

Does the High Speed Rail (TGV) infrastructure boost corporate competitiveness?

By [Claire Lelarge](#)

*The G20 has called for greater investment in infrastructure projects in order to boost growth. One such project, the **Train à Grande Vitesse** (the TGV – France's high-speed train) allows for corporate productivity gains through reorganisations and increased site specialisation in their areas of expertise. For companies in operation in 2011, this could have represented a positive impact on profit margins of between 0.6 and 1.9 percentage points depending on the industry.*



SOURCE: SHUTTERSTOCK

The need for more, better quality infrastructure investments is currently one of the G20's central messages ([Shanghai, 2016](#)), as this type of large-scale project is widely believed to be a key growth factor. What are the underlying economic mechanisms? This post proposes to "dissect" the main mechanism through which the TGV is likely to have an impact on the productivity of companies and groups operating multiple production sites.

The TGV infrastructure facilitates management of multi-site entities

The economic weight of companies and groups managing several, geographically dispersed production units is extremely significant. In France, more than half of the paid workforce in the for-profit sector is employed in this type of structure, subsidiaries of foreign groups included.

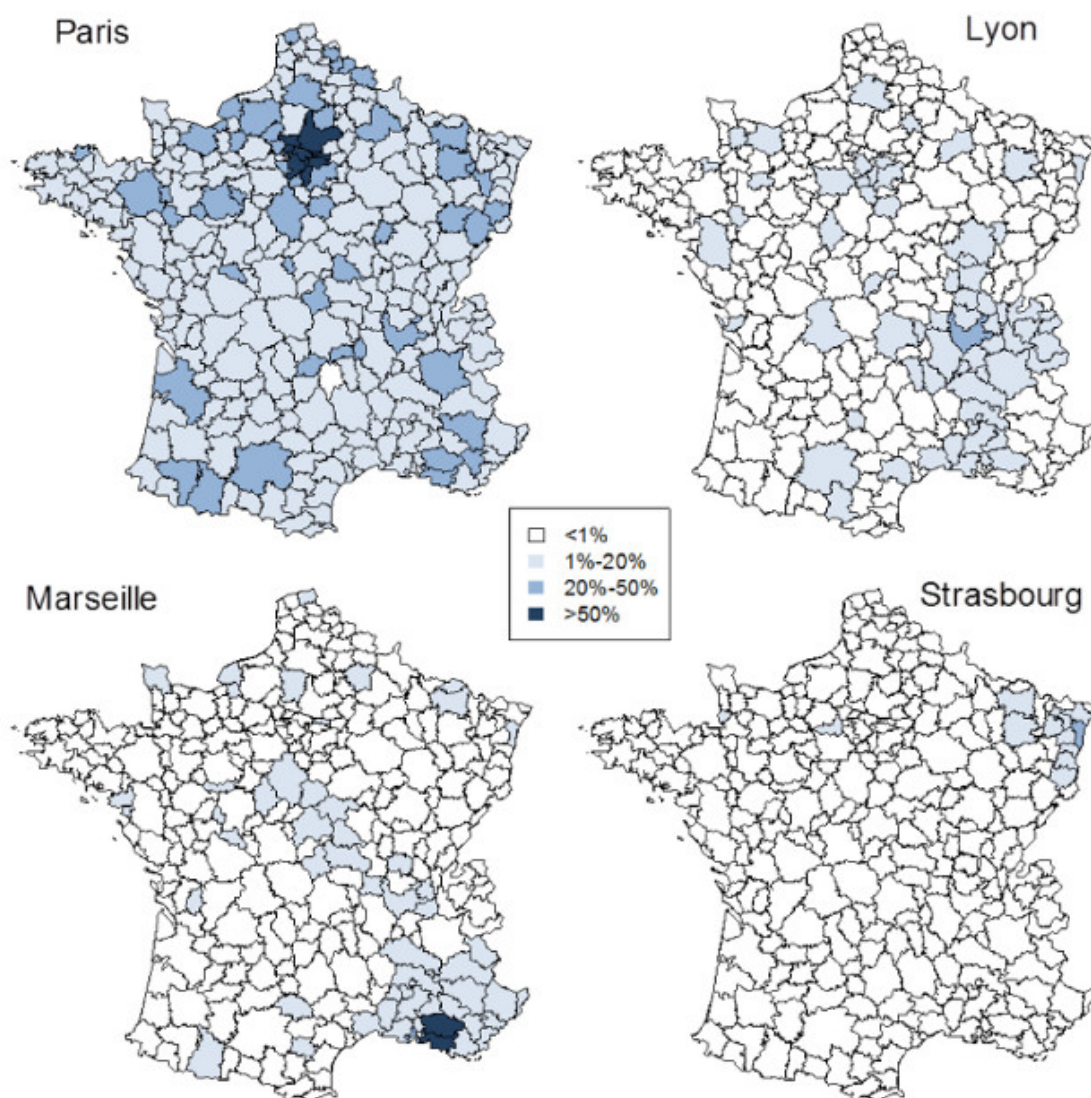
The map of French production sites and their head offices reveals the metropolitan areas that are the main

"decision-making business centres", along with their respective spheres of influence (see Chart 1): the proportion of private employees that are remotely managed amounts to more than 30% in all of the metropolitan employment areas and even exceeds 50% in many of the areas that fall within the capital's sphere of influence. The influence of Paris would appear to be particularly significant, especially in comparison with other metropolitan areas such as Lyon, Marseille and Strasbourg.

For groups with operations in several different locations, the challenges posed by the need to communicate between the different sites, particularly between head offices and subsidiaries, are critical. Indeed, the most important strategic decisions often necessitate face-to-face interaction. For example, managers of remote subsidiaries, who have a good knowledge of local market conditions, often need to meet with head office management, which decides on the allocation of group funds to different investment projects.

As a result, communication technologies and transport infrastructure such as the TGV are likely to facilitate the management of these complex structures. They will also make the French territory more attractive as a choice of location for such businesses.

Chart 1: "Spheres of influence" of four large metropolitan areas in terms of remotely managed employees



Sources: Insee, DADS and LIFI files (2011). The data cover the for-profit sector, excluding agriculture and private individual employers in metropolitan France.

Note: The maps show the proportion of the workforce in each employment area working in subsidiaries under the control of head offices located in Paris, Lyon, Marseille and Strasbourg, respectively.

The TGV has increased the specialisation of remote subsidiaries in their production activities

The French TGV network has expanded significantly since the opening of its first service on a segment of the line between Paris and Lyon in 1981. The main developments during our analysis period (1993 to 2011) included the opening of the Île-de-France interconnection line as well as the Rhône-Alpes *ligne à grande vitesse* (LGV – high-speed line) between Lyon and Valence in 1994. The LGV Rhône-Alpes was extended to Marseille in 2001 and the LGV Est connecting Paris and Strasbourg was opened in 2007 (see Chart 2). Commercial speeds on the dedicated TGV network are significantly faster than those attained on the standard railway network, reaching speeds of 300 km/hour to 320 km/hour. Consequently, journey times between newly connected cities have plummeted. As an example, the train journey from Paris to Marseille which took 6 hours and 40 minutes in 1981, was reduced to 4 hours and 40 minutes in 1982 then 4 hours and 18 minutes in 1994, and as of 2001 only takes 3 hours. Equally, the journey time from Paris to Strasbourg was reduced from 3 hours and 55 minutes to 2 hours and 20 minutes in 2007.

In 2011, more than 40% of the subsidiaries of multi-site groups could use the TGV for all or part of the journey to their head office. Our analyses (Charnoz, Lelarge and Trevien, 2017^[1]) show that when the journey time between a group's head office and one of its subsidiaries is reduced due to an extension of the TGV network, the group tends to reorganise. It increases the number of jobs in the subsidiary allocated to production activities to the detriment of managerial functions, which are partially relocated to the head office. The net effect on total group employment tends to be slightly positive in most industries.

The magnitude of these workforce reallocations varies substantially depending on the industry. The results obtained are particularly significant in the service sectors, where the availability of the TGV technology is on average associated with one additional full-time equivalent (FTE) employee allocated to production activities, as compared to 20% of one FTE in other business sectors (retail and manufacturing industries). It also leads to the relocation of around one managerial position from the subsidiary to the head office.

The reorganisations have a positive but limited impact on profit margins

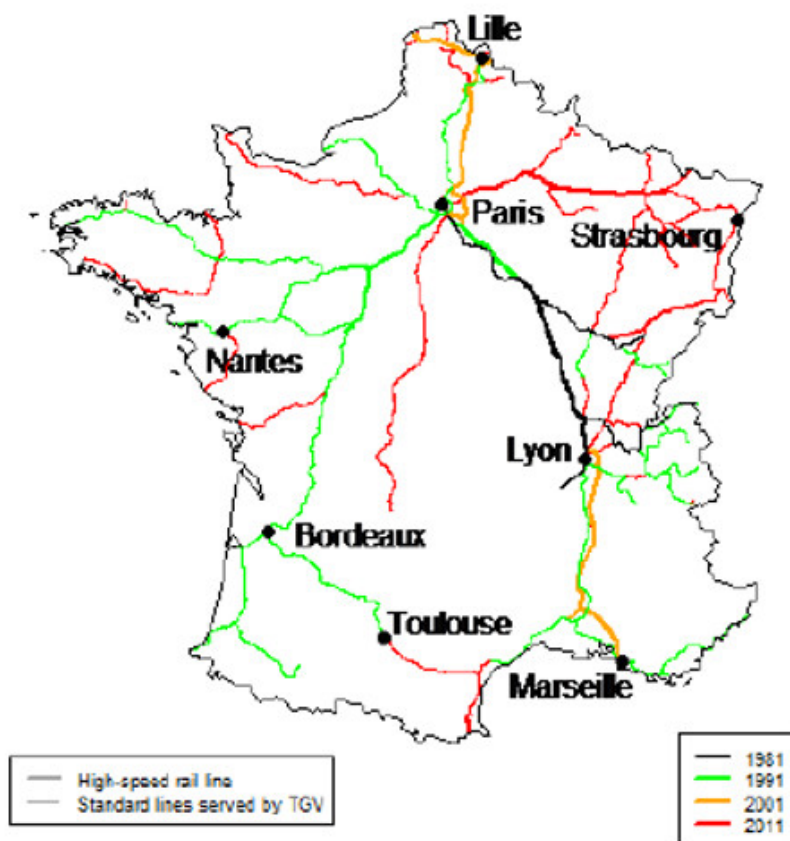
Groups reorganise quickly after the opening of a TGV line – typically during the same or following year – and the changes appear to remain stable over a three to five year horizon. The fact that the changes are not subsequently called into question suggests that they generate concrete productivity gains. Unfortunately, this hypothesis is difficult to confirm directly as the productivity of groups with complex organisations is notoriously difficult to assess empirically.

It is however possible to calculate a rough estimate of the TGV's impact on the gross profit margin of those groups affected. Our analyses suggest that it is relatively consistent across the retail, services and manufacturing sectors at between 0.6 and 0.8 percentage points, and reaches a maximum of 1.9 percentage points in the transport sector. These results are statistically significant, although relatively limited in magnitude, and should be compared to average profit margins ranging between 24% and 32% depending on the industry.

These estimates are however likely to under-state somewhat the true impact. Indeed, they incorporate the main channels through which the TGV infrastructure is likely to affect firms' productivity, but there might be additional mechanisms that have not been taken into account in this study. For example, the TGV infrastructure might also affect the ability of firms to find better or more appropriate suppliers or investors. It might also affect firms' ability to prospect for customers. Lastly and most importantly, in addition to its

impact on firms' productivity, the TGV infrastructure might have significantly boosted demand, in particular in industries related to tourism.

Chart 2: Expansion of the railway network served by the TGV from 1981 to 2011



Sources: SNCF archives and open-data platform.

Note: The map shows the railway network served by the TGV in 1981, 1991, 2001 and 2011, respectively.

[1] Pauline Charnoz, Claire Lelarge and Corentin Trevien, "Communication Costs and the Internal Organization of Multi-Plant Businesses: Evidence from the Impact of the French High-Speed Rail", Banque de France Working Paper (forthcoming).

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