

Different approaches and responsibilities for investment sustainability in EU railway infrastructure: four case studies

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1. Introduction

This paper² describes the approach to investment in rail infrastructure in four European countries (Great Britain, France, Germany, and the Netherlands) with a view to understanding whether and how these countries differ in their approach to the sustainability of investment.

We compare and contrast different approaches to investment, such as:

- The direct role of government;
- The role of the economic regulator, where present;
- The influence of particular ownership agreements, such as the use of concessions for high-speed networks;
- Any differential treatment of assets and items of expenditure, such as maintenance, renewals, and enhancements;
- The role played by private capital (in infrastructure as separate from passenger and freight train operations); and
- The existence of a (more or less unlimited), either direct or indirect, state guarantee on debt issued to fund investment in network assets.

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When analysing the four European case studies, we ask the following questions, which may differ across infrastructure categories (for instance track/signalling, structures, stations, and high-speed lines):

- (a) What is the ownership structure of each Infrastructure Manager (IM)?
- (b) Who “sponsors” and specifies investment?
- (c) Who is responsible for planning and approving investment?
- (d) What are the ultimate funding sources of investment? And
- (e) Who is responsible for delivering investment?

After the illustration of the case studies, the paper concludes with some policy considerations.

2. Great Britain

In Great Britain³ (GB), the railway sector was privatised in 1994 and split into an IM (Railtrack, subsequently Network Rail since 2002), a number of franchised Train Operating Companies⁴ (TOCs), Freight Operating Companies (FOCs), companies leasing rolling stock to the former (known under the acronym of ROSCOs) and – more recently – open access operators in the passenger sector⁵. Since 2007, GB has had a dedicated high-speed line along the London-Folkestone (Kent) corridor, physically separate from the traditional network, which is owned by government⁶ and let under a long-term concession agreement to a company called High Speed 1 (HS1). The concessionary company is being sold by the government in 2010, but the concession itself (or rather, the company owning the right to transfer or revoke it) will be kept under public control. A second high-speed line, serving the domestic market along the West Coast corridor from London to Birmingham/Manchester and eventually Scotland, is currently planned under the name of High Speed 2 (HS2), with a provisional completion time horizon of 2025.

In GB there is an economic, technical, and safety regulator, the Office of Rail Regulation (ORR). ORR regulates both traditional and high-speed networks. Differently from some if not most UK network regulators (for instance, in utility

³ We concentrate on Great Britain (England, Wales, and Scotland) as a subset of the UK (which also includes Northern Ireland) because the most interesting arrangements for this specific paper are those made in Great Britain, where railways are vertically de-integrated and an economic and quality/safety regulator is active.

⁴ TOCs operate under franchise agreements with the government through the UK Department for Transport in England and Wales, and Transport Scotland (under devolution) in Scotland.

⁵ All FOCs are treated as open access operators, i.e. they are not franchised by government.

⁶ Under the name of London and Continental Railways (LCR).

sectors⁷), ORR plays an active role in the setting of network access charges as opposed to simply approving the methodology and calculation of charges by the industry. ORR sets revenue requirements for Network Rail (NR), the IM⁸ for conventional networks, and has recently started regulating HS1 (October 2009) along similar lines. Revenue requirements are determined according to the traditional UK method of “building blocks” regulation, although in the railway industry the building blocks tend to differ from those in the utility sectors because of different traditions in the categorisation of cost items.

In traditional utilities such as energy and water, the building blocks for a network operator would typically be operating expenditure⁹ (opex), capital expenditure (capex), and an appropriate rate of return on the Regulated Asset Base (RAB). In railways, the cost categories of an IM are typically made up of operating cost, maintenance cost, renewals cost, and cost related to enhancements of the network or other assets pertaining to the railway. This different categorisation has important implications for the way in which both the government and the economic regulator structure the funding and regulation of the IM. Although there is no ring-fencing of individual cost categories, both the government (Department for Transport) and regulator (ORR) tend to view funding and efficiency issues at least partially as a function of the different taxonomy of cost and asset categories that is typical of railway infrastructure.

2.1 Infrastructure ownership and funding of main lines

NR owns mainline infrastructure in GB, with the exception of HS1, whose assets are owned directly by the government through the Secretary of State.

NR itself is not owned directly by government, but is partly funded and (with respect to debt) “guaranteed” by it through a relatively uncommon corporate structure known as “Company Limited by Guarantee” (CLG). The CLG is an alternative type of corporation used primarily for non-dividend organisations that require legal personality. NR does not have a share capital or shareholders, but instead has “members” who formally guarantee it by undertaking to contribute a nominal amount in the event of the winding up of the company. In practice, the real guarantee is provided by government through debt. NR’s debt – albeit separate from pure and simple government debt – carries the backing of the UK government in exchange for a nominal fee. This particular arrangement puts NR in a somewhat undefined position that is, according to some independent bodies reporting to UK Parliament such as the National Audit Office (NAO), only formally different from that of full state ownership. In addition to the financial guarantee, the government also

⁷ For instance, the electricity and gas transmission/distribution sectors.

⁸ Network Rail is prevented by its licence from having any interest in the operation of trains, apart from infrastructure maintenance and inspection trains.

⁹ Depending on regulatory accounting conventions, the yearly rate of asset depreciation – which is also part of the building blocks – is either included in regulatory opex or kept as a separate category.

provides NR with a direct grant to complement NR's track access income. At the time of the last regulatory price control decision (late 2008), NR had been given, since company inception, £16.4bn¹⁰ (€19.7bn) worth of Government grants to supplement £6.2bn (€7.4bn) in regulated track and station access charges¹¹ paid by train operators using the network. In addition, NR issues debt on the open market under government support. Its level of debt has recently (June 2010) been reported as being in the neighbourhood of £23.8bn (€28.6bn)¹².

2.2 Infrastructure management and sustainability (main lines)

NR is entirely responsible for managing main line infrastructure in GB. It is also responsible for the sustainability of investment over time, within the funding constraints set by government and the caps imposed by ORR on the revenue requirement from track access charges (taking into account efficiency targets over each 5-year price control period). However, the government takes responsibility for making sure that investment outputs are set at a level which is compatible with the public funds available to the railway sector at each five-year interval. It does so through the High Level Output Specification (HLOS) coupled with a Statement of Funds Available (SoFA)¹³, which is the input available to meet HLOS requirements.

These documents are intended to ensure that the railway industry has clear and timely information about the strategic outputs that governments in England/Wales and Scotland want the railway to deliver with the public funds (grants) they are prepared to make available. ORR determines the outputs that NR in particular, as the monopolistic provider of main line infrastructure in GB, must deliver to achieve the HLOS, the cost of delivering such outputs in the most efficient way (revenue requirements), and the implications for the track access charges payable by train operators to NR for using the main line network.

Because of the above arrangements, there are three parties responsible in GB for making sure that investment in railway infrastructure is sustainable. These are:

¹⁰ The total amount of rail subsidies in the UK for main line services, including trains, is around £4.4bn (€5.3bn) per annum (2009), as reported by the UK Department for Transport. This is around 44% of the total amount paid by France in 2009, including local and regional subsidies. The British network is (mainline GB) roughly 55% the size of the French one.

¹¹ NR owns virtually all GB main line stations, with the exception of those serving HS1 and the Channel Tunnel (which are owned either by London and Continental Railways under concession to HS1 or by Eurotunnel, limited to the Tunnel terminals). It also manages a core of 18 mainline stations, including all London terminals, whereas smaller stations are – with a few exceptions – managed by franchised train operating companies.

¹² Sources: ORR and NR.

¹³ These two documents are the UK version of the Programme/Framework Contract between government and industry as per EC Directives on the liberalisation of the EU railway sector (first, second, and third packages).

(a) the government (through the HLOS and SoFA, issued at five-year intervals), including high-level enhancement ring-fencing;

(b) NR (through its active management of the network, subject to government and other funding, and regulatory determinations); and

(c) the regulator (through its efficiency determinations, for a given level of quality and safety, on operations, maintenance, renewal, and enhancement costs of the railway).

Investment sustainability must therefore be ensured through the combination of government guarantees and funding, the infrastructure manager's effectiveness and efficiency over time at delivering the outputs required by government policy and regulated by ORR, and ORR itself as it sets NR's targets in terms of cost efficiency and asset management for a given level of quality and safety. ORR does this by assessing NR, both in isolation and in comparison with other IMs (in the EU and beyond), through a series of benchmarking activities.

The GB case study is summarised in the following Table.

Ownership of IM	CLG structure, formally classified as private but guaranteed by the state
Access charges set by	Methodology and framework by the regulator (ORR); actual pricing calculations by the IM
Ownership and funding of high-speed network	Separate through a distinct company (LCR) directly owned by government, with tradable concession ¹⁴
Ring-fenced funding for different items of network expenditure (operations/maintenance/renewals/enhancements)	Some significant enhancements are ring-fenced in the HLOS, for instance the refurbishment of some big stations and some crucial projects

¹⁴ The concession (asset operations) is currently being put up for tender by the UK government. HS1 funding is mainly through per-train occupancy minute charges (pre-paid "use-it-or-lose-it" third-party access with currently no secondary market) paid by international open-access operators, and per-minute track access charges paid by domestic high-speed train services using the line between London and the Tunnel. There is no explicit (direct) government funding or network grant.

¹⁵ The London by-pass is jointly sponsored by Transport for London and Network Rail. There was also a Transport Innovation Fund, set up by the previous UK government for special innovation projects (mainly enhancements), but there are indications that, following the recent public spending review (June 2010), this fund will either be scrapped or be profoundly modified in scope.

	like London's "Crossrail" by-pass ¹⁵
Private share capital in IM?	No ¹⁶
Debt guaranteed by the state?	Yes, for a "financial indemnity" fee
Who sponsors and specifies investment?	The government, as a "high-level" output (sort of framework agreement)
Who plans and delivers investment?	NR ¹⁷
Who approves investment?	ORR, subject to high-level government specifications
Who funds investment?	Government, NR through track access charges, and the financial market through NR-denominated debt under state guarantee
Who is responsible for investment sustainability over time?	Government, NR, and the regulator (ORR)

Table 1: Institutional arrangements in GB.

3. France

In France, the railway industry is controlled by the state. Infrastructure management, including high-speed lines, is the responsibility of Réseau Ferré de France (RFF). RFF delegates the day to day maintenance of the network, and above all enhancements and renewals, to the historic incumbent Société

¹⁶ However, some network investment has recently been undertaken in conjunction with non-infrastructure parties such as train operators (for instance, on the commuter branch in South-East England franchised to Chiltern Railways). DfT has recently issued (July 2010) a consultation on train operations' franchise reform. The consultation covers options to ensure that future rail franchises deliver improved services for passengers, better value for taxpayer money, and create the right conditions for a sustainable rail industry. It includes specific options such as granting longer franchise periods, alternative risk-sharing arrangements, and incentives for private investment. It was published on <http://www.dft.gov.uk/consultations/open/2010-28/>. Note that train operators can be either publicly or privately owned. If the reform goes ahead, it might lead to more direct investment proposals from the TOCs, possibly in partnership with Network Rail.

¹⁷ Up to 2002, when the (then) IM was taken over by NR, much of planning and delivery was sub-contracted. Since 2003, NR has brought back in much of maintenance and all investment planning. Investment delivery falls under NR's responsibility but most of it is contracted out, both in terms of renewals and enhancements. Infrastructure maintenance is both planned and carried out internally. NR has around 33,000 full-time equivalent employees in total.

Nationale des Chemins de Fer Français (SNCF) in its capacity as “delegated IM”¹⁸.

RFF has been equipped by the French government with 1,100 full-time equivalent employees. Almost 50% of these are based in Paris, with the remaining 50% based across regional locations in France. The regional offices of RFF do not necessarily mirror historic SNCF rail regions, but are consistent with administrative French regions. RFF is the network asset owner for the whole of metropolitan France (including Corsica) and SNCF is currently the sole network asset concessionaire. RFF transfers to SNCF each year, on behalf of the government, a network management fixed fee of around €3bn.

RFF oversees SNCF’s best (i.e., efficient) use of the network management fee, a role which the economic railway regulator (ARAF), created in 2010, might contribute to in future. RFF also uses engineering sub-contractors to carry out its IM functions, but the role of these companies relative to SNCF is negligible.

3.1 The relationship between RFF, SNCF, and the regions

At the moment, there is a relatively small technical team available to RFF to oversee the efficiency and effectiveness of SNCF’s management IM contract. This means that some of SNCF’s actions might not be fully observed, or properly monitored, by RFF because of a shortage of resources. Moreover, it is arguable that investment planning and delivery should remain with RFF, but monitoring and review should be transferred to the independent regulatory authority, although the government will probably retain approval powers. The regulatory authority, ARAF, will also be responsible¹⁹ for high-speed network regulation and for international interconnections in conjunction with other regulators or commissions²⁰.

The fixed annual fee paid by RFF to SNCF for overall network management is reported as an operating expenditure item by RFF. This means that it is not

¹⁸ In June 2010, the European Commission took 13 countries, including France, to the European Court of Justice for not fully implementing the First European Transport Liberalisation Package (Directive 2001/14/EC). According to the Commission, France has still not clearly separated the management of railway infrastructure from train operations.

¹⁹ In practice, from 2011.

²⁰ At the moment, the Channel Tunnel between France and England, run commercially under the name of Eurotunnel, is regulated as a long-term concession by an Inter-Governmental Commission (IGC). It is worth noting that, apart from safety and technical inter-operability which are under the remit of the Valenciennes-based European Railway Agency (ERA), the international coordination of interconnection investment in railway infrastructure, including capacity allocation and congestion management, cannot rely on a sound European base yet. In other network industries, international cooperation responsibilities are currently being transferred by the European Commission to new agencies (energy, electronic communications).

possible for RFF to separate this fee into operations, maintenance, renewals, and enhancements of the network.

The subsidy paid by the French government to the rail industry as a whole amounts to around €12bn per annum²¹. Network renewals are funded out of RFF's own annual cash flow sourced from track access charges²² (circa €1bn p.a.). Regional lines²³ (where the majority of running trains are those belonging to the SNCF division known as Transport Express Regional, TER), are directly subsidised by regions (circa €200m per annum), in different proportions depending on every region's willingness to pay for, and propensity to support, local passenger railway traffic²⁴. Some of the subsidies are intended to pay for regional trains as opposed to lines, in which case SNCF will receive them directly.

3.2 Funding of renewals and enhancements

Network enhancements must be co-funded according to pre-defined quantitative principles by law:

(a) up to 50% through bonds (RFF's own debt²⁵); and

²¹ Source: authors' discussions with RFF.

²² In France, stations are owned by SNCF, not by RFF. This situation has potentially powerful implications for third-party, open access train operators, for instance those new entrants in the long distance and/or high-speed markets willing to exploit the competition possibilities offered by the third EU railway liberalisation package (2010). Although SNCF is obliged to provide station access to third parties on a non-discriminatory basis, there is an evident conflict of interest with special respect to the main TGV stations located along international corridors such as (for instance) those in Paris, Lille, Lyon, and Strasbourg.

²³ According to *Les Echos* (25 June 2010), the French government and SNCF have been negotiating a public service agreement for "territorial equality" rail lines (conventional lines that span more than one region, used by inter-regional, night, and special discount trains). Regions will not finance the lines directly. The government may establish an inter-regional compensation scheme funded through a surcharge on all high-speed train tickets (SNCF and new entrants). As reported by *Les Echos*, the "territorial equality" lines have an annual turnover deficit of EUR 100m to 400m. There are both rolling stock and line maintenance backlogs on these lines. The public service agreement could last for two to five years and will also determine the future of rolling stock renovation.

²⁴ This gives rise to distinct levels of rail transport density and pricing by region. Interestingly enough, since individual regions are not bound by emissions targets constraints locally, it will eventually be up to the state as a whole to balance different regional attitudes to rail subsidy against France's overall agreed emissions targets. This should be done by balancing the cost of local transport by different modes (rail, road, waterways) at a national level through (arguably) either a regional compensation fund or a nationally-led government policy on the relative pricing of non-rail local transport modes.

²⁵ Interest cost is split by duration (short and long term) to reflect the different time horizon of investment projects. There has also been a recent re-balancing between debt and network access charges (SNCF/RFF). RFF's debt is largely

(b) up to 50% through subsidies (from the state, the regions, and/or the EU in a very limited number of cases).

Network renewals are defined as like-for-like asset replacements. Everything that is not like for like is classified as enhancements. All new high-speed line projects are, by definition, enhancements, including international links used by both incumbents and new entrants.

The French case study is summarised in the following Table.

Ownership of IM	Entirely owned by the state
Access charges set by	RFF/SNCF, with a future role for the economic regulator (ARAF)
Ownership and funding of high-speed networks	RFF through network funding via grants, debt issues, and income from track access charges
Ring-fenced funding for different items of network expenditure (operations/maintenance/renewals/enhancements)	Yes
Private share capital in IM?	No
Debt guaranteed by the state?	Indirectly, since RFF is entirely state-owned
Who sponsors and specifies investment?	The government at a high level (Ministry of Transport) and RFF at a detailed level
Who plans and delivers investment?	RFF plans investment and incumbent TOC SNCF delivers it as "delegated IM"
Who approves investment?	RFF subject to its Programme Contract (a framework agreement) with the government; in the future, the regulator (ARAF) subject to the Programme Contract
Who funds investment?	Government, the regions (through RFF and SNCF; local lines only), RFF through track access charges, and RFF on the financial market through RFF-denominated bonds

determined by law because of the mandatory way in which railway capital expenditure must be financed.

Who is responsible for investment sustainability over time?	Government, RFF, SNCF under delegation, the regions, and – in the future – the regulator (ARAF)
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Table 2: Institutional arrangements in France.

3. Germany

In Germany, railway infrastructure is largely controlled by DB Netz²⁶ AG, which is part of the DB Group. Stations, energy traction, and other ancillary aspects of infrastructure are dealt with by separate companies of the DB (Deutsche Bahn AG) Group. Formally, there is an open access regime operating on all services. Regional rail transport is subcontracted, similarly to France, at a federal state level (Land) and there are separate DB companies dealing with regional train services (such as DB Regio). The regional DB company is also in charge of some regional passengers franchises overseas, for instance in England (Chiltern Railways, Tyne and Wear Metro in the Newcastle/Sunderland region) and is also active in passenger open access operations. DB has also a dominant position²⁷ in the German (as well as other European) freight market through its subsidiary DB Schenker. DB Schenker is also involved in road haulage and logistics.

The DB Group is run as a limited company with shareholders (Aktiengesellschaft). However, all shares are currently owned by the Federal Government. The infrastructure aspects of DB, i.e. the activities of DB Netz AG, are subject to federal economic regulation by the Bundesnetzagentur (BNetzA), Germany's multi-sector network regulator. The BNetzA does not directly monitor investment and does not, at the moment, benchmark DB Netz's cost efficiency levels. However, it has powers in the setting of track (and station) access charges contributing to DB Netz's annual regulated revenue requirement.

There are a large number of train operators in Germany, especially regional, local, suburban, and heritage railways. However, the long distance passenger market is virtually a DB monopoly and the levels of investment in regional grids are mainly agreed upon at Land level by passenger transport authorities (some of which can be municipal, especially in large conurbations) which, in a

²⁶ We understand that the group has recently renamed itself DB Netze (plural) to reflect a multiplicity of activities along different lines, including the electricity network.

²⁷ The European Commission, when justifying its Infringement Decision towards 22 out of 27 Member States for not abiding by the First Liberalisation Package (see <http://europa.eu/rapid/pressReleasesAction.do?reference=IP/08/1031&format=HTML&aged=0&language=EN&guiLanguage=en>), claimed that, for France, Germany, and a number of other Member States there were "insufficient incentives for the IM to reduce costs and levels of access charges", partly due to a lack of regulatory oversight, suggesting that the Bundesnetzagentur should be given more powers to oversee DB Netz AG.

similar way to France, contract their infrastructure and service requirements directly with DB Regio and other transport operators.

However, the way in which regional rail transport investment is dealt with in Germany bears a fundamental difference from what is observed in France²⁸. The federal states deal with two separate entities when agreeing the required level and funding of infrastructure investment and train services. DB Regio formally coordinates with its mother company DB Group (and DB Netz) on infrastructure issues as well.

DB Netz for network infrastructure (track, signalling, civil engineering, ancillary structures), DB Station & Service for stations including retail, and DB Energie for traction electricity all have access to overall infrastructure federal funding of €2.5bn per annum. Out of this total grant, €0.25bn each year is reserved (2009-2014) for DB Station/Service. DB Energie currently self-generates around 80% of DB Netz traction electricity requirements. Electricity for traction is resold by DB Netz to the train operating companies (including DB itself) through a system of transfer prices. However, electricity purchasing and resale is currently unregulated by BNetzA (which otherwise deals with both rail and energy regulation) because of a legal loophole (which is currently being closed) at a federal level. In addition to the annual federal grant, DB Netz receives €3.9bn from train operators²⁹ in mainline track access charges. This amount is the minimum annual recoverable input from government and users of the network, although in theory extra contributions are allowed. The annual funding plus track access charges is intended to cover maintenance, renewals, and stations, but there is the possibility of ad-hoc contributions for network enhancements³⁰.

The quinquennial 2009-2014 Framework Contract between the Federal Government and Deutsche Bahn AG is the first of its kind (as per European Directives) in Germany. Therefore, similarly to France, there is no possibility of a backward comparison with previous programme contracts. Also similarly to France, the contract also covers high-speed lines because these are part of DB Netz AG.

²⁸ In France, RFF (separately from SNCF) contracts with regions from a relatively centralised perspective (although it does have regional offices), and there is a separation between RFF (both Paris and regional) and SNCF/TER (regional train operations).

²⁹ The turnover of DB Netz AG (source: DB Annual Report, 2009) is about €4.1bn, around 94 per cent of which is made up of access charges. The remainder is (mostly) direct government funding. However, one must keep in mind that access charges mainly come from other parts of the publicly-owned DB group, so the difference between access charges and direct federal funding in the German case is mainly an issue of accounting definition.

³⁰ DB Netz stated in its 2008 annual report that 75 per cent of all investment relates to the existing network (down to 70 per cent in 2009). However, there is no confirmed public data about the fraction directly funded by DB Netz (through charges or debt) as opposed to direct federal funding.

Local services are subsidised, on top of network grants to DB Netz and ancillary companies, via additional subsidies separately provided by federal entities³¹ (Bundesländer, through public transport authorities). There are open access tenders for regional integrated transport (generally covering local and light rail, tramways, and local coaches/buses under an integrated fare system). DB has so far tendered for the majority of local transport contracts and therefore receives an extra subsidy for regional operations (mainly directed to DB Regio³²) in addition to the federal subsidies provided to DB Netz and its ancillary companies.

BNetzA does not police local tenders. Tender fairness should be checked ex post by the Federal Cartel Office (Bundeskartellamt). Although the mechanisms underlying local transport services in Germany are, as said, technically different from France, the observed results in terms of investment, end-user fares, and quality of service are similar:

- (a) in both countries, the level of investment and service depends on the region's (or individual Land in Germany) willingness to pay for it;
- (b) in both countries, there are sometimes evident regional differences in investment, end-user prices, and quality of service; and
- (c) in both countries, regional rail services are sometimes dependent on the effectiveness of inter-modal alternatives (where available) and on the asset management strategies of the infrastructure manager, for instance in terms of "cascading" materials and assets from higher-speed services/lines to lower-speed ones³³.

It is also worth noting that the BNetzA does not set network access charges itself. The IM sets charges, which are then reviewed ex post by the regulator. The regulator has the right to make objections. This, together with the fact that the economic regulator is physically separate from the safety one (Eisenbahnbundesamt), gives rise to a potential issue in terms of investment sustainability in the longer term as cost and safety/performance issues might eventually present a binding trade-off (with either cost spiralling up or safety/network quality deteriorating). Also, since track access charges must take into account and discount to the present the existence of long-run cost trade-offs and lumpy capital investment, the fact that DB Netz currently sets charges, with the BNetzA checking and approving them - albeit consistent with what happens in utility sectors - might potentially present some efficiency and sustainability issues. This is because DB Netz is a "natural" monopoly in

³¹ DB Regio gets around 61% (source: BNetzA Annual Report, 2009) of funding for regional line rail services, including train operations, from regional passenger transport authorities, which in turn fund these subsidies through a variable mix of local taxes and direct contributions from the Federal Government.

³² A significant fraction of the regional service tenders has been awarded, in the last round of tendering, by the Länder to either DB Regio or other subsidiaries of Deutsche Bahn.

³³ The BNetzA is currently not allowed to challenge the efficiency of DB Netz's costs based on, for instance, international benchmarking analysis.

Germany, and is not currently exposed to any benchmarking or comparative cost efficiency analysis by BNetzA³⁴. Since the regulator cannot verify the efficiency of the regulated company's costs, it should at least, in the interest of investment sustainability, have a greater say in the determination of revenue requirements through track access charges³⁵.

The funding of investment in renewals and enhancements is, for a fraction approximating 21.5% in 2008 (source: DB Netz/DB Annual Report, 2008), directly provided by DB Netz through its 100% state-controlled mother company. The state does not directly guarantee Deutsche Bahn's debt as there is no need to do so, since the company is fully owned by government. Because of the way in which state and regional funding was modified in 2008-2009, DB Netz's gearing ratio³⁶ as a whole has recently been calculated at 28.7% (source: DB Netz Annual Report, 2008). There is no distinction between renewals and enhancements with respect to DB funding (including debt). The state makes a formal distinction, but it is eventually up to DB Netz to separate funds for enhancements and renewals.

The German case study is summarised in the following Table.

Ownership of IM	Entirely owned by the state
Access charges set by	DB Netz, reviewed and approved by the regulator
Ownership and funding of high-speed networks	DB Netz through network funding via grants, debt, and income from track access charges
Ring-fenced funding for different items of network expenditure (operations/maintenance/renewals/enhancements)	Yes, but only limited to renewals of existing network as opposed to enhancements (network changes)
Private share capital in IM?	No, but the infrastructure manager is organised as a private-sector holding group
Debt guaranteed by the state?	Only indirectly, since DB is entirely state-owned at the moment
Who sponsors and specifies	The government at a higher level

³⁴ Anecdotal evidence gathered by ORR in Great Britain and by its advisers during a European benchmarking study suggested that both RFF in France and DB Netz in Germany sometimes "cascade" materials (for instance, rail and ballast) from higher to lower speed lines.

³⁵ For instance, in the UK, the regulator is legally allowed to challenge the IM's cost efficiency and to exert first-hand control over the methodology and actual calculation of track access charges.

³⁶ This refers to interest-bearing debt only. DB Netz liabilities in 2008 were worth €12.6bn on total assets of €22.1bn. Source: DB Netz Annual Report, 2008.

investment?	(Federal Ministry of Transport) and DB Netz AG
Who plans and delivers investment?	DB Netz plans investment as a function of the national Framework Contract with the Federal Government. Independent regional railways/suburban ones do the same limited to their territorial agreements with the regional passenger transport associations and (sometimes) with municipalities in wider urban areas featuring integrated local transport
Who approves investment?	The Ministry, through the Framework Contract
Who funds investment?	The Federal Government, some municipalities -- limited to integrated urban transport involving urban railway lines, DB Netz (through track access charges and own debt, not directly underwritten by the Federal Government)
Who is responsible for investment sustainability over time?	The Federal Government, DB Netz in concert with the BNetzA (through the mechanism of setting and approving access charges), and municipal authorities limited to integrated local transport in metropolitan areas

Table 3: Institutional arrangements in Germany.

4. The Netherlands

In the Netherlands, the Ministry of Transport, Public Works, and Water is responsible for policy in the rail sector. It is also responsible for funding ProRail, the IM, on top of track access charges, and for issuing concessions for passenger transport and for infrastructure management.

ProRail reports back to the Ministry on its infrastructure management activities and is mainly responsible for granting track access and for timetabling on the mainline network, which is kept separate from high speed lines. The main passenger train operating company in the Netherlands is owned by the old incumbent, NS. However, there is a healthy level of open-access competition in freight services because the country is a traditional transit node for transport in general (including seaports). There is also a separate chamber of

the Dutch Competition Authority (NMa) that is specifically charged with the regulation of rail network access.

ProRail is responsible for maintenance, management, renewal, and enhancement of the traditional infrastructure network. The high speed network (Amsterdam to Northern Belgium line) is currently separate. It is both owned and managed by a privately-controlled infrastructure company, originally set up as a public/private partnership³⁷.

Investment sustainability in the Netherlands is spurred by a number of laws. Both ProRail and NS have to abide by primary legislation as regards:

- (a) sustainable quality; and
- (b) the way in which some of the infrastructure management activities are undertaken (for instance, outsourcing and working practices).

For this reason, ProRail and NS, both of which are linked to the government by a concession agreement, are obliged to demonstrate to the Ministry that their investment strategies, both in infrastructure and train operations, meet the minimum standards set in the concession sustainably over time. Therefore, the ultimate responsibility for investment sustainability in the Netherlands firmly remains with the Ministry. The Ministry has chosen to delegate the monitoring of the concession, including input measurement, to the Competition Authority (NMa), which acts de facto as the economic regulator of ProRail.

The Dutch government has recently shifted from an “input” to an “output” view of infrastructure regulation, meaning that ProRail is now judged on a mixture of cost (i.e. input) efficiency and output effectiveness in terms of service quality (punctuality, density, and congestion minimisation targets) as well as network safety. This mix of output and input regulation is well known from the British case. Shifting from input to output regulation does not mean that the Ministry will cease to be the ultimate guarantor of infrastructure investment. It, however, does mean that ProRail will gradually be less constrained in the way it decides to pursue investment sustainability and effectiveness. Because of this move and other rail policy signals sent by the Ministry, it is apparent that the role of the economic regulator will have to become more important in the future, especially with respect to incentive regulation and target setting.

It might be argued as a result that the current transport and infrastructure management plans (for NS and ProRail, respectively), currently agreed upon by the Ministry and the interested parties, will have to be monitored by the regulator. In this respect, the Netherlands is currently facing the same challenges as France (and Belgium) in terms of empowering the independent rail regulator and making the infrastructure managers perceive that the economic regulator is a distinct entity from the Ministry.

³⁷ These arrangements have been formalised under a 25-year concession tender. ProRail might theoretically step back in when the tender is re-issued.

All in all, the Dutch approach to infrastructure investment is therefore relatively centralised and Ministry-based. However, there are local concessions for regional transport which are issued and administered by local transport authorities through a tender process, in quite a similar way to what is observed in Germany³⁸. For this reason, it might be argued that the approach adopted in the Netherlands towards infrastructure investment and funding is a mix of the French (Ministerial steering), British (gradual shift towards output-based regulation), and German (separation between long distance and regional concessions) approaches. The regulator³⁹ is only dealing, for the time being, with track access charges and national capacity allocation.

Infrastructure funding is provided by the state to ProRail for main line services. It is directly provided, partly on behalf of the state and partly through local finances, by regional transport authorities for local lines. The concession agreement between the Ministry and ProRail (expiring in 2015, renewable) is the Dutch equivalent to the French and German Programme/Framework Contracts (dictated by EU transport policies on railway sector liberalisation), which in turn – for they specify inputs and outputs – are the equivalent to the British output/input “contract” (HLOS/SoFA) between the government and the railway sector as a whole (including train operators).

The concession agreement with ProRail obliges the latter to produce a yearly infrastructure management plan (with set output-related performance standards) in exchange for the yearly government subsidy (network grant) paid to ProRail by the government for maintenance, renewals, enhancements, and structures. Enhancements are ring-fenced in the structural investment plan, so that the government can assess them (individual network improvement/expansion projects) on a case by case basis. To complement the government subsidy, ProRail receives network access charges from train operators, which only tend to cover the short run marginal cost of the infrastructure. The government therefore remains, through the network grant, the ultimate and sole guarantor of network investment sustainability.

Regional services are now subject to tender offers (like in Germany) with a relative degree of competition to NS (whose passenger train operations, differently from the British case, have not been dismantled before setting the franchise auctions in place) from both domestic and international entrants. In this respect (train operations’ franchising), the Dutch policy can be viewed as a hybrid between the radical British approach and the more traditional German one.

Without prejudice to safety (separately regulated), the Transport Chamber within NMa oversees fair access to the railway network, determines capacity allocation in concert with ProRail (with a special focus on the punctuality

³⁸ In the Netherlands, a number of privately owned local railways are relatively free to set the level of their services, timetabling, etc., subject to national network quality and safety standards.

³⁹ This is the transport regulator (the Transport Chamber). There is also a separate Railway Safety Agency.

performance v traffic density trade-off, for a given level of network capacity), and reviews ProRail's network access charges. However, the Chamber is not at the moment engaging in any active cost efficiency benchmarking of ProRail (including investment cost and capital expenditure plans, which are formally overseen by the Ministry directly). Recent informal contacts with the Chamber point towards a possibly more active NMa role in cost efficiency analysis in the future.

The Dutch case study is summarised in the following Table.

Ownership of IM	Entirely owned by the state (traditional lines); the high-speed IM (concessionaire for 25 years) is a mixed-ownership company at the moment
Access charges set by	ProRail; reviewed and approved by the regulator
Ownership and funding of high-speed networks	Separate ownership and government funding through grants, debt, and income from track access charges
Ring-fenced funding for different items of network expenditure (operations/maintenance/renewals/enhancements)	Yes, but only limited to large individual enhancement projects (network changes)
Private share capital in IM?	No, but the infrastructure manager is organised as a private-sector holding group
Debt guaranteed by the state?	Only indirectly, since ProRail is entirely state-owned at the moment
Who sponsors and specifies investment?	The government at a higher level (Ministry of Transport, Public Works, and Water), the regional passenger transport associations at a lower level, and ProRail at a detailed level (nationally and regionally); high-speed investment is separate
Who plans and delivers investment?	ProRail must plan infrastructure investment on a compulsory basis to meet the requirements of the national concession agreement with the government. This concession agreement also covers regional lines, but does not cover some privately owned secondary (local) networks, which are subject to separate (less stringent) quality and

	safety requirements and otherwise plan their investments freely. There are some professional, rail-dedicated engineering concerns (such as Strukton) who deal with maintenance and renewals on a contractual basis. Overall planning responsibilities remain with ProRail
Who approves investment?	The Ministry, through the national concession agreement
Who funds investment?	The government, the regional (sometimes municipal/provincial) Passenger Transport Authorities, and residually ProRail through partially cost-recovering track access charges and own bonds. High-speed incremental investment is currently funded by the private sector.
Who is responsible for investment sustainability over time?	The government, through the national concession agreements with ProRail and NS; limited to franchised regional train services, the regions through their own franchise agreements with train operators; limited to privately owned local railways, the owners of these railways (subject to quality and safety standards); long-run responsibilities for high-speed investment sustainability are currently unclear, given the 25-year concession horizon.

Table 4: Institutional arrangements in the Netherlands.

5. Policy considerations

The four case studies examined so far have shown different models of rail infrastructure management and regulation.

In Great Britain (GB), the government sets a high-level output specification and the IM is regulated by incentives and outputs to deliver the level of service expected by the government (given safety) for the funds available. There is an independent, combined economic and safety regulator which is perceived to be different from the “Ministry of Transport” (DfT in England/Wales and Transport Scotland in Scotland). The IM (Network Rail) is therefore left

relatively free to determine the way in which its infrastructure plans are to be sustainable in the long run, subject to the overseeing powers of the regulator. The IM is a “company limited by guarantee”, formally in the private sector but with debt underwritten by the British government in exchange for a financial indemnity fee. Therefore, although funding is ultimately determined by government, the IM can theoretically choose to diversify its debt away from government support⁴⁰. In GB, high-speed services are distinctly structured and regulated (including investment) as separate companies and there is a concession agreement on the line to the Channel Tunnel, which will lead to private system operation of the existing (government-owned) high-speed line and stations as soon as the high-speed system concession is put up for public tender in the second half of 2010. The government is also planning to develop a fully domestic high-speed line, but the stated lead time horizon is still relatively long. In both cases, investment sustainability is left to the government, although the economic and safety regulator has been given formal powers to oversee it (as it does with conventional lines) since October 2009.

In France, the government determines the way in which investment has to be carried out sustainably, but regions play an important role in making sure that local track sections (and train operations) stay alive. In this respect, and counter-intuitively, the French approach to investment sustainability is less centralised than the British one⁴¹. The IM (RFF) is theoretically free to make the most appropriate trade-offs between different items of infrastructure expenditure (for instance, between maintenance and renewals), but is constrained by law about the way in which it must fund enhancements. It is also currently affected by some lack of monitoring power over the “delegated” IM (SNCF), especially in terms of transparency over the apportionment of the yearly €3bn “network management fee” that RFF transfers to SNCF for its network management services. The regional way in which RFF is structured aids the regionalisation of rail infrastructure policy as desired by the government, but does not necessarily facilitate regional interaction between RFF and SNCF. The French rail regulator (ARAF) was created in early 2010 as a separate entity from the Ministry of Transport. It will be responsible for access charging and conditions, but there have been no clear signals so far that its responsibilities will also be extended to the assessment of efficient and sustainable network investment.

In Germany, the government controls funding through a Framework Contract with the IM (DB Netz/e AG). Regional governments (the Federal Laender) retain an important role in planning investment (as well as train services) at a sub-national level, as regions do in France. The main difference between the German and French regional approaches is that, in Germany, there is a

⁴⁰ This has not happened so far, because the IM can access better credit conditions if its debt is supported by a state guarantee. Also, because of the financial and economic downturn observed since late 2007, it is quite unlikely that “unsupported” debt will be issued by the IM any time soon.

⁴¹ With the obvious exception of Scotland as a distinct constituent nation, and subject to London-Edinburgh devolution measures.

specific subsidiary of the Deutsche Bahn group dealing with regional issues, whereas in France the regions negotiate train services and infrastructure investments with the delegated IM through RFF, although both the delegated IM and RFF do have regional operations. The German government pays the IM around €2.5bn/year according to the current Framework Contract (2009-2014) and oversees investment. Like in France, the German economic regulator only deals with access charging at the moment, without challenging the IM on infrastructure cost efficiency or on the effectiveness of sustainable asset management. Primary legislation is needed to empower the economic regulator in this respect. At the moment, ex post regulation (including investment issues), when not tackled directly by the Ministry, must be dealt with by the Federal Cartel Office (Bundeskartellamt).

In the Netherlands, there is a hybrid approach to investment sustainability, with an interplay of elements of all three preceding cases combined. The concession agreement between government and the IM (ProRail) is similar to the French and German approaches. The franchising of some passenger services, with some infrastructure maintenance responsibilities, bears some resemblance to the British train operation franchising case (with a limited role played in infrastructure by train operators). The regionalisation of some infrastructure management is once again a mixture of the French and German cases. Finally, the existence of a regulator which does not really oversee infrastructure investment (for the time being), but simply deals with track access charging and capacity allocation, is similar to the German case. The most original practical aspect observed in the Netherlands is perhaps the strong presence of professional engineering companies dealing with maintenance and renewals on an independent (contractual) basis, but under the strict planning guidance of ProRail. Another interesting aspect of the Dutch approach is that the high-speed operator (for just one line, like in England) has been set up as a public-private partnership by government tender and is currently in the private sector (its shareholders include Siemens and HSBC Infrastructure), with funding from track access charges.

To conclude, some policy considerations on the sustainability of network infrastructure investment from observed international practice are offered below:

- (a) given funding requirements, the government remains the ultimate customer of railway services in each of the countries considered, with the only possible exception of high-speed services; therefore, it is reasonable for it to remain in control of investment specification and sponsorship;
- (b) given the possibility of socially beneficial cross subsidies between high-speed networks and traditional ones, it is not surprising that different countries look at the separation of high-speed lines from classic ones in different ways. This is mainly a value judgement. Although, from an economic perspective, separation is a superior alternative (cf. HS1 in Great Britain), especially for those countries with a substantial domestic high speed network (such as France), horizontal integration (coupled with the regionalisation of lower-speed lines) might provide more security in terms of sustainability, assuming

the cross subsidy will not lead to inefficiencies and/or to excessive regional differences in the quantity and quality of local rail services;

- (c) it is relatively surprising that only one country out of four has a fully independent economic regulator overseeing investment plans and investigating cost efficiency. Irrespective of industry design (vertical/horizontal separation, structure of subsidies, etc.) and also in line with the three EU railway liberalisation packages, investment sustainability (as well as certainty and contestability) is normally facilitated by the existence of an independent and non-captured regulator which is perceived to be distinct from the funding Ministry. This “type” of regulator (present in GB) has just been created in France, and ought to be granted more powers⁴² in Germany and the Netherlands;
- (d) there are only two cases out of four where some aspects of investment (typically, network renewals/enhancements) are dealt with separately – France and Germany. In Britain and the Netherlands, the IM is set relatively free to make internal trade-offs between expenditure items (for instance, renewals and enhancements). Whether the government should more or less over-specify the investment mix in the first place eventually depends on the level of professional trust placed in the IM and the regulator. In a country with an overseeing regulator, one would expect a less interventionist government. Assuming this is the first best (i.e., a non-micromanaging government), regulators should then be given powers to oversee IM capital expenditure. This is what happens in Britain, but not in the Netherlands. However, where the regulator is not in this position, one would typically expect a more interventionist government (or a “government-regulator”), which is currently the case in France and Germany;
- (e) in all cases examined, IM debt is guaranteed, either directly or indirectly, by the state. In one of the cases examined (Britain), the IM can theoretically issue debt that is not supported by the state, but this has never happened so far. In all other cases, although there is no formal state guarantee, the debt issued by the IM is perceived to be akin to state debt because the IM, albeit organised as a private limited company with shares, is currently 100% state-owned. State guarantees clearly enhance investment sustainability (as long as the state does not go bankrupt!) and reduce interest costs. However, as technology develops (high speed lines) and sovereign states face tougher financial positions, it might be argued that -- perhaps in the not too distant future -- some rail investment will be more sustainable if undertaken and financed privately. This interesting development, which must be tested in reality, might favour the complete ownership unbundling [but see points (a) and (b) above] and privatisation of high speed facilities and services (including strategic bottlenecks such as

⁴² A fully empowered regulator should have authority over access charges, cost efficiency analysis, access to detailed data, and competition policy issues.

international interconnections like the Channel Tunnel or the future Alpine High Speed Tunnels); and

- (f) regionalisation, as observed in France, Germany, and the Netherlands, is useful in ensuring that responsibility for investment is brought closer to the demand for services. However, in order to avoid that IMs simply “off-load” unprofitable low-speed lines to regional governments, in the interest of long-run sustainability it is important that national governments set up compensation (“federalist”) schemes to make sure that the level of quality and quantity of service in each region does not fall short of minimum acceptable standards -- even in those regions that, for economic or other reasons, choose or are constrained to accept lower standards of service⁴³.

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⁴³ However, this would become an issue if the country were subject to territorial or fiscal devolution. Arguably for this reason, the regional rail transport model has not been chosen so far in the UK, where devolution would limit inter-regional compensation schemes or fund transfers between the four constituent nations. Indeed, in one of those -- not examined here (Northern Ireland) -- rail transport is dealt with in a completely separate way (as with other network industries). Also because of the limited size of the local market, Northern Ireland's railways are still vertically and horizontally integrated.

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