69 paragraph 3 provides that such agreement is mandatory "where the preservation of the environment requires it" (*lorsque la préservation de l'environnement l'exige*). But the Code does not provide any further detail here.

Republic of Congo (ROC)

In the Republic of Congo, article 14 of the Mining Code provides that the Government can create a public entity so as to intervene in any operation necessary for the construction and development of mining infrastructure and has to participate in the capital of any mining exploration company operating in the country.[113] All mining-related activities are regulated by the Ministry of Mines. Railways and other mine-related transport infrastructure can benefit from right-of-way/easement of way ("*servitudes d'obligation et de passage*") under articles 109 and 113. Their construction and development is subject to *déclaration d'utilité publique* under article 114, a status which triggers the possibility of expropriation for public interest. All transportation networks that have been declared of public interest (*déclaration d'utilité publique*) can be subject to a public service obligation under article 114.3.

Legal provisions are more likely to be successful where they are clear, precise, based on objective criteria and simple to adjudicate. There must be a clear legal remedy for their breach, and access to a forum for resolving disputes. Typically, an independent Government regulator will be responsible for monitoring compliance with owners' undertakings, although this role can also be fulfilled by the courts or an independent arbitrator. Nonetheless, realizing access through the judicial system rather than through the administrative system can be a more uncertain process (see Box 21).

Box 21: The US essential facilities doctrine: disagreements over scope of application and outcomes

The U.S. essential facilities doctrine dates back to the 20th century and has been used in particular in the case of railways and airports. In *United States v. Terminal Railroad Association of St Louis*,[114] the U.S. Supreme Court defined "essential facilities" as "instrumentalities … of

[111] See article 11 of the Mining Code of the Republic of Cameroon created by Law No. 001-2001 of April 16, 2001.
[112] See article 18 of the Mining Code of Burkina Faso created by Law No. 031-2003/AN of May 8, 2003.
[113] See articles 14 and 100 of the Mining Code of the Republic of Congo created by Law No. 4-2005 of April 11, 2005.
[114] *United States v. Terminal Railroad Association of St. Louis*, 224 U.S. 383 (1912) [hereinafter *Terminal Road*].

the greatest public utility,"[115] exclusion from which (including through the imposition of "arbitrary hauling charge[s]"[116]) would induce an "illegal restraint of trade,"[117] an "unnecessary duplication of facilities,"[118] and an "attempt to monopolize,"[119] and which acquisition "cost to any one company is prohibitive."[120] In *Terminal Railroad*, the court finally agreed that the infrastructure, the only existing railroad bridge, should be "jointly owned and controlled"[121] by the non-proprietary companies and access ensured to all owners under "just and reasonable terms."[122] The court added that access should be guaranteed on the basis of "[non-]arbitrary charges" [123] subject to review by the Interstate Commerce Commission (now replaced by the Surface Transportation Board.)

Since *Terminal Railroad*, the essential facilities doctrine has been used by several circuit courts.[124] The Ninth Circuit further interpreted "essential" as meaning that exclusion can "eliminate" competition.[125] Other courts have preferred restricting the definition, stating that facilities are not "essential" where equivalent facilities exist,[126] that no access should be granted where sharing is "impractical,"[127] or where there is legitimate justification to refuse it.[128]

As a matter of fact, the US Supreme Court never formerly acknowledged this doctrine. It has even refused to use it where access threatens innovation, where compelled negotiation creates a risk of collusion,[129] or where it would imply forcing parties to cooperate.[130]
For this reason, outcomes of claims brought in US courts are quite uncertain. On the contrary, claimants bringing a claim before a specialized administrative agency such as the Surface Transportation Board can rely on more straightforward precedents, with precise tests and clearly established methods of calculus (see Box 7).

In addition to the fact that the judiciary process is generally lengthier and more unpredictable than the administrative one, leaving the duty to find access solutions and determine access tariffs to the judiciary can also be less efficient. Indeed 1) judges have more limited knowledge than

[115] *Terminal Railroad*, 224 U.S. at 402: Interstate Commerce Commission Termination Act, Pub.L. 104–88, 109 Stat. 803 (1995).
[116] *Terminal Railroad*, 224 U.S. at 410.
[117] *Terminal Railroad*, 224 U.S. at 384.
[118] *Terminal Railroad*, 224 U.S. at 393.
[119] *Terminal Railroad*, 224 U.S. at 410.
[120] *Terminal Railroad*, 224 U.S. at 397.
[121] *Terminal Railroad*, 224 U.S. at 406.
[122] *Terminal Railroad*, 224 U.S. at 411.
[123] *Terminal Railroad*, 224 U.S. at 412
[124] R. Pitofsky, D. Patterson, and J. Hooks., "The essential facilities doctrine under United States antitrust law," 70 *Antitrust Law Journal* (2002), p. 443, available at : http://www.ftc.gov/os/comments/intelpropertycomments/pitofskyrobert.pdf.
[125] *City of Anaheim v. S. Cal. Edison Co.*, 955 F.2d 1373, 1380 n.5 (9th Cir. 1992) (quoting *Alaska Airlines Inc. v. United Airlines Inc.*, 948 F.2d 536 (9th Cir. 1991).
[126] *Apartment Source of Philadelphia v. Philadelphia Newspapers*, Civ. A. No. 98–5472, 1999 WL 191649, at *7 (E.D. Pa. Apr. 1, 1999).
[127] *Hecht v. Pro-Football, Inc.*, 570 F.2d 982, 992–93 (D.C. Cir. 1977).
[128] *City of Anaheim*, 955 F.2d at 1381. For a review of international variations of the "essential facilities" doctrine, see OECD, *The Essential Facilities Concept* (Paris: OECD, 1996), Policy Roundtables, available at: http://www.oecd.org/dataoecd/34/20/1920021.pdf.
[129] *Verizon Communications v. Law Offices of Curtis V Trinko LLP*, 540 US 398 (2004) (authorizing a telephone carrier with an exclusive franchise to deny interconnection.)
[130] *Aspen Skiing Co. v. US*, 410 US 366 (1973) (refusing to force ski resort operators to keep their agreement.)

firms to determine what a "fair" price is and less opportunities than a specialized regulator to develop specific industry expertise, and 2) they can only intervene punctually and are not in a position to monitor long-term compliance. To reduce regulatory risk, it is advised therefore that the courts should defer access and pricing decisions either to the market or to the regulator.[131]

An independent regulator model is the unanimously accepted "best-practice" model of regulation for its credibility, transparency and legitimacy. In addition, it has been shown to reduce the risk of renegotiation: using a sample of about 900 Latin American and Caribbean infrastructure contracts, Guasch, Laffont and Straub estimate that the existence of an independent regulatory body to monitor, enforce, and modify concession contracts reduces the expected renegotiation rate by 20–40 percent.[132]

Nonetheless, the regulator model is only viable where it offers guarantees of independence. This implies not only independence from the parties at stake, i.e. both the firms and the government, but also independence from a pro-access agenda that will impede neutral decisions in terms of access. [133] Differently, having a regulator specialized on antitrust issues, for example, would allow to ensure both the goals of market efficiency[134] and have a more independent judgment with regards to access disputes.

In addition, the independent regulator model only works in a context where there is no multiple level of decision-making, which would increase regulatory risk. In Australia, for example, critics show the complexity of the Australian regulatory model, where access issues are determined either by courts or by administrative agencies at the federal and state levels, by the local government, or by the national government.[135] On the contrary, having one single decision-making entity ensures more certainty in the outcome, Some jurisdictions have preferred a structure with one specialized administrative agency, like the STB in the United States (see Box 7). Other have preferred a hierarchical structure, like the proposed institutional structure to regulate mining-related infrastructure developments in Mongolia, where different specialized administrative entities are gathered under one single body in charge of overseeing cooperation between all the entities and issuing the final decision.[136]

Sometimes the institutional setting is not suitable for the independent regulator model and therefore transitional regulatory systems are needed.[137] In this situation, it has also been advised

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[131] Moran and Pengilley, op. cit.

[132] J. Luis Guasch, Jean-Jacques Laffont, and Stéphane Straub, "Concessions of infrastructure in Latin America: Government-led renegotiation," Working Paper (University of Edinburgh, Scotland: 2005), p. 28.

[133] Moran and Pengilley, op. cit..

[134] See Janusz A. Ordover and Russel Pittman, "Restructuring the railway for competition," Paper prepared for the OECD/World Bank Conference on Competition and Regulation in Network Infrastructure Industries, Budapest, June 28 – July 1, 1994, available at: http://129.3.20.41/eps/io/papers/0111/0111006.pdf

[135] Moran and Pengilley, op. cit.

[136] The proposal in Mongolia is to have one entity overseeing other entities, such as one specialized on tariffs, one on risk management, one on PPP structures, one on emergency decision-making (which could "step-in" the decision-making process of another agency where the latter is not diligent enough) and another which would be a council between mining companies, the national and local governments, and NGOs. The International Bank for Reconstruction and Development / The World Bank, *Southern Mongolia Infrastructure Strategy* (Washington D.C.: The International Bank for Reconstruction and Development / The World Bank, 2009), available at: http://siteresources.worldbank.org/INTMONGOLIA/Resources/SMIS_July.pdf

[137] For a complete discussion on the topic, see World Bank, *World Bank Handbook for Evaluating Infrastructure Regulatory Systems* (Washington D.C.: The World Bank, 2006).

to refer to an international dispute settlement board whose members are vetted by the government, infrastructure investors and infrastructure users[138].

FURTHER RESEACH

This Working Paper has set out preliminary findings on appropriate commercial and regulatory models to encourage shared use in mine-related rail and port systems. In summary, we find that an effective regime for shared use of infrastructure assets requires both an appropriate commercial structure and well-drafted regulation. The goal is to set up a model wherein all parties are incentivized to maximize shared use through appropriate economic signals. Regulation can assist this process, but will be ineffective if it seeks to force companies to act against their commercial interests.

Further research will include:

- examining more closely the operational impact of shared use, to identify particular situations where shared use is more likely to succeed in particular when it comes to general cargo;
- extending the research to other types of infrastructure – in particular road transport, power, telecommunications, and waste water treatment facilities; and
- drafting model legal provisions that can be used by Governments.

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[138] Paul Collier, op. cit.

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