

Travel, Transport & Logistics (Europe)



Getting freight back on track

August 2014

Daniel Girardet

Jürgen Müller

Anselm Ott

Contents

Getting freight back on track

Historical development and current situation	1
Not favored by trends	2
A flat share by 2025, but huge uncertainties	3
The “basics”—three forces that railways can control	4
Three other forces to watch	6
Three forces that could impede growth	7
What does it all mean	7

Getting freight back on track

In Europe, freight rail is undergoing deep change. While the industry was long able to profit from the general increase in demand for transportation and from public investment in infrastructure and services, the future looks more austere—with weak economic growth, stagnating demand, limited public funds, and fundamental technological advances in competing modes. To grow sustainably, the freight-rail business will need to defend and expand its share of the transportation market, taking share from other modes.

To understand the challenges of growth, we recently analyzed historical drivers of both modal share¹ and modal-share growth in Europe² since 1995. To assess the growth outlook for rail freight in Europe, we also examined some current trends that seem likely to continue. In the most likely scenario, freight rail's modal share would remain essentially flat. There is, however, a significant spread between the scenarios for low and high growth: the low-growth scenario would see rail's share fall by 4.8 percentage points, while the high-growth scenario would bring an increase of 5.1 percentage points. This means that intermodal competition is still quite unstable and could swing either way over the next ten years and beyond.

The main factors posing a risk to rail operators are changes in trucking standards, improved energy efficiency of trucks, and rail-infrastructure fees. Each of these factors is out of operators' control. But other drivers of modal share represent opportunities. To take control of their destiny and counter changes in competing modes, freight services need to invest in big data solutions to lower costs and offer a seamless customer experience, embrace the rise in competition triggered by deregulation to improve their cost positioning, and improve the scheduling of rail services to attract new traffic with a more flexible and reliable offering.

In this paper, we will first review the current context of Europe's freight market, and then the forces that will likely shape its future, with a focus on the forces that operators can influence.

Historical development and current situation

Freight rail has grown on average by 1.1 percent a year over the past two decades.³ Around 70 percent of this increase came from the general growth of the markets for transportation services, which essentially tracks the growth of GDP. From the mid-1990s through 2007, freight volumes actually grew faster than the economy as a whole—that is, freight had a multiplier greater than one. Since 2008, the multiplier has plummeted to roughly one-third of historic values (though this drop might be slightly exaggerated by the financial crisis of 2008). Why? Service industries now contribute more to GDP, and they have lower transport needs. And much activity in the primary transport-intensive sectors (such as raw materials and processing) has been offshored to low-cost locations.

The multiplier will likely remain at current levels, or may even shrink further; for example, some core freight-rail customers in the chemical industry have recently cut back investment in Europe, shifting production to North America, where energy costs are lower. Overall freight transport, and in particular the freight-rail market, is stagnating. With low GDP growth expected in most European countries and rail's connection to the broader economy greatly diminished, operators are looking at flat growth (Exhibit 1).

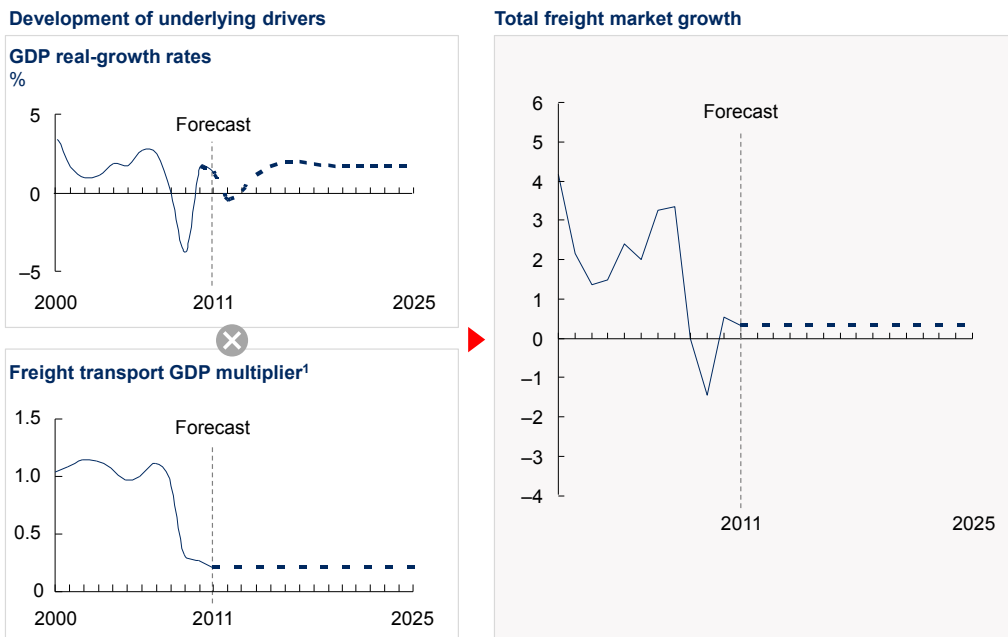
To address that challenge, operators should consider the remaining 30 percent of historical growth, which has come

1 The relative share of each mode of inland transport as measured in ton-kilometers. In 2013, rail's share was 18.3 percent, road transport's share was 75.6 percent, and inland waterways' share was 6.1 percent.

2 We analyzed the EU-27 as of 2013 (except for Malta and Cyprus, which have little railway infrastructure), plus Croatia (which joined the EU in 2013), Norway, Switzerland, and Turkey. Due to limited data availability, the samples used in various analyses ranged between 18 and 29 countries.

3 To provide a better focus on the longstanding core markets, we limited our historical analysis to the EU-15. Data for the EU-27 includes many countries with widely different rail industries, which can obscure the trends in the larger and older markets. In the EU-27, freight-rail volumes fell by about 1.3 percent per year from 1980 to 2012; rail's modal share fell even faster. Reasons for the decline include the modernization of Eastern Europe's economies, which brought shifts in the industrial landscape; the availability of cheap truck transport; investment in roads; and withdrawal of railways from smaller customers.

Exhibit 1 Europe's total freight market is stagnating.



¹ Growth of rail-freight market in ton-kilometers over growth in real GDP calculated as 10-year moving average.
Source: Eurostat; Organisation for Economic Co-operation and Development (OECD) International Transport Forum; OECD Statistics

from market-share gains at the expense of other modes of transport. To understand the factors that drove those shifts, we analyzed data related to accessibility, schedule, availability of other modes, and industry landscape for countries in Europe from 1995 through 2012. We found that the absolute level of modal share across countries was most affected by the size of so-called captive industries (such as mining, chemicals, and automotive) and the availability of freight services. We expect this to continue. However, when we analyzed the rate of change in modal share over time, transit traffic, international traffic, and distance were most influential.⁴ Put another way, higher international traffic volume and thus greater transport distance increased freight rail's modal share. Increases in motorway density favored trucking. Although these factors are difficult to influence, others that also had an effect on share gains, such as investment in rail-car availability, are open to rail investment.

Not favored by trends

In the future, the situation for Europe's freight railways will not become easier, for two reasons. First, the drivers of

past gains for freight railways will fade in strength. Supply-side measures such as improved track infrastructure are less likely, given strained public finances. The migration of captive industries outside Europe's borders and the stagnation of the manufacturing-based industries will make growth difficult.

Second, other modes seem to have a better fit with current transport needs. These modes, especially trucking, are in a better position to benefit from changes in industry, where a greater number of small, just-in-time shipments will be required. It seems unlikely that rail might innovate its way out of the problem; in the past, the industry's innovation has been slower and smaller-scale than other transport modes—an understandable result, given a highly regulated environment and the long lifetime of rail assets. These factors aren't changing, so innovation is likely to remain sporadic. For example, few operators have tapped into business competencies of the 21st century such as big data, which can improve forecasting, key-account management, and yield management.

⁴ Due to incomplete data, we did not include in our estimates factors such as throughput speeds for rail and competing modes. These factors are highly relevant to buyers of transport services but are not reported consistently by European railways.

Exhibit 2 Development of rail's future modal share is subject to several forces.

▲ ▼ ▶ Impact on freight rail in comparison to other modes

	Categories of change	Impact on rail offer		Impact on rail's 3 key differentiators		
		Price/cost	Ease of use/ attractiveness	Capacity	Predictability	Eco-friendliness
Industry's ability to influence	Business-performance		▲ Competition Cross-border traffic Big data ▼ Reduction of single-wagon loads		▲ Scheduled railway Big data	▶ Energy recovery
	Technological			▶ Autonomous trucks	▲ Expanded infrastructure	▲ Customer connectivity ▼ Trucks' energy efficiency
	Regulatory	▼ Increased infrastructure charges	▲ Truck-traffic regulation and pricing Harmonized trucking standards	▼ EuroCombi trucks Decreased slots	▼ Tighter rail-noise regulation	▼ Tighter rail-noise regulation
	Customer behavior	▲ Containerization	▲ Containerization	▶ Offshoring of output-oriented industries	▼ Just-in-time requirements/ expectations	▲ Increased demand for green logistics

A flat share by 2025, but huge uncertainties

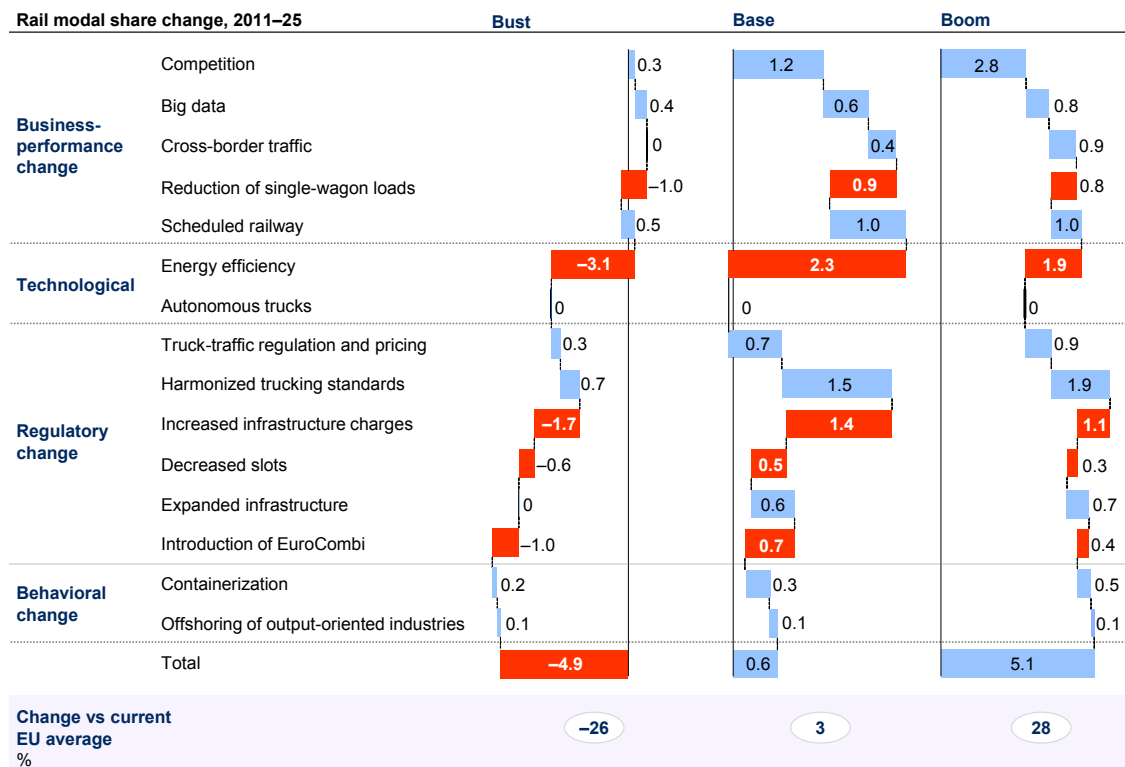
Our research suggests that the freight-rail market could see drastic developments in either direction: by 2025, rail's modal share, which currently stands at 18.3 percent, could range from 13.5 percent to 23.4 percent. At the low end, changes in other modes of transport could turn the outlook for railways negative; at the high end, railways might capture some significant growth opportunities.

We reviewed the full range of forces likely to influence freight-rail modal share in the future; some were also factors in the past. The forces fall in four categories (Exhibit 2): business performance (changes in the relative competitiveness of rail and actions railways can take to improve their business model), technological change (opportunities and threats from new technologies in both rail and competing modes), regulatory change, and behavioral change (changes in the macroenvironment and customer base that could influence modal share; these were also large factors in the past, as our historical analyses have shown).

To understand the effect these forces might have on the freight market, we developed three possible growth scenarios: bust, base, and boom (Exhibit 3).

- Bust.** Technological advances and regulatory changes that favor trucking outweigh the value of improved freight-rail performance and behavioral trends. The result is a drop of 4.8 percentage points in rail's modal share by 2025, a 26 percent decline.
- Boom.** Strong performance by rail, boosted by favorable regulatory changes and behavioral trends, leads to the highest possible impact; meanwhile, forces affecting trucking turn negative. The result is an increase of 5.1 percentage points, 28 percent, in rail's modal share.
- Base.** Business-performance changes are mostly positive, but are countered by technological advances in trucking. Regulation tilts slightly toward rail, and behavioral trends have some positive impact. The result is a modest gain of 0.6 percentage points, or 3 percent, in modal share.

Exhibit 3 Rail's modal share could drop by 4.8 percentage points by 2025—or rise by 5.1 points.



The range of potential change, from a decrease of 4.8 percentage points to an increase of 5.1 percentage points, shows the vulnerability of freight rail to external factors, mainly outside the control of rail operators. Given the uncertainty, operators need to do whatever they can on all the levers they can influence. We will examine three forces that operators can exploit to boost growth; three other forces that may also accelerate growth, but are outside of operators' control; and three final forces that may hinder growth.

To understand the possibilities, European operators can look to some successful North American freight railways, notably Canadian National. By improving car productivity and velocity (which is measured consistently in Canada, unlike in the European Union), Canadian National increased transport volume by 4.1 percent per year between 1995 and 2013. And it increased trip-plan compliance by more than 10 percentage points over the same period. It did this by optimizing its core operations and increasing productivity of locomotives by more than 2.9 percent and productivity per employee by almost 5 percent per year during that period. Critically, these gains led to slight increases in modal share, from an already high level of 16.6 percent to 16.9 percent between 2001 and

2011. Rail operators that address all the levers within their control can see real improvements.

The “basics”—three forces that railways can control

Operators should start by working on the levers with high impact over which they have the greatest control: embracing competition, big data, and scheduling. Together these could increase modal share by 2.8 percentage points, or 15 percent, in the base scenario, which we believe is the most realistic outlook and the focus of the remainder of the article.

- Embracing competition.** The arrival of new competitors—typically, operators from other markets—is a double-edged sword for freight-rail incumbents. On one side, increased competition typically leads to lower market share and profit margins for the incumbent (at least initially), which hurts shareholders and limits the ability of railways to invest in the future. On the other side, competition also forces railway operators to unlock efficiency gains and improve their cost competitiveness. They can then lower prices and take share from other

modes. Intramodal competition makes the need for change clear to all rail stakeholders, including employees, labor unions, politicians, and the public. Transformational changes to legacy business models and contracts suddenly become possible.

The liberalization of freight markets has proven that operators can lower costs effectively. For example, in the context of increased competition, DB Schenker, Green Cargo, and SBB Cargo have seen staff productivity improvements (in terms of full-time employee equivalent per ton-kilometer) ranging from around 50 to approximately 100 percent since 2000. In the United Kingdom, staff productivity has jumped by about 60 percent in a decade. Asset productivity has risen even faster: the number of locomotives has fallen by approximately 50 percent, even as volumes increased by almost 60 percent.

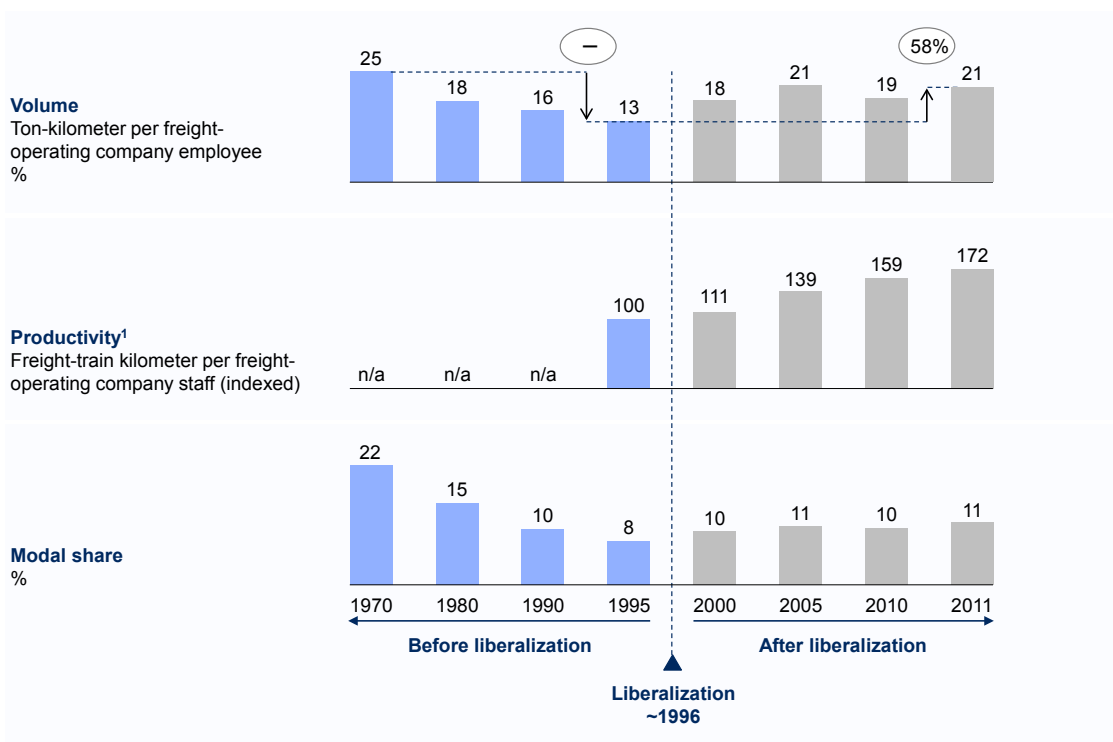
These achievements have changed the competitive dynamics in the UK freight market. Rail's modal share fell from approximately 30 percent in the mid-1970s to just 8 percent in 1996. After the UK freight market was

liberalized, freight-modal share began to climb once again (Exhibit 4). We argue that these techniques of embracing competition could boost the performance and attractiveness of freight rail as a method of transport by 1.2 percentage points, in our base scenario.

- Big data.** Freight-rail operators can use big data to improve their operations and overall business performance. Big data—massive data sets generated by sensors, social media, and other unstructured data sources such as reports on production flows—can be used across the railway. Today, the most relevant application is in process-optimization support and decision support. Big data and related technologies provide greater transparency into operations and can help railways pinpoint inefficiencies and reduce waste in three major expenses.

First, train-flow planning software can help reduce unnecessary braking and stopping and thereby preserve fuel. Second, predictive maintenance can improve operations and lower costs. Sensors in engines and cars provide operators with large quantities of data. Using a computerized maintenance-management system

Exhibit 4 After liberalization, the UK freight-rail industry improved its performance and modal share.



Source: DB Schenker; Department for Transportation; Eurostat; Office of Rail Regulation; Organisation for Economic Co-operation and Development; McKinsey analysis

powered by this data, operators can monitor track conditions and locomotive performance in real time. With a clear picture of the current condition of their fleet and infrastructure, operators can better plan maintenance and repairs, proactively order spare parts, and avoid costly derailments and breakdowns. Third, crew data (about location, for example, which can be used to empower mobile sign-in for crew shifts) and personnel-planning technology can reduce out-of-schedule shift changes and delays. In the United States, a major freight operator's use of operational data has improved train and railcar velocity by 5 percent and, perhaps more important, reduced derailments by 75 percent.

These three uses of big data can increase rail's modal share by 0.6 percentage points. And there are other opportunities, for example, in marketing and pricing. Operators can use big data to better predict demand; they can then manage pricing to lessen the effects of short-term variations in demand. More refined forecasting and booking systems can create top-line opportunities by integrating into customers' logistics procurement process. Big data can drive yield-management techniques that lead to higher average yields and load factors. Big data can also make rail freight more flexible and easier to use for customers, through simplified booking processes and more systemized schedules. Hupac, for example, uses big data in this way.

As an example of the new kinds of data available to operators, GPS technologies allow operators and customers to track loads in real time. In addition to location, the devices indicate cargo status (loaded or unloaded), door status (open or closed), and internal and external temperature. This technology helps operators actively manage the transport process and adjust schedules as needed. Customers also have greater clarity on the progress of their shipments and feel empowered to intervene in the event of delays or deviations. DB Schenker installed approximately 15,000 GPS devices on its rolling stock and equipment and reports strongly increased customer-satisfaction levels as a result.

- **Scheduling.** One of the main advantages that rail offers customers is punctuality and reliability, as rail is not subject to the same traffic patterns, road conditions, and unknowns that plague roads and trucking operators. To be sure, freight operators face their own scheduling

challenges (such as sharing tracks with passenger rail and fluctuating slot allocations), but on balance rail is more punctual and reliable.

Improvements in scheduling can make the most of this advantage, and lead to better asset utilization and customer service. Big data will be newly available throughout the business system, giving insight into areas such as shipping partners' inventory levels. With that, we expect freight-rail operations to shift away from spot-market transactions to a fixed schedule, increasing the utilization of assets. We believe that scheduled railways could increase modal share by 1 percentage points.

This ability is likely to become more relevant as many transportation customers have reduced safety stock and other reserves and moved toward just-in-time inventory management. This plays to the strength of the rail system, especially on the longer haul, international traffic streams (both north-south routes and, as economic development in Eastern Europe continues, east-west corridors as well).

Three other forces to watch

Three additional forces could increase freight's modal share by 2.7 percentage points, or 15 percent. Although operators have little control over these forces, they may become noteworthy sources of growth.

- **Harmonization of trucking standards.** Today, lower labor costs and looser regulations are benefiting trucking companies based in Eastern Europe. These companies spend on average 60 percent less on labor, fuel, taxes, and insurance than their counterparts in Western Europe. However, as wages increase and trucking standards become more consistent throughout the European Union, these companies may lose their competitive advantage. And if various nations' rules are aligned and the trucking industry's cost advantage shrinks, more companies could turn to freight rail for transport. The result could be a 1.5 percentage-point shift in share from trucking to rail.
- **New truck-traffic regulation and pricing.** Most countries in Europe levy a toll on trucks for the use of motorways. Current levels range from €0.04 to €0.40 per kilometer,⁵ with an average around €0.20 for a 40-ton truck. However, proposed legislation may increase truck tolls by €0.03 to €0.04 per kilometer on average. What's more, some countries such as Germany are discussing

5 Switzerland goes even further, levying a toll of up to €1 per kilometer on all roads.

plans to extend the scope of the truck toll to include all roads in the country. More stringent regulation of road use and increased tolls will diminish the cost advantage of trucking.

However, past experience indicates that the result is not necessarily a bump in rail's modal share. In Switzerland, the government levied additional tolls and taxes (for example, a distance-related heavy-vehicle fee in 2001) and proposed legislation (such as the Alpine crossing exchange) to shift truck cargo to rail. At the same time, the price of diesel fuel, which typically accounts for around 30 percent of a truck's cost base, has climbed steadily. The government also invested heavily in rail infrastructure (such as a €320 million investment in connecting rail tracks). Despite all this, trucking's modal share has remained relatively unchanged. This very modest impact contributes to our assessment that expanded trucking regulations may increase rail modal share by 0.7 percentage points.

- **Expanded and standardized rail infrastructure.** As evidenced by our analysis of past modal-share growth, better infrastructure and increased availability can drive demand. A significant challenge for operators in the European Union today is the different rail infrastructure and operating guidelines encountered at almost every national border. Countries have different electrical and signaling systems, and different standards governing train length, axle loads, clearance gauge, speed, safety, and driver licensing. The effects are burdensome. A haul from Ljubljana to Istanbul crosses five countries and involves eight locomotive changes over 1,577 kilometers, according to a 2010 study for the European Commission. What's more, slot capacity is restricted on the most popular routes, especially on the north-south corridors.

The Community of European Railway and Infrastructure Companies is working on solutions to some of these issues, such as unifying signaling systems and standardizing train lengths on certain rail corridors. Still, changes to fully standardize infrastructure would require significant investment from both operators and government. Currently, appetite for this investment on this scale appears limited.

Three forces that could impede growth

Some additional forces present real challenges to operators and could significantly decrease freight rail's modal share;

they are also largely outside the immediate control of railways. The first two are especially significant: they have the potential to reduce rail's share of the market by 20 percent. Such sizable impact underscores the need for operators to focus on initiatives for improvement.

- **Improved energy efficiency of trucks.** Better fuel consumption, as well as a switch to trucks powered by eco-friendly alternative fuels, such as compressed natural gas, could decrease truckers' fuel costs by 50 to 65 percent. If fully realized, this would reduce rail's modal share by 2.3 percentage points.
- **Increased infrastructure charges.** Standardized track usage fees (that is, increased fees for countries with below-average track usage fees) across Europe would significantly affect the industry and could reduce rail's modal share by 1.4 percentage points.
- **Environmental concerns.** A few issues are quickly gaining awareness on the political agenda and could influence modal share. Because of the uncertainty associated with these, we did not quantify the effects in our analysis. Noise emissions of freight-rail systems are increasingly contentious; operators may be asked to comply with more stringent targets to avoid the introduction of curfews, which would increase costs and lower track access, transport speeds, and reliability. The trucking sector is benefiting from much faster progress on noise reduction, including public-sector interventions such as resurfacing highways with noise-efficient surfaces and lining highways in high-density areas with noise-reducing infrastructure.

What does it all mean

Putting all the factors together, the outlook for rail freight is basically flat, but with big question marks. Drastic swings in modal share, either positive or negative, are possible, due mainly to factors that are hard for rail operators to directly influence.

Given this uncertain picture, freight-rail operators are well advised to expand their set of capabilities and in so doing the reach of their influence. For instance, to take full advantage of the outlined opportunities in big data very likely will require new competencies. Rail-freight operators often possess strong marketing and sales groups, as well as operations

units. They may need to add technical and innovation expertise to integrate big data into their go-to-market strategies and day-to-day operations.

Another new competency for many is regulatory strategy. Lobbying for technical standards and collaborating with other stakeholders with similar interests could speed their adoption. Operators can engage more proactively and in a concerted effort with regulators and partners along the value chain. For example, network service providers could collaborate with rail operators to improve network speed and flows (for example, by enabling longer trains). They might also work together to tell their story to the public and improve social acceptance of freight-rail transport (for example, by tackling the noise and other emission challenges together).



This article is about growth, not profitability—but profits are of course vital. Under current regulations, it is difficult for most operators to earn sustainable margins and create

decent returns for shareholders over time. In recent decades none of the larger European carriers achieved average margins of 3 percent in earnings before interest and tax. At least 7 percent is necessary to cover the costs of capital.

As long as this situation endures, operators will be subject to the pressures of politics; their public support will be limited, and they will have to make do with outdated assets. For rail freight to thrive, operators will need to help to shape the industry in a way that cuts unit costs significantly. Costs at most large rail systems in the world are 20 to 50 percent of Europe's. (Costs for road freight are much more similar from region to region.) Operators should work to automate more of their processes, from coupling to data transfer, and work with regulators to run longer and heavier trains on an infrastructure designed mainly for freight.

Knowing the constraints on governments and operators, the likelihood of such a positive development within next decade seems to be limited. But we encourage the industry to fight for bold moves.

