



THE BOSTON CONSULTING GROUP

The 2012 European Railway Performance Index

Understanding What Drives High Performance

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AT A GLANCE

BCG developed the Railway Performance Index to measure three components of European railway performance: intensity of use, quality of service, and safety. This comprehensive index provides insights that will help the European Commission, national governments, and railway operators improve railway performance.

THREE TIERS OF NATIONAL RAILWAYS

Three groupings, or tiers, emerged from the RPI analysis. In tier one, five countries have high-performing railway systems: Switzerland, France, Germany, Sweden, and Austria. In tier two, nine countries perform generally well, but their results vary widely among the three dimensions. In tier three, ten countries have low overall ratings, mainly because of poor safety.

WHAT DRIVES PERFORMANCE?

We found that a railway system's overall performance typically correlates with the level of public cost, which we defined as the sum of public subsidies and investments in the system. We found only a weak correlation between performance and the degree of market liberalization or the choice of governance model. Therefore, understanding how to apply public subsidies and investments most effectively may be critical for improving performance throughout the European railway system.

DURING THE PAST TWO decades, the European Commission has launched a series of reforms to improve the economic efficiency and service quality of European railways and to reduce barriers to rail travel throughout the continent. EC regulators have detailed approaches that national policymakers can use to establish sound and transparent funding schemes and to implement interoperability. In both current and proposed regulations, however, the EC has focused especially on promoting competition through liberalization.

But is there a link between liberalization and improved railway performance? And to what extent do public expenditures and a railway system's governance model influence performance independently of market openness? More generally, what are the drivers of railway performance? This information is critical to the EC, national governments, and railway operators as they seek to develop and implement policies to improve railway performance.

To increase understanding of what drives railway performance in Europe, and to provide a tool for measuring that performance, The Boston Consulting Group developed the Railway Performance Index. To our knowledge, the RPI is the most comprehensive benchmarking of European railway operations conducted to date. Previous studies have focused on only one factor—productivity, the level of public expenditures, or the degree of market liberalization. The RPI, however, provides a holistic measurement that includes three critical components of railway performance: intensity of use, quality of service, and safety. This comprehensiveness allows us to isolate the factors that drive high performance. As a result, the RPI provides valuable insights for all stakeholders who seek to promote high performance by European railway systems.

Four key findings emerged from our benchmarking and analysis:

- Five countries have high-performing railway systems: Switzerland, France, Germany, Sweden, and Austria.
- Switzerland, France, Germany, and Sweden get better value in return for public investments in their railway systems than other European countries.
- A railway system's overall performance generally correlates with the level of public cost.
- There is only a weak correlation between performance and the degree of

The RPI measures three critical components of railway performance: intensity of use, quality of service, and safety.

market liberalization or the choice of governance model.

The 2012 RPI is the first edition of our benchmarking. We plan to publish an updated index annually.

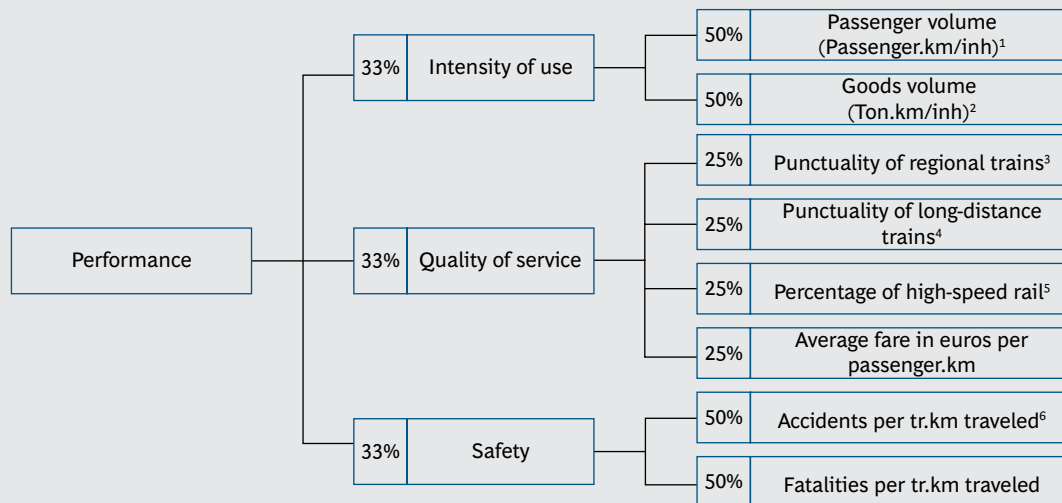
Measuring Performance in Three Dimensions

The RPI measures railway systems' performance in three dimensions for both passenger and freight:

- *Intensity of Use.* To what extent is rail transport used by passengers and freight companies?
- *Quality of Service.* Are the trains punctual and fast, and is rail travel affordable?
- *Safety.* Does the railway system adhere to the highest safety standards?

We confined the analysis to these three dimensions to create an indicator that is comprehensive yet easy to understand. Each dimension comprises at least two subdimensions, and all were given equal weight. (See Exhibit 1.) We rescaled the data to represent a score out of ten for each subdimension. To create the index, we then combined the ratings for each dimension and subdimension based on their weighting.

EXHIBIT 1 | The Index Comprises Weighted Measures Across Critical Dimensions



Source: BCG analysis.

¹Passenger.km/inh: The number of passengers multiplied by the number of kilometers traveled, divided by the country's population.

²Ton.km/inh: Tons of goods multiplied by the number of kilometers traveled, divided by the country's population.

³Punctuality of regional trains, computed as percentage of regional trains with less than a five-minute delay.

⁴Punctuality of long-distance trains, computed as a percentage of long-distance trains with less than a 15-minute delay.

⁵Percentage of high-speed rail, computed as high-speed rail's share of long-distance traffic (measured in passenger.km).

⁶Tr.km: The number of trains multiplied by the number of kilometers traveled.

The index's simplicity resulted in two methodological biases:

- Passenger performance is overweighted relative to freight performance because reliable information about the quality of service—especially in terms of price and punctuality—for freight operators is unavailable. Consequently, the RPI for a particular country may not necessarily reflect the high quality of that country's freight services.
- Large countries are favored relative to smaller countries because the quality dimension takes into account the proportion of high-speed rail travelers. That is significant because high-speed rail travel is more common in countries with railway networks that cover long distances.

Variation was greatest in terms of safety. Ratings for intensity of use showed the second greatest variation.

One caveat: The primary source for data used in the RPI is the International Union of Railways (UIC) 2010 database. Some countries, however, do not provide all the information that the UIC database requests. We were thus unable to include those countries in every calculation. Furthermore, due to the unavailability of data, Denmark, Estonia, and Greece were excluded from the RPI altogether.

THREE TIERS OF NATIONAL RAILWAYS

Three groupings of countries emerged from the analysis:

- *Tier One (RPI of at Least 6 Out of 10)*. Switzerland, France, Germany, Sweden, and Austria
- *Tier Two (RPI Between 4.5 and 6)*. Finland, Great Britain, the Netherlands, Czech Republic, Spain, Belgium, Italy, Luxembourg, and Norway
- *Tier Three (RPI Below 4.5)*. Ireland, Slovakia, Slovenia, Romania, Lithuania, Latvia, Poland, Hungary, Portugal, and Bulgaria

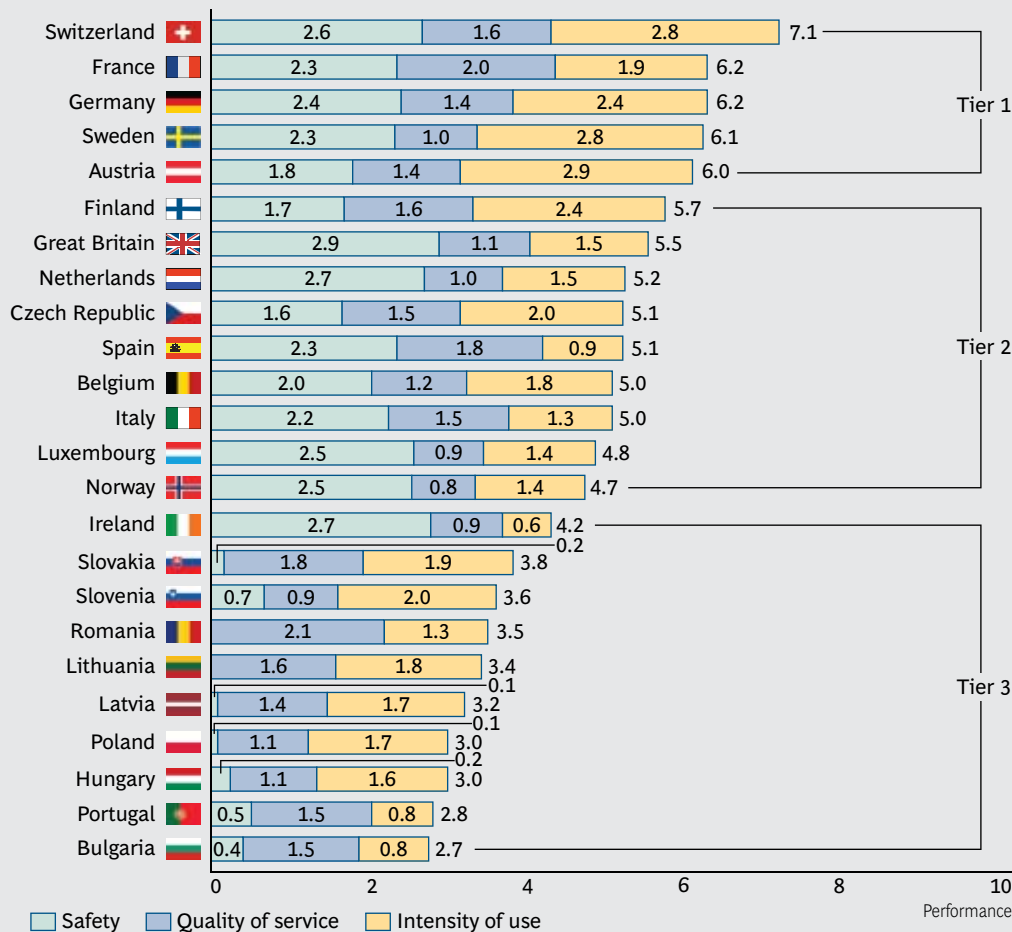
Exhibit 2 shows each country's performance, overall and for each of the three dimensions, as weighted in accordance with the methodology. For example, Switzerland's rating of 8.5 for intensity of use appears as 2.8 in the exhibit because each dimension contributes 33 percent to the overall rating.

The overall findings show that variation was greatest in terms of safety: the nine countries with the lowest overall ratings have a safety rating no higher than 2.0, while the remaining countries have safety ratings of at least 4.9. Ratings for intensity of use showed the second greatest variation, reducing the overall index scores for Spain, Ireland, Portugal, and Bulgaria especially. Ratings for quality of service showed less variation among countries.

Below, we discuss our findings for each tier. In describing a country's performance in each dimension, we consider "excellent" to be a weighted rating of 2.7 or above, "very good" to be 2.0 to 2.6, "good" to be 1.3 to 1.9, and "poor" to be under 1.3.

Tier One Countries. Tier one countries perform well in at least two dimensions, although the results were not uniform.

EXHIBIT 2 | Measuring Country Performance on the RPI



Source: BCG analysis.

Note: Individual data points have been rounded to the nearest tenth. As a result, overall totals may vary by plus or minus one-tenth of a point.

- Switzerland.** With a rating of 7.1 overall, Switzerland has an excellent rating for intensity of use, notably driven by passenger traffic. It also has a good rating for quality and a very good rating for safety.
- France.** At 6.2, this country has a good rating for intensity of use, driven by passenger traffic. It has a good rating for quality and a very good rating for safety.
- Germany.** At 6.2, Germany has a very good rating for intensity of use, driven by both passenger and freight traffic. It has a good rating for quality and a very good rating for safety.
- Sweden.** With a score of 6.1, this country has an excellent rating for intensity of use by both passengers and freight, and a very good safety rating. But it has a poor rating for quality.

- *Austria*. At 6.0, Austria has the highest intensity of use, driven by both passenger and freight traffic. It also has a good rating for quality. However, its safety rating, while good, is among the lowest outside the tier three countries.

Tier Two Countries. Tier two countries have railway systems that perform well overall. The similarity among their RPI ratings, however, obscures a wide range of results among the three dimensions.

Two countries in this tier have high ratings for intensity of use, but lag in quality and safety:

- *Finland*. At 5.7, this country has a very good rating for intensity of use and good ratings for quality and safety.
- *Czech Republic*. With a score of 5.1, the Czech Republic also has a very good rating for intensity of use, driven by freight utilization. It has good levels of quality and safety.

Four countries in this tier have high ratings for safety but relatively low ratings for quality and intensity.

- *Great Britain*. At 5.5, Great Britain has the highest safety rating, but its quality rating is poor. Its rating for intensity of use is good due to low levels of freight utilization.
- *The Netherlands*. With a score of 5.2, this country has an excellent safety level, but its quality rating is poor. Its good rating for intensity of use stems from low freight utilization.
- *Luxembourg*. At 4.8, Luxembourg has a very good safety level. However, its poor quality rating stems from the high price of service, while its good rating for intensity of use results from low freight utilization.
- *Norway*. At 4.7, Norway also has a very good safety rating, but its quality level is poor. Its intensity level is good, stemming from low utilization by both passengers and freight companies.

Two countries in tier two perform well with respect to safety and quality but have low intensity of use (especially for freight):

- *Spain*. With a score of 5.1, Spain has a very good rating for safety and for quality of service, notably resulting from its high-speed service. But it has a poor rating for intensity of use, stemming from low freight utilization.
- *Italy*. At 5.0, Italy has a very good safety level and a good quality rating. But its intensity of use is reduced by low freight utilization.

At 5.0, Belgium—the remaining country in tier two—has a good rating for intensity of use and a very good rating for safety but a poor rating for quality.

Tier two countries have railway systems that perform well overall but vary widely among the three dimensions.

Tier Three Countries. Almost all the tier three countries have very low safety ratings (0.7 or lower). The exception is Ireland, whose safety rating is the second highest in the index. Ireland's overall rating of 4.2 stems from very low ratings for intensity of use and quality.

Among the rest of the tier three countries, quality levels are generally good (with the exception of Slovenia's poor rating). Intensity of use is good or very good for five countries—Latvia, Lithuania, Poland, Slovakia, and Slovenia. However, two countries—Bulgaria and Portugal—have very low intensity of use.

Analyzing the Results: What Drives Performance?

What explains the performance ratings derived from the RPI? To find out, we analyzed the ratings in relation to three factors: public cost, market liberalization, and governance model. We found that performance correlates strongly only with public cost.

RPI VERSUS PUBLIC COST

We compared each country's overall RPI rating with its public cost, which we defined as the sum of public subsidies and investments. Public subsidies refer to recurring government contributions that support passenger and freight operations and infrastructure maintenance. Public investments are one-time government investments in infrastructure construction projects. Because public investments are project-based expenditures, we used the average annual public investment over the six-year period from 2005 through 2010. We then converted the public cost to per capita figures for each country. (Data for this analysis are not available for the Netherlands and Luxembourg.)

Note that this cost measurement does not consider the extent to which investments contribute to public debt. In other words, the measurement judges the efficiency of public spending but does not evaluate whether this spending was a good use of public funds.

We analyzed the ratings in relation to three factors: public cost, market liberalization, and governance model.

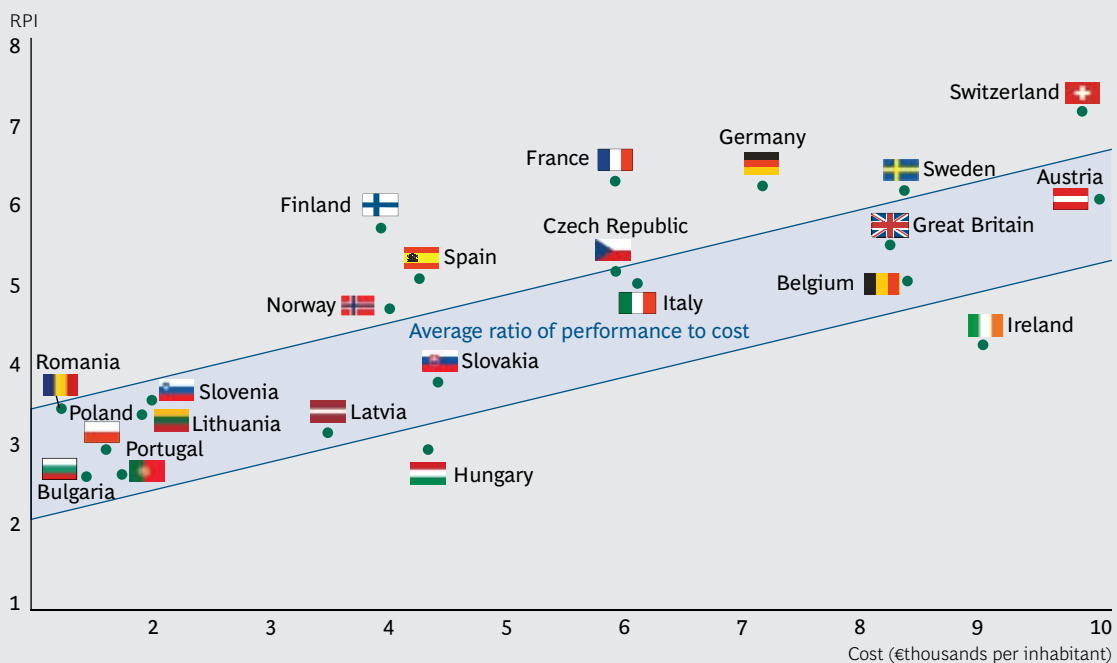
Overall, the analysis shows a correlation between public cost and a railway system's performance level as measured by the RPI. (See Exhibit 3.) It also reveals some differentiating attributes within certain country groups.

Among the tier one countries, Switzerland, France, Germany, and Sweden outperform relative to the average ratio of performance to cost for all countries—that is, they achieve high performance at a lower cost per capita than the other countries. Switzerland has a very high public cost per capita, but it has achieved the highest overall performance due to intensity of use. Germany and France have lower public costs per capita and slightly lower performance levels.

Three countries with lower-cost models—Finland, Spain, and Norway—also succeed in getting good value in return for their investments, as evidenced by their high performance ratings.

Austria, Great Britain, and Belgium get reasonable value in terms of performance

EXHIBIT 3 | RPI Ratings Correlate with Public Cost



Source: BCG analysis.

for their public cost. The Czech Republic and Italy also get reasonable value from their more limited public cost.

Six countries—Slovenia, Romania, Lithuania, Poland, Portugal, and Bulgaria—make low investments in their railway systems and experience correspondingly poor performance. Slovakia and Latvia invest slightly more but still get average performance. Two countries, Ireland and Hungary, are notable for their relatively low return on public cost.

RPI VERSUS DEGREE OF LIBERALIZATION

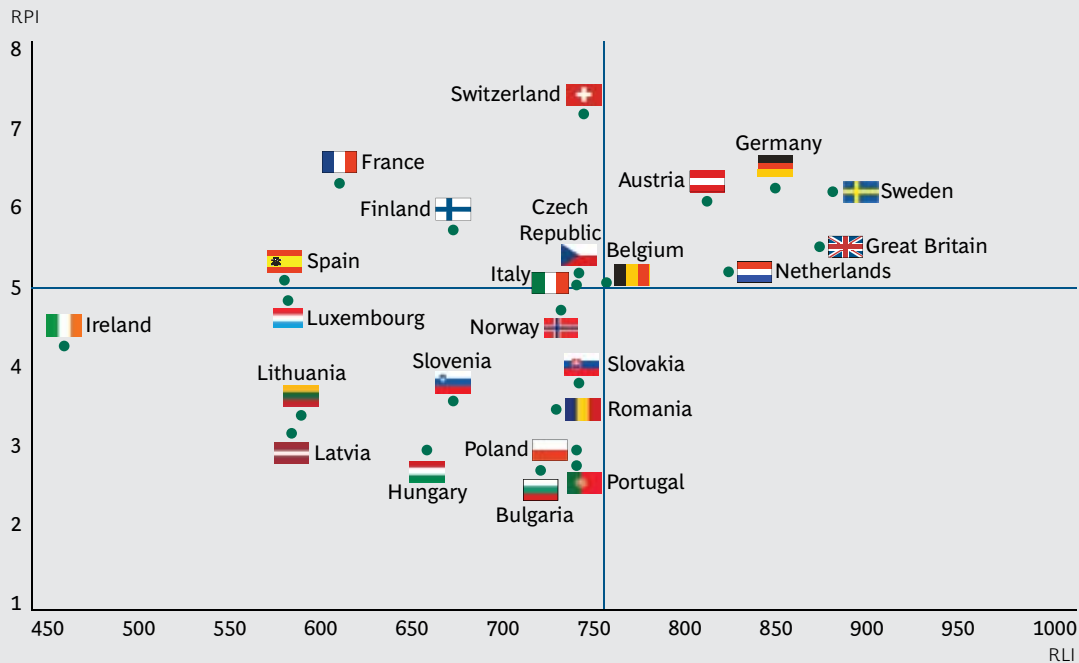
To analyze the correlation between performance and market liberalization, we compared the RPI ratings with IBM’s Rail Liberalisation Index 2011 (RLI), which evaluates the status of railway system liberalization in the European Union, Norway, and Switzerland. The analysis shows that the level of market liberalization does not by itself determine a railway system’s level of performance. (See Exhibit 4.)

All countries with a very high RLI rating (greater than 750) have an RPI rating higher than 5.0. Does this mean that increased competition necessarily results in higher performance? We do not believe that a direct link can be made.

Notably, three countries with midrange RLI ratings have very high RPI ratings: Switzerland, France, and Finland. This suggests that other factors come into play in determining high performance. The attention that public authorities give to a railway system is critical, for example, and an open market requires a high level of

EXHIBIT 4 | The Index Shows Only a Weak Correlation Between Market Liberalization and Performance

RPI Versus IBM's Rail Liberalisation Index (RLI) 2011



Sources: BCG analysis; IBM's Rail Liberalisation Index 2011.

government regulatory oversight. In addition, railways are an essential component of the transportation infrastructure in countries that have pursued liberalization, indicating that efforts at liberalization reflect a desire for high performance.

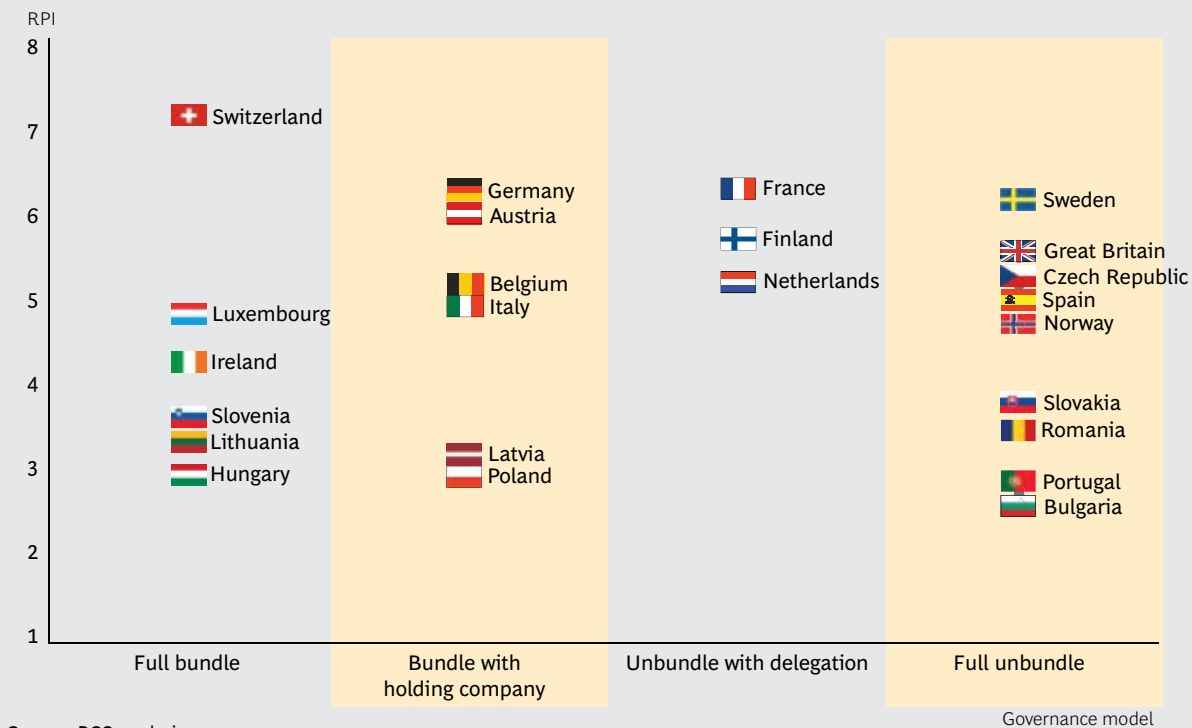
RPI VERSUS GOVERNANCE MODEL

To analyze whether performance correlates with governance models, we examined RPI ratings relative to four organizational archetypes:

- *Full Bundle.* A single entity owns the infrastructure and operates the railway.
- *Bundle with Holding Company.* A holding company owns both the infrastructure manager and the railway operator.
- *Unbundle with Delegation.* The infrastructure manager and railway operator are separate companies, and the infrastructure manager delegates the maintenance work to the railway operator.
- *Full Unbundle.* The infrastructure manager and railway operator are separate companies.

This comparative analysis revealed no clear correlation—countries in the first and second tiers are found in all archetypes. Tier three countries are dispersed among three of the archetypes. (See Exhibit 5.)

EXHIBIT 5 | A Railway's Performance Is Not Dictated by Its Governance Model



WE HOPE THAT the findings of the 2012 RPI will help to inform discussions about priorities for action by the EC, national governments, and railway operators over the coming year. Focusing solely on policy changes—such as liberalizing markets and changing governance models—may not produce the desired performance improvements. Understanding how public subsidies and investments can be applied most effectively to drive higher performance may be the critical factor for improving passenger and freight services throughout the European railway system.

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