An Overview of the Structural Economic Impacts of Alto

COMPUTABLE GENERAL EQUILIBRIUM MODELLING APPROACH TO ASSESSING HIGH-SPEED RAIL IN THE TORONTO–QUÉBEC CITY CORRIDOR

June 2026

AVISEO strategy + economy

ALTO

Work undertaken by Aviseo on behalf of Alto.

Table of Contents

Introduction 3

Methodology and model used 4
Literature review 4
Definition of CGE model 4

Structural economic shocks 7
Economic theory behind the shocks 7
Translation of empirical evidence into CGE modelling assumptions 10

Interpretation of results 13
Definition and interpretation of key results 13
Implications for populations 17

Conclusion 19

Bibliography 20

Introduction

The study conducted by Aviseo Consulting aims to assess the structural economic and fiscal impacts of implementing a high-speed rail (HSR) service in the Québec City–Toronto corridor. Unlike traditional analyses that focus on the impact of construction and operating costs, the focus is placed on the long-term effects that could transform the Canadian economy in a lasting way.

The approach uses a computable general equilibrium (CGE) model of Canada, an analytical framework recognized and widely used by governments and international organizations to analyze the systemic effects of economic shocks. This model allows for the consistent integration of interactions between different economic agents and estimates the impacts of the structural effects associated with rail projects, particularly in terms of productivity, the labour supply, and economic attractiveness.

The analysis is based on internal data inputs (including demand forecasts and other project information), public data, and recognized statistical sources, particularly those from Statistics Canada. The methodology adopted is explicitly documented and structured around four main steps: a review of the literature to identify the structural effects observed in comparable contexts, a presentation of the methodological framework and the scenarios selected, an analysis of the economic and fiscal results, and a conclusion putting the lessons learned into perspective for public policy.

The relevance of the study stems from the strategic nature of the Québec City–Toronto corridor, which accounts for a significant portion of the country's population and economic activity, while facing growing constraints in terms of capacity and performance of transportation infrastructure. By highlighting the long-term structural impacts of the HSR, the study provides a solid analytical basis for informing public decision-making on the desirability of the project.

Methodology and model used

Literature review

A thorough literature review is essential to the creation of realistic scenarios. Usually, econometric studies would first need to be conducted on HSR in Canada to accurately estimate its contributions or elasticities. However, since no such infrastructure exists along the Toronto-Quebec City corridor, evidence from comparable HSR systems elsewhere in the world is used to calibrate the scenarios in an *ex-ante* approach. The analysis therefore began with a large-scale literature review. This made it possible to identify and characterize the structural economic impacts generally generated by HSR. The transferability of these effects to the Alto high-speed rail line is considered, as the geographic and economic context can affect both impacts and magnitudes.

The literature review mainly includes scholarly articles published in peer-reviewed journals, as those tend to have better, more standardized methodologies. When possible, more recent articles were favoured as time can impact the estimations. However, some articles that are not peer-reviewed have been considered, based on their relevance, in a spirit of completeness. Most of the articles come from project studies in Europe or China, where HSR networks are highly developed and have been in operation for several years. A total of 118 articles were consulted for this study.

Definition of CGE model

In this study, a static computable general equilibrium (CGE) model is used to estimate the structural economic impact of the HSR expressed as an average impact. A CGE model represents the economy as a system of interconnected agents and markets. Prices adjust simultaneously to ensure equilibrium between supply and demand across all markets. This approach makes it possible to analyze how an economic shock, such as a change in productivity or a public policy, changes the allocation of resources between industries and economic agents.

Although the model is *static*, it is used here to quantify *long-run* (structural) impacts in a *comparative-static* sense. “Static” means the model does not generate a year-by-year transition path; instead, it compares two equilibria: (i) a baseline equilibrium that reproduces the observed economy, and (ii) a counterfactual equilibrium after the HSR-related structural shocks are introduced and markets have fully re-equilibrated. In that interpretation, the reported impacts should be read as differences between “before” and “after” equilibria once prices and quantities have adjusted, not as short-term forecasts or as the timing of adjustment.

In practice, the “long-run” label reflects that the shocks represent persistent changes in productivity, effective labour input, and tourism demand that are expected to prevail once the infrastructure is operational and behavioural responses have taken place. The equilibrium concept allows outputs, relative prices, wages, trade flows, and the allocation of labour across sectors to adjust simultaneously. Some elements (e.g., capital mobility or the external balance) depend on the chosen macro closure, which is why the report emphasizes robustness across alternative closures rather than relying on a single specification.

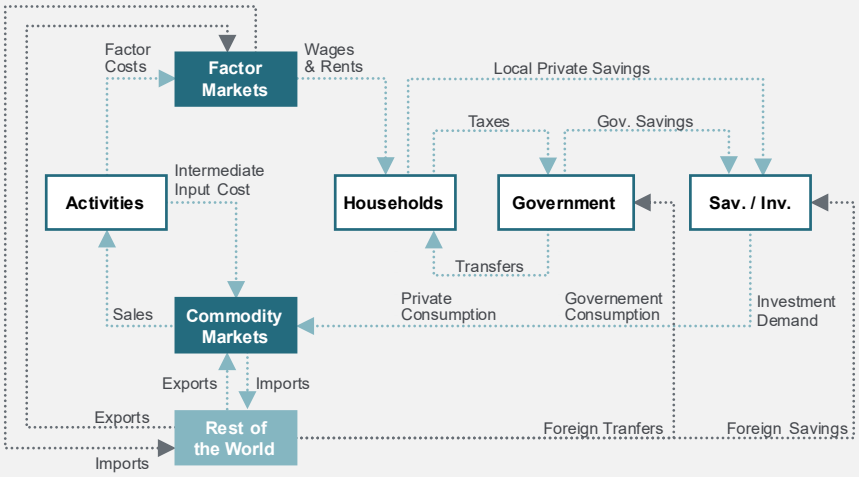
The model explicitly describes the behaviour of the main agents in the economy:

- Firms produce 18 goods and services by combining intermediate inputs, and two factors of production: labour and capital. These factors of production produce according to a Cobb-Douglas production function. Labour is mobile between sectors, while capital is fixed. Firms choose the combination of factors that maximizes their profits, where marginal revenue equals marginal cost.
- The aggregated household receives income from the supply of labour and capital, and from transfers with the other agents. They allocate this income between consumption of goods and services, transfers to other agents, and savings.
- The government income comes from collecting taxes on household and firms’ income, transfers from the rest of the world or nonprofit organizations, and a part of capital remuneration. This income is distributed between public expenditures, public investments, and transfers to other agents.

– Finally, the rest of the world represents trade with other countries, particularly imports, exports, and transfers.

The economy is kept in balance by equilibrium conditions in each market, except for the labour market, for which we are introducing an imbalance caused by unemployment. For each good and service, domestic production and imports must equal total demand from households, businesses, the government, and exports. Similarly, factor markets are in equilibrium when business demand for labour and capital matches the supply available in the economy. Prices play a central role in this mechanism, as they adjust to ensure the simultaneous equilibrium of all markets. Figure 1 is a visual representation of those flows.

Figure 1: Flow structure in a CGE model



In the basic static framework of CGE models, labour supply is often considered fixed. This specification is extended by allowing labour supply to respond endogenously to economic incentives. More specifically, households can adjust the number of hours worked in response to changes in real wages. This modification is consistent with standard microfounded labour supply behaviour and with the empirical evidence summarized by Blanchflower and Oswald (1994). In the context of this work, this extension allows simulated shocks to translate not only into changes in labour demand, but also into responses in terms of participation and hours worked that affect equilibrium wages, output, and welfare.

Data, calibration and shock

The structure of the model is calibrated using the 2019 social accounting matrix (SAM) for Canada. 2019 is the latest reliable and available data describing the economy for a reference year at the moment of realization of the study, as 2020 and 2021 are pandemic years. The SAM draws heavily from Statistics Canada's Supply and Use Table and Canada's public accounts. This calibration allows the observed structure of the economy to be reproduced exactly in the model. It constitutes the baseline scenario from which the simulations are carried out.

It is also necessary to make a choice on the closure of the model. This choice can often impact results and can lead to criticisms. Six closures are therefore tested and the average is reported in the results section. Variation across closures stems from the endogenization of the following variables (not all at the same time): price index, government savings, government spending, exchange rate, and the current account deficit. Consequently, the results are more robust and can be interpreted with greater confidence.

Because the responsiveness of labour supply to changes in wages varies with market conditions, two labour-market regimes are explicitly differentiated: a tense market, in which labour supply is relatively inelastic and adjustment to shocks is slower, and a more fluid market, in which supply responds more strongly to wage signals. A tense labour market would correspond, for example, to a labour shortage. Conversely, a fluid labour market corresponds to high labour availability, an example of which would be an increase in immigration.

This distinction is particularly relevant for an HSR project whose construction and ramp-up span several years: by the time the infrastructure becomes operational, aggregate and regional labour-market tightness may differ

markedly from current conditions, notably given Canada's immigration targets and the heterogeneity of labour-market dynamics across provinces and metropolitan areas. To account for this uncertainty and to avoid over-interpreting results conditional on a single closure/parameterization, simulations are run under both regimes (i.e., alternative labour-supply elasticity) and outcomes that are robust to these assumption changes are reported. A total of nearly 100 simulations were performed to investigate the structural impacts of HSR in Canada.

The simulation part then consists of introducing an exogenous shock into the model, such as a change in labour supply, an increase in productivity, or a change in taxation. The model is then solved to determine the resulting new economic equilibrium. The simulation results correspond to the differences between this new equilibrium and the baseline situation.

Use of CGE models in Canada and internationally

CGE models are a well-established tool for evaluating economy-wide policy changes because they trace how a shock affects production, consumption, trade, prices, and public finances at the same time. In Canada, they are used across several public institutions:

- Environment and Climate Change Canada (ECCC), for example, uses a peer-reviewed multi-region, multi-sector CGE model (EC-PRO) to assess the economic impacts of major climate policy packages, including the Pan-Canadian Framework, and to support internal policy development.
- Global Affairs Canada (GAC) has used CGE modelling to support ex-ante assessments of trade agreements and related policy changes.
- CGE-type tools are also commonly referenced in government analysis, including within the Department of Finance Canada, because they provide an internally consistent way to link policy changes to macroeconomic aggregates and tax bases. Several provincial Ministries of Finance also use general equilibrium (CGE-type) frameworks in applied policy work, often in collaboration with external modelling teams, to assess economy-wide impacts of major fiscal, tax, or climate-related policy changes.
- Also, Industry Canada, Social Sciences and Humanities Research Council (SSHRC), and Agriculture and Agri-Food Canada, among others have CGE models.

Internationally, CGE models are routinely used by governments and multilateral organizations to inform decisions on trade, taxation, energy and climate policy, and major infrastructure reforms. Examples include the World Bank MANAGE-WB family of CGE models for macroeconomic and policy analysis, the OECD's METRO trade model to study changes in trade and related policies, and the European Commission's GEM-E3 model (maintained by the Commission's modelling ecosystems) to assess the macroeconomic implications of energy, climate, and environmental policy packages.

Structural economic shocks

Economic theory behind the shocks

HSR primarily affects the economy by reducing the generalized cost of intercity travel, through shorter travel times and improved reliability. In economic terms, this reduction increases accessibility between places, firms, and workers, thereby altering market access and the spatial organization of economic activity. These accessibility gains generate structural impacts that extend well beyond the direct spending associated with construction and operations. By reshaping how firms interact with suppliers and clients, how workers access employment opportunities, and how tourists choose destinations, HSR can influence productivity, labour supply, and tourism. Each channel is grounded in established economic theory and empirical evidence presented in the current section of the report.

The contribution of public capital to productivity and economic growth

Over the past three decades, a substantial body of research has examined how public capital contributes to productivity and long-run economic growth. In his seminal paper, Barro (1990) introduces public capital into an endogenous growth framework and shows how it can raise private-sector productivity, thereby supporting higher growth. In general, public infrastructure can reduce significant economic costs (e.g., transaction, coordination, or production costs) and alleviate certain constraints or inefficiencies (including congestion when infrastructure is saturated). By lowering these costs, it can increase private sector productivity and improve the return of private capital.

In the Canadian context, Harchaoui and Tarkhani (2003) examine the contribution of public capital to economic growth and productivity. In their definition, public capital includes transportation systems (e.g., highways, subways and mass transit) as well as water supply and wastewater infrastructure. Under this interpretation, an HSR network would constitute an additional form of public capital and would be expected to contribute to multifactor productivity by improving connectivity and reducing the cost of moving people and services. They find a positive contribution of public capital to productivity growth across industries. In aggregate, they estimate that public capital accounts for roughly 18% of multifactor productivity growth in the long-term.

While the remainder of this section seeks more direct, HSR-specific evidence to calibrate the shocks used in the model, these results provide a clear rationale for treating major transport infrastructure as a potential driver of productivity in an applied economic assessment. This perspective is also relevant given Canada's recent productivity performance. In 1970, Canada ranked 6th among OECD countries in terms of GDP per hour worked, by 2022, it ranked 18th[1]. In that context, improvements in intercity connectivity, such as HSR along the Toronto—Quebec City corridor, could be one of several levers that support stronger productivity growth.

Productivity

HSR can affect productivity by improving access between firms, workers, and markets. In the urban and regional economics literature, these accessibility gains translate into *agglomeration economies*. This refers to the economic benefits that arise when firms, people and institutions are geographically concentrated in a region (e.g.: economic corridor, city, industrial hub), as they gain advantages from being near one another. The agglomeration economies traditionally arise through three channels: (i) the proximity of suppliers, customers, and infrastructures (ii) labour market interactions (larger and more specialized labour pools), and (iii) knowledge spillovers and innovations.

- (i) The sharing of indivisible facilities and public goods (such as universities and laboratories), as well as suppliers, workers, and consumers, reduces fixed costs for firms and encourages specialization. Access to a broader set of intermediate suppliers allows firms to purchase inputs at lower cost. Greater firm density also promotes specialization in complementary products, which helps reduce overall production costs.

[1] *RBC Economics (2024)*

- (ii) A larger pool of workers in close proximity to employers leads to faster and better job-worker matchings, which decrease the costs of research for firms. The proximity makes it easier for employers and workers to find each other and to find better fits between the skills sought by companies and those possessed by the workforce. Better matchings make it easier to adjust to shocks and to allocate talent efficiently.
- (iii) Knowledge spillovers are the transfer of knowledge, valuable information and skills. Having a proximity between people and firms allow for more face-to-face contacts and learning opportunities. These interactions facilitate knowledge exchange, transfer of skills, diffusion of better practices and technologies, even in an era of fast communication technologies. Workers can implement new skills or ideas in their job and contribute to productivity. Also, new workers can bring new skills or ideas to a firm, which then again can boost productivity. Learning strengthens local innovation capacity.

Across studies that estimate overall productivity effects (or closely related determinants such as agglomeration effects), the implied magnitudes vary. They suggest a range of estimates between 0.01 and 0.06, with many HSR-focused estimates around 0.05. More directly applicable to the methodology used in this report, Wetwitto and Kato (2017) and Bottasso *et al.* (2023) find that HSR connectivity positively impacts productivity, with estimates between 0.047 and 0.108. Kuang *et al.* (2020) report substantially higher results than other estimates, which can be explained by their focus on industries that are most likely to benefit from HSR.

Also, Bhatt and Kato (2021) find that capital expenditures are positively correlated with knowledge spillovers, and that HSR is also positively correlated with knowledge spillovers. This highlights that productivity impacts are likely to be heterogeneous across sectors, with larger effects in activities that rely more on business travel, dense supplier networks, and knowledge exchanges.

Because these mechanisms depend on proximity and interaction, the magnitude of productivity effects is strongly related to geography and the effective distance between places. The literature suggests that agglomeration impacts decline with distance: in Germany, for instance, the strength of spillovers is found to fall by about 50% for every additional 30 minutes of travel time. Consistently, several studies identify impacts concentrated within roughly a 30 km radius of stations.

Labour supply

By reducing the generalized cost of commuting, HSR increases effective accessibility between places of residence and employment. It allows workers to reach a larger set of potential job opportunities within a given commuting time. In labour-market terms, this change can influence both (i) participation in employment and (ii) the amount of work supplied by those who are already employed.

- (i) First, lower commuting costs expand the range of jobs that workers consider acceptable. Some individuals may therefore enter employment or participate in the labour market because commuting options that were previously too costly in terms of time or effort become feasible. In other words, improved accessibility can increase the number of people who choose to work.
- (ii) Second, reductions in commuting time relax the time constraint associated with a given work schedule. When less time is spent travelling, workers may choose to supply more hours of work because the total time required to maintain their work schedule decreases. These two effects jointly translate into a potential increase in aggregate paid hours.

In transport terms, these behavioural changes may appear as induced demand. As commuting becomes faster and more reliable, individuals may travel more frequently, accept jobs located farther from their place of residence, or switch from other modes of transport such as car, bus, or conventional rail. The resulting increase in commuting trips therefore reflect the improved accessibility generated by HSR. To avoid double counting across channels, this mechanism is limited to changes in quantity of labour supply while improvements related to job matching or productivity (quality of labour supply) are captured separately through the productivity channel.

Evidence suggests that HSR connectivity can affect local employment composition and levels. For instance, Zhang and Xu (2022) find positive impacts of HSR on the service-sector workforce in Spain, consistent with the idea that improved intercity accessibility supports the expansion of market services. Lin (2017) finds that being connected to HSR tends to increase regional employment, providing further support for a positive labour-market response to improved accessibility.

Heuermann and Schmieder (2014; 2018) show that reductions in travel time can significantly increase commuting flows and the share of workers commuting by train. In their 2014 results, a 1% reduction in travel time is associated with a 0.4% to 0.6% increase in the number of commuters; in their 2018 study, the comparable effect is about 0.25%. They also find that the sensitivity of commuting to travel-time reductions is the largest for trips in the 200–550 km range, an interval that is directly relevant to many city pairs in the Toronto—Quebec City corridor.

Tourism

HSR can influence tourism primarily by improving accessibility to destinations. By reducing travel time between major cities, it can make multi-destination itineraries easier, increase the attractiveness of visiting secondary cities, and encourage longer stays when travellers can cover more sites within the same trip. Tourism is increasing economic activity because spending by foreign visitors acts like an export of locally produced services, injecting external demand into the domestic economy. This demand stimulates tourism-related industries and generates spillovers to supplier sectors while supporting employment in typically labour-intensive service activities. In principle, these effects can apply to both domestic and international tourists.

In this summary, the focus is placed on international tourism. Increased domestic tourism would likely reflect, at least partly, substitution from existing household expenditures, which may have limited net effects at the macroeconomic level. Domestic tourism can matter regionally, but for national GDP, the key driver is the net inflow of foreign spending.

In the empirical literature, international tourism impacts are typically measured through three related outcomes: the number of foreign tourist arrivals, tourism revenues, and tourism demand.

On tourist arrivals, Lopresti and Tartaglia (2023) find that the presence of HSR service increases international tourist arrivals, and Castillo-Manzano *et al.* (2018) report a similar positive effect on the number of foreign tourists. On tourism revenues, Chen and Haynes (2012; 2015) estimate a strong positive effect of HSR on international tourism revenues in China, while Campa *et al.* (2016) document a smaller but still positive effect in Spain. These studies are particularly informative given the size of the tourism sectors and the extensive HSR networks in both countries.

According to Campa *et al.* (2016), countries with vast distances between tourist destinations, like Canada and China, tend to have less dense transportation networks as alternatives to HSR. This limited accessibility allows HSR to have a more substantial impact on tourism in these countries.

Translation of empirical evidence into CGE modelling assumptions

This section translates key findings from the empirical HSR literature into modelling assumptions for the CGE simulations. For each channel, results from the literature are mapped into scenario parameters and the shock implemented in the model is defined. Productivity effects are spatially concentrated around major stations, labour-supply effects are derived from commuting time savings and induced demand, and tourism impacts are based on responses of international arrivals and spending to HSR connectivity in comparable contexts.

Productivity

The productivity literature reviewed above suggests that accessibility gains from HSR can generate agglomeration and related productivity effects that are spatially concentrated around stations. Because the exact location of future HSR stations in the Corridor is not yet known, each city's census metropolitan area (CMA) is used as a practical approximation of the 30 km radius recommended in the literature around major stations in Toronto, Montréal, Ottawa, and Québec City. The size of the affected economy is then scaled using the share of Canadian GDP produced in these CMAs, with an industry adjustment to reflect that impacts are likely to be heterogeneous across sectors.

The productivity channel is implemented as an exogenous increase in total factor productivity in the industries and geography considered to be affected by HSR. In the model notation, this is captured by a productivity parameter (Ω) that shifts the production function upward: for a given combination of labour and capital, firms can produce more output.

Three productivity scenarios are defined: a pessimistic scenario, a baseline scenario, and an optimistic scenario:

Shock 1 : Productivity impacts of HSR		
1.1 Pessimistic scenario The pessimistic scenario considers a productivity value that is at the lower end of the interval, in part because of endogeneity concerns but also because the sectoral impact might be smaller than what is reported in the literature review. While we could have produced a pessimistic scenario in which specific industries would have been considered not to be impacted by the HSR, such a decision would have been arbitrary. A similar result is hereby obtained through a lower value of the productivity parameter (Ω).	**1.2 Baseline scenario** Productivity gains stemming from agglomeration impacts because of HSR are between 0.02 and 0.04 in studies on Germany and Sweden. Other studies, albeit not specifically on HSR, place it around 0.05. If productivity gains are exclusively coming from agglomeration impacts, it seems reasonable to consider a baseline scenario where productivity impacts on the regions affected by HSR would be of 0.03. Of course, one could consider that the estimates of Bottasso et al. (2023) should be the baseline scenario but applied to a smaller number of industries and still produce a 0.03 baseline scenario.	**1.3 Optimistic scenario** While Bottasso et al. (2023) found a productivity impact of 0.05 for firms impacted by HSR, such a figure, if generalised to all firms in the relevant area, is poised to induce a significant impact on GDP. It is true that others have found elasticities even higher than this (e.g. Harchaoui and Tarkhani, 2003; Wetwitto and Kato, 2017). However, some could argue that there is a potential endogeneity issue with the estimation and that what is included in the productivity impact of HSR might also encompass other effects. We set the optimistic scenario according to the estimations made by Bottasso et al. (2023).
Ω = 0.02	**Ω = 0.03**	**Ω = 0.05**

Labour supply

The commuting literature reviewed above provides the conceptual basis for treating HSR time savings and induced commuting as a positive shock to effective labour supply. In practice, Alto demand forecasts and route-level time-saving estimates (shared in May—June 2024) are used to translate these mechanisms into modelling parameters for the horizon 2046.

The labour-market channel is modelled as an exogenous increase in *effective* labour supply, combining (i) commuting time savings (via modal shift toward HSR) and (ii) induced demand (additional commuting and, potentially, additional workers). Consistent with CGE accounting, labour supply is calibrated in value terms (hours worked multiplied by the mean hourly wage).

The time-saving component is computed from route-level estimates of annual hours saved when commuters switch to HSR, using the non-business segment. For each route, the per-passenger time saving is multiplied by Alto's projected number of HSR passengers, then aggregated across routes. Induced demand reflects additional commuting generated by lower generalized travel costs. In the scenarios, induced demand is mapped into additional effective labour supply; differences across scenarios are driven mainly by the assumed magnitude of this induced-demand component, given limited observability of future commuting patterns in a Corridor where HSR does not yet operate:

Shock 2 : Labour supply impacts of HSR		
1.1 Pessimistic scenario	**1.2 Baseline scenario**	**1.3 Optimistic scenario**
Assumes a low response of commuting behavior to the new rail service. Only 5% of non-business demand is attributed to commuting trips, resulting in limited time savings converted into additional labour supply and a weak induced demand effect.	Assumes a moderate and plausible response. 20% of non-business demand is associated with commuting trips, combining time savings for existing workers with a moderate induced labour supply effect.	Assumes a strong behavioral response to improved accessibility. 35% of non-business demand is attributed to commuting trips, leading to larger time savings and a stronger induced increase in labour supply.
5%	**20%**	**35%**
of the non-business demand is for commuting from or to work		

Tourism

Consistent with the tourism literature summarized earlier, HSR's tourism effect is modelled as an increase in international tourism spending in Canada attributable to improved accessibility along the Corridor. Additional international tourists and tourists extending their stay are assumed to exhibit the same expenditure structure as current foreign tourists travelling to Canada.

International tourists visiting regions along the HSR route typically spend in five main sectors. According to Statistics Canada visitor travel survey, accommodation and food services account for about 65% of total tourist expenditures, while clothing and gifts, transportation, and arts, entertainment and recreation make up most of the remainder. This spending profile is used to allocate the tourism-demand shock across sectors in the CGE model. In the model, this demand shock increases final demand for the sectors that receive tourist expenditures, using the observed spending shares described above.

The expenditure shock is calibrated as follows:

$$Expenditure\ shock_i = \Delta spending \times international\ tourists'\ annual\ spending_i$$

Where :

- Expenditure $shock_i$: expenditure shock generated by international tourists in sector *i*
- Δspending = the coefficient estimated through the literature review (varying depending on the chosen scenario)
- International tourists' annual $spending_i$ = total annual international tourists spendings in sector *i*

Shock 3 : Tourism impacts of HSR		
1.1 Pessimistic scenario	**1.2 Baseline scenario**	**1.3 Optimistic scenario**
The pessimistic scenario considers a tourism impact value on the lower end of the interval. Campa et al. (2016) and Castillo-Manzano et al. (2018) report the two lowest tourism impact values.	The baseline scenario assumes a tourism impact based on the average of the values found in the literature review. This approach considers the entire interval of potential tourism impacts.	The optimistic scenario considers a tourism impact value at the upper end of the interval, drawing on findings from Lopresti and Tartaglia (2023) and Chen and Haynes (2012; 2015).
78 M$	**1 320 M$**	**2 148 M$**

In the short run, capital is treated as fixed in the CGE model, implying that the effects of higher tourism spending primarily translate into higher labour demand and higher utilization of existing capacity, which limits the full impact. In the long run, both labour and capital can adjust, which can amplify the impact. To reflect this, each tourism scenario is run under two assumptions: fixed capital demand and flexible capital demand.

Interpretation of results

In a CGE model, the impacts of HSR are not read as isolated effects, but as an equilibrium adjustment across all markets. Regardless of the initial shock, results typically propagate through a common chain including price adjustments, changes in domestic and external demand, factor reallocation across sectors, and government budget responses.

Each reported outcome in the following tables reflects the net effect of all mechanisms interacting in the CGE model. Results are expressed relative to a baseline that reproduces the observed structure of the Canadian economy, and they should be read as annual mean differences between the baseline equilibrium and the new equilibrium reached after the HSR-related structural shocks are introduced.

To support interpretation, results are averaged across macro closures and labour-market regimes, so they are best viewed as robust central tendencies rather than precise point estimates. Some variables, such as private investment, are more sensitive to closure assumptions, including the current-account adjustment and the savings–investment balance. Core outcomes such as real GDP are comparatively stable because they are anchored in changes to technology (TFP), effective labour input, and demand.

Table 1: Key macroeconomic results
Canada; mean annual impact; in billions $

	Productivity	Labour supply	Tourism	Total
Annual economic impact when the ramp up will be complete	Average results of fluid and tense labour markets			
Real GDP	14.0 – 35.0	0.7 – 4.7	0.0 – 1.3	14.8 – 41.0
Baseline scenario	*21.0*	*2.7*	*0.8*	*24.4*
Governments revenues	3.6 – 8.9	0.2 – 1.2	0.0 – 0.6	3.8 – 10.7
Baseline scenario	*5.4*	*0.7*	*0.4*	*6.4*
Firms' revenues	5.7 – 14.2	0.3 – 2.0	0.0 – 0.7	6.0 – 16.9
Baseline scenario	*8.5*	*1.1*	*0.4*	*10.1*
Households' disposable income	6.3 – 15.6	0.3 – 2.1	0.0 – 1.0	6.6 – 18.7
Baseline scenario	*9.4*	*1.2*	*0.6*	*11.2*
Private investment	8.3 – 20.7	0.4 – 2.8	0.1 – 2.4	8.8 – 25.9
Baseline scenario	*12.4*	*1.6*	*1.4*	*15.4*
Welfare variation	Welfare increases in every scenario			

Sources: CGE modelling results from Aviseo Consulting's internal model, 2024.

In magnitude, the mean annual real GDP gain supported by HSR is about $24.4B, which is equivalent to roughly 1.1% of Canada's 2019 GDP.

The definitions below clarify how each macro indicator reported in Table 1 should be interpreted in a comparative-static CGE setting.

Definition and interpretation of key results

- Real GDP measures the change in total value added in the economy after all reallocations of labour, capital, and demand have taken place.
- Government revenues increase as higher economic activity expands tax bases related to labour income, consumption, and corporate profits.

- Firms' income captures changes in the share of capital income and transfers accruing to firms and thus reflects variations in corporate profits and retained earnings within the economy.
- Household disposable income captures changes in after-tax income and therefore reflects households' purchasing power more directly than GDP alone.
- Private investment captures changes in capital formation financed by private savings.
- Welfare, measured as equivalent variation, aggregates income and price effects into a single money-metric indicator that reflects changes in overall economic well-being.

Productivity

In the productivity scenario, higher total factor productivity (TFP) means firms can produce more output with the same bundle of labour and capital. This immediately lowers unit production costs in the affected industries and, through competition, translates into lower output prices.

Lower domestic prices improve competitiveness versus imports and stimulate demand for domestically produced goods and services (household consumption, intermediate demand, and—where relevant—exports). Output therefore expands economy wide. With capital fixed and labour mobile across sectors, factor prices adjust as the economy reallocates resources toward expanding activities. Higher productivity reduces labour required per unit of output, which can put downward pressure on wages for a given level of output; however, the expansion in demand and production increases labour demand, offsetting this effect in equilibrium. Similarly, the return to capital can fall as efficiency rises, but may increase if expanding production makes capital relatively scarce.

Through this supply-side chain, the model generates the following changes in macro aggregates:

- Lower prices raise demand and output, so aggregate **real GDP** (value added) increases as more labour is utilized in production across sectors.
- As production expands, labour and capital incomes adjust (wages recover with higher labour demand and capital returns increase when capital becomes relatively scarce), which lifts **household disposable income** and supports higher consumption.
- With higher output and higher returns of capital at the new equilibrium, corporate profits and retained earnings rise, increasing **firms' revenue**.
- As wages, consumption, and profits rise with the expansion of activity, tax bases broaden, so **government revenues** increase alongside the productivity-driven output gains.
- Higher incomes and profits raise private saving in the model, which finances additional **private investment**.
- **Welfare** increases because households benefit mostly from higher real income (via higher factor incomes as output expands) and, in some scenario with endogenous price index, lower prices. This jointly rise purchasing power.

Table 1 illustrates this pattern clearly: for example, for real GDP, the "Productivity" contribution ranges from 14.0 to 35.0, compared to a total of 14.8 to 41.0. The same pattern emerges for government revenue (3.6 to 8.9 out of 3.8 to 10.7), corporate revenue (5.7 to 14.2 out of 6.0 to 16.9), and household disposable income (6.3 to 15.6 out of 6.6 to 18.7). This wider gap compared to other channels is explained by the cross-cutting nature of productivity, which simultaneously affects labour and capital.

Table 2: Key macroeconomic results of the productivity shock
Canada; mean annual impact; in billions $

	Tense labour market			Fluid labour market		
	Pessimistic	Baseline	Optimistic	Pessimistic	Baseline	Optimistic
Real GDP	**13.8**	**20.7**	**34.5**	**14.1**	**21.2**	**35.4**
Governments revenues	3.5	5.3	8.8	3.6	5.4	9.0
Firms' revenues	5.6	8.4	14.0	5.7	8.6	14.3
Households' disposable income	6.2	9.2	15.4	6.3	9.5	15.8
Private investment	8.2	12.2	20.5	8.4	12.5	20.9
Welfare variation	Welfare increases in every scenario					

Sources: CGE modelling results from Aviseo Consulting's internal model, 2024.

Labour supply

In the labour-supply scenario, HSR increases the economy's effective labour input (more workers and/or more hours worked). In a general equilibrium model, this relaxes a binding quantity constraint in the labour market and initially puts downward pressure on real wages, which lowers unit labour costs—especially in labour-intensive sectors.

Lower costs translate into lower output prices, improving competitiveness and raising demand for domestic production (household consumption, intermediate demand, and—where relevant—exports). As output expands, firms increase their demand for labour and wages recover partially until the economy reaches a new equilibrium with higher employment (hours worked), higher production, and higher factor incomes than in the baseline.

Through this chain, the model generates the following changes in macro aggregates:

- Higher hours worked and higher production increase aggregate **real GDP** (value added), with gains concentrated in sectors that expand output when labour becomes more available.
- Even if wages adjust, total labour income can rise because more labour is supplied (more hours/participants). This supports higher **household disposable income** and, in turn, higher consumption.
- As output expands, firms' demand for capital rises while the capital stock is fixed in the short run, pushing up the return to capital. This increases **firms' revenues** (capital income and retained earnings).
- Higher employment and production expand the bases for labour, consumption, and corporate taxes, so **government revenues** increase with the rise in economic activity.
- With higher aggregate income and profits, private saving rises in the model, which finances higher **private investment** (capital formation).
- **Welfare** increases because households benefit from higher real income (more employment and factor income) and lower prices driven by lower unit production costs, in some scenario with endogenous price index.

Table 3 quantifies this contribution: the labour-supply component ranges from 0.7 to 4.7 for real GDP, 0.2 to 1.2 for government revenue, 0.3 to 2.0 for business turnover, and 0.3 to 2.1 for household disposable income. This smaller contribution relative to productivity is consistent with a more gradual adjustment process and with a channel that primarily operates through additional hours worked rather than economy-wide efficiency gains.

Table 3: Key macroeconomic results of the labour supply shock
Canada; mean annual impact; in billions $

	Average results of fluid and tense labour markets		
	Pessimistic	Baseline	Optimistic
Real GDP	0.7	2.7	4.7
Governments revenues	0.2	0.7	1.2
Firms' revenues	0.3	1.1	2.0
Households' disposable income	0.3	1.2	2.1
Private investment	0.4	1.6	2.8
Welfare variation	Welfare increases in every scenario		

Sources: CGE modelling results from Aviseo Consulting's internal model, 2024.

Tourism

In the tourism scenario, higher international visitor spending is modelled as an exogenous increase in final demand for tourism-related goods and services (e.g., accommodation and food services, transportation, retail trade, and recreational activities). Because this spending originates abroad, it enters the model like an export-demand shock for domestic services.

The increase in final demand raises sectoral output in tourism-facing industries and propagates to upstream suppliers through intermediate input demand. As firms expand production, they demand more labour and make more intensive use of the existing capital stock, which increases wages and the return to capital in the new equilibrium.

The net impact on real GDP depends on how much of this additional demand is met by domestic production versus imports. Leakage occurs when tourists purchase imported goods or when tourism industries rely on imported intermediate inputs. When domestic supply responses dominate leakage, value added, incomes, and fiscal revenues rise.

Through this demand-led chain, the model produces the following macro effects:

- Higher tourism demand increases sectoral output and upstream supply-chain activity, raising aggregate **real GDP** (value added) insofar as domestic production meets the additional spending.
- As labour demand rises in tourism and supplier sectors, wages and employment increase, lifting **household disposable income** and supporting additional domestic consumption.
- Higher output raises the demand for capital, increasing the return to capital and therefore **firms' revenues**.
- With higher labour income, consumption, and profits, tax bases expand, so **government revenues** increase alongside tourism-driven activity.
- Higher aggregate incomes increase private saving in the model, which finances additional **private investment**.
- **Welfare** rises when households experience higher real income from increased employment and capital returns; the effect is tempered when import leakage reduces the domestic value-added generated by tourism spending.

Table 1 confirms that the tourism contribution is small relative to the other channels: depending on the indicator, it ranges from 0.0 to 1.3, which is why it represents only a limited share of the total effects. This reflects the fact that the shock is concentrated in a subset of tourism-facing industries and that part of the additional demand can leak into imports through imported goods and intermediate inputs.

Table 4: Key macroeconomic results of the tourism shock
Canada; mean annual impact; in millions $

	Fluid labour market and fluid capital (Long term)		
	Pessimistic	Baseline	Optimistic
Real GDP	46.8	792.1	1 288.0
Governments revenues	22.1	373.5	607.4
Firms' revenues	20.9	353.1	574.4
Households' disposable income	36.9	625.1	1 016.8
Private investment	85.5	1 447.4	2 354.0
Welfare variation	Welfare increases in every scenario		

Sources: CGE modelling results from Aviseo Consulting's internal model, 2024.

Robustness and modelling choices

CGE results are conditional on modelling choices that govern how the economy re-equilibrates after a structural shock. To reflect this uncertainty, robustness is assessed by running simulations under alternative (i) *macro closures* and (ii) *labour-market regimes*, and by reporting outcomes that are not driven by a single parameterization.

Closures. Six closures are tested, differing in which aggregate variables are treated as endogenous. These closure rules matter because they determine where the adjustment burden falls (prices vs. external balance vs. the government budget), which can affect the magnitude of some macro aggregates, particularly those that are closely tied to savings and financing.

Labour-market regimes. A tense labour market (relatively inelastic labour supply) is distinguished from a more fluid one (more elastic labour supply). This choice affects how strongly wages, employment (hours worked), and therefore household income and tax bases respond when the economy expands.

Implications for populations

In this study, the results may be presented at the Corridor or national level, but the effects are driven by geography. When travel time shortens, firms and people become effectively closer, thus enabling them to reach markets more efficiently. As a result, impacts can differ across places and populations depending on proximity to stations, local economic density and industry composition, housing and land-use constraints, and labour-market tightness.

Exposure to accessibility gains varies across communities depending on the nearest station proximity, how easy it is to get to and from the station, and travel-time reliability. These factors mainly shape direct benefits for individuals, such as time savings and easier access to a larger set of employment opportunities, education and training programs, specialized health services, and higher-order amenities. The improved access to larger urban labour markets is often associated with productivity gains, leading to wage increases for commuters.

Benefits are not restricted to frequent users of HSR. Increased demand and production in directly served areas can diffuse through supply chains, supporting jobs and incomes in other regions. Higher productivity in connected nodes can reinforce these spillovers by lowering costs and raising output across a wider set of sectors. In parallel, **higher economic activity tends to expand tax bases and government revenues, which can support broader public-service provision depending on fiscal choices and intergovernmental redistribution**.

- This study finds robust growth in economic activity, thus leading to more fiscal revenues for the government. As such, **the government has a leading role in redistributing the various benefits generated by the HSR**, especially to communities that could be adversely impacted by the construction and/or operation of

the HSR. Future studies could delve into the compensating variation required to fairly compensate those who are negatively impacted while permitting the realization of these economic and social benefits.

Regional outcomes depend on the balance between diffusion (new demand spreading through supply chains and broader labour-market integration) and reallocation (activity concentrating more strongly in larger nodes). Both mechanisms are documented in the literature on transport improvements, and both can be influenced by station location, local specialization, and the quality of connections to the broader territory.

- Chia and Lin (2013) show that the national effects of HSR can be significant but are not automatic. Cities located roughly 1–2 hours from London experienced diverse outcomes, including episodes of economic renewal. At the regional level, large cities tended to benefit from hub status, but gains did not necessarily spill over to surrounding sub-regions. Beyond a 2-hour travel time, the effects appear much weaker.
- Guirao *et al.* (2017; 2018) find that HSR-enabled commuting can increase labour mobility by integrating smaller cities into larger metropolitan labour markets, which may raise wages. They also note a potential downside: improved connectivity can widen regional disparities if it draws highly skilled workers away from their origin regions. Station location is a key determinant of impacts, and poor planning limit benefits by reducing the attractiveness of HSR for commuters.
- Feng *et al.* (2023) report that HSR can expand effective market size, increasing the number and scale of enterprises. At the same time, they highlight that HSR may reshape local employment structures and put pressure on land use and housing markets, including through changes in property prices.
- Koning *et al.* (2017), focusing on France's HSR network, emphasize that local impacts are heterogeneous and highly conditional on the territory's economic specialization and local policy choices. They find stronger positive effects in residential and tourism-oriented urban areas, while predominantly productive territories tend to see weaker gains, though HSR may help slow decline. Overall, outcomes depend on local actors' ability to diversify the economy and implement complementary strategies.

Finally, the distribution of benefits across populations is sensitive to modelling assumptions and to real-world constraints that are not fully captured in a national CGE framework (e.g., local land-use regulation, housing-supply responsiveness, and the pace at which labour and capital can relocate). The macro results should therefore be interpreted as indicating the direction and potential magnitude of net benefits, on average, while local outcomes depend on implementation choices and complementary policies that shape accessibility, affordability, and inclusion. A more in-depth analysis of these impacts (including their spatial distribution and equity implications) should follow.

Conclusion

This semi-technical note summarizes the 2024 impact study of the HSR service in the Québec City—Toronto corridor, with a focus on long-run *structural* effects rather than short-run construction and operating expenditures. The core question is how large, persistent reductions in generalized travel costs, through faster and more reliable intercity connections, can reshape economic interactions, raise productive efficiency, and ultimately translate into higher Canadian output, incomes, and welfare.

Methodologically, the study relies on a CGE model calibrated to a 2019 Canadian social accounting matrix. This economy-wide framework captures how a structural shock propagates through interconnected markets, via price adjustments, shifts in demand, and reallocation of labour and capital across sectors, until a new equilibrium is reached. Because some macro-outcomes can be sensitive to modelling choices, the results reported here emphasize robustness: simulations are run under multiple macro closures and under alternative labour-market regimes, and the discussion focuses on central tendencies that persist across these assumptions.

Across scenarios, the modelling results suggest that HSR can generate meaningful net benefits at the national level by acting through three reinforcing channels: (i) productivity gains associated with improved market access and agglomeration forces; (ii) increases in effective labour supply driven by commuting time savings and induced commuting; and (iii) higher international tourism spending attributable to improved accessibility. The productivity channel is consistently the largest contributor to gains in real GDP, household disposable income, business income, government revenues, and welfare, while the labour-supply and tourism channels provide additional, though comparatively smaller, uplifts.

These results should be interpreted as economy-wide, long-run equilibrium differences relative to a baseline, not as short-term forecasts. Moreover, a national CGE model is not designed to resolve fine-grained spatial impacts: the mechanisms triggered by HSR are inherently geographic, and local outcomes will depend on station locations, connectivity, housing-market and land-use constraints, and the extent to which activity diffuses through supply chains versus concentrates on larger nodes. Similarly, average positive impacts can mask distributional differences across places and population groups, particularly when exposure to accessibility gains is uneven.

Further work will complement the macroeconomic perspective with more recent data and more granular analysis. Taken together, the evidence reviewed and the modelling results provide a coherent, theory-consistent case that improved intercity connectivity in the Québec City—Toronto corridor could yield substantial long-term economic benefits, while also underscoring that the realization and allocation of these benefits will hinge on design and policy decisions beyond the rail investment itself.

Bibliography

Ahlfeldt, Gabriel M, and Arne Feddersen. 2018. “From Periphery to Core: Measuring Agglomeration Effects Using High-Speed Rail.” Journal of Economic Geography 18(2): 355–90. doi:10.1093/jeg/lbx005.

Albalate, Daniel, Javier Campos, and Juan Luis Jiménez. 2017. “Tourism and High Speed Rail in Spain: Does the AVE Increase Local Visitors?” Annals of Tourism Research 65:71–82. doi:10.1016/j.annals.2017.05.004.

Albalate, Daniel, Javier Campos, and Juan Luis Jiménez. 2023. “Local Tourism Effects of HSR in Small Cities: Three Synthetic Control Case Studies.” Current Issues in Tourism 26(14): 2301–16. doi:10.1080/13683500.2022.2086106.

Albalate, Daniel, and Xavier Fageda. 2016. “High Speed Rail and Tourism: Empirical Evidence from Spain.” Transportation Research Part A: Policy and Practice 85:174–85. doi:10.1016/j.tra.2016.01.009.

Amos, Paul, Dick Bullock, and Jitendra Sondhi. 2010. High-Speed Rail. World Bank, Beijing. doi:10.1596/27812.

Bazin, Sylvie, Christophe Beckerich, and Marie Delaplace. 2010. “Desserte ferroviaire à grande vitesse, activation des ressources spécifiques et développement du tourisme : le cas de l’agglomération rémoise.” Belgeo 1–2: 65–78. doi:10.4000/belgeo.6669.

Bhatt, Ayushman, and Hironori Kato. 2021. “High-Speed Rails and Knowledge Productivity: A Global Perspective.” Transport Policy 101:174—86. doi:10.1016/j.tranpol.2020.12.006.

Blancheton, Bertrand, and Jean-Jacques Marchi. 2013. “The Three Systems of Rail Tourism: French Case.” Tourism Management Perspectives 5:31–40. doi:10.1016/j.tmp.2012.09.008.

Koning, Martin, and al. 2017. “The Local Economic Impacts of High-Speed Railways: Theories and Facts.” European Transport Research Review 9(2): 12. doi:10.1007/s12544-017-0233-0.

Boccanfuso, Dorothke, et Luc Savard. “Analyse d’impacts de La Construction de l’autoroute Dakar-Thiés : Un Modéle d’équilibre Général Calculable Multiménages Intégré “. *Canadian Journal of Development Studies/Revue Canadienne d’études Du Développement*, vol. 29, nos 3 - 4, janvier 2010, p. 435 - 64. *DOI.org (Crossref)*, https://doi.org/10.1080/02255189.2010.9669267.

Bogliacino, Francesco, and Mario Pianta. 2016. “The Pavitt Taxonomy, Revisited: Patterns of Innovation in Manufacturing and Services.” Economia Politica 33(2): 153–80. doi:10.1007/s40888-016-0035-1.

Börjesson, Maria, Gunnar Isacsson, Matts Andersson, and Christer Anderstig. 2019. “Agglomeration, Productivity and the Role of Transport System Improvements.” Economics of Transportation 18:27—39. doi:10.1016/j.ecotra.2018.12.002.

Boto-García, David, and Levi Pérez. 2023. “The Effect of High-Speed Rail Connectivity and Accessibility on Tourism Seasonality.” Journal of Transport Geography 107:103546. doi:10.1016/j.jtrangeo.2023.103546.

Bottasso, Anna, Maurizio Conti, Antonella Ferrara, and Simone Robbiano. 2023. “High-Speed Railways and Firms Total Factor Productivity: Evidence from a Quasi-Natural Experiment.” SSRN Electronic Journal. doi:10.2139/ssrn.4623037.

Campa, Juan Luis, María Eugenia López-Lambas, and Begoña Guirao. 2016. “High Speed Rail Effects on Tourism: Spanish Empirical Evidence Derived from China’s Modelling Experience.” Journal of Transport Geography 57:44–54. doi:10.1016/j.jtrangeo.2016.09.012.

Cartenì, Armando, Luigi Pariota, and Ilaria Henke. 2017. “Hedonic Value of High-Speed Rail Services: Quantitative Analysis of the Students’ Domestic Tourist Attractiveness of the Main Italian Cities.” Transportation Research Part A: Policy and Practice 100:348–65. doi:10.1016/j.tra.2017.04.018.

Castillo-Manzano, José I., Mercedes Castro-Nuño, Lourdes López-Valpuesta, Diego J. Pedregal-Tercero, and José M. Garrido-Michó. 2018. “High Speed Rail: Fast Tracking Tourism in the EU?” Annals of Tourism Research 71:64–66. doi:10.1016/j.annals.2018.02.005.

Chapelle, Guillaume, Etienne Wasmer, and Pierre-Henri Bono. “Impact du Grand Paris Express sur le marché du travail et le marché du logement.”

Chatman, Daniel G., and Robert B. Noland. 2011. “Do Public Transport Improvements Increase Agglomeration Economies? A Review of Literature and an Agenda for Research.” Transport Reviews 31(6): 725–42. doi:10.1080/01441647.2011.587908.

Chen, Jieping, Na Yan, Shanlang Lin, and Shijun Chen. 2023. “Comparative Analysis of the Influence of Transport Modes on Tourism: High-Speed Rail or Air? City-Level Evidence from China.” Transportation Research Record: Journal of the Transportation Research Board 2677 (2): 1592–1604. doi:10.1177/03611981221106476.

Chen, Yawei. 2021. “High Speed Rail and China’s New Economic Geography: Impact Assessment from the Regional Science Perspective: Edited by Zhenhua Chen, Kinsley E. Haynes with Yulong Zhou and Zhaoxin Dai, Cheltenham, UK and Northampton, MA, USA, Edward Elgar, 2019, 328 Pp., Web: £81.00 (Hardback), ISBN: 978-1-78536-603-1 (Cased), ISBN: 978-1-78536-604-8 (Ebook). The eBook Version Is Priced from £22/$31 from Google Play, Ebooks.Com and Other eBook Vendors, While in Print the Book Can Be Ordered from the Edward Elgar Publishing Website.” Eurasian Geography and Economics 62(2): 243–46. doi:10.1080/15387216.2020.1742181.

Chen, Zhenhua, and Kingsley E. Haynes. 2015. “Impact of High-Speed Rail on International Tourism Demand in China.” Applied Economics Letters 22(1): 57–60. doi:10.1080/13504851.2014.925043.

Cheng, Junmei, and Zhenhua Chen. 2022. “Socioeconomic Impact Assessments of High-Speed Rail: A Meta-Analysis.” Transport Reviews 42(4): 467—502. doi:10.1080/01441647.2021.1979689.

Chi, Fangting, and Haoying Han. 2023. “The Impact of High-Speed Rail on Economic Development: A County-Level Analysis.” Land 12(4): 874. doi:10.3390/land12040874.

Chia-Lin, Chen. 2013. “The Spatial-Economic Impact of High-Speed Trains: Nationally (The UK IC 125) and Regionally (a British-French Comparison).” Doctoral thesis, University College London, UCL Discovery. https://discovery.ucl.ac.uk/id/eprint/1403226/

Couto, António. 2011. “The Effect of High-Speed Technology on European Railway Productivity Growth.” Journal of Rail Transport Planning & Management 1(2): 80–88. doi:10.1016/j.jrtpm.2012.05.002.

Delaplace, Marie, Francesca Pagliara, Julie Perrin, and Samuel Mermet. 2014. “Can High Speed Rail Foster the Choice of Destination for Tourism Purpose?” Procedia — Social and Behavioral Sciences 111:166–75. doi : 10.1016/j.sbspro.2014.01.049.

Deng, Taotao, Chen Gan, and Yukun Hu. 2021. “Do Hotel Business Benefit from Increased Tourist Accessibility? Evidence from China’s High-Speed Railway Program.” Tourism Economics 27(7): 1357–74. doi:10.1177/1354816620923216.

Di Matteo, Dante. 2023. “Does High-Speed Rail Matter for Tourism? Evidence from Italy.” Research in Transportation Business & Management 48:100881. doi:10.1016/j.rtbm.2022.100881.

Dong, Xiaofang, Siqi Zheng, and Matthew E. Kahn. 2020. “The Role of Transportation Speed in Facilitating High Skilled Teamwork across Cities.” Journal of Urban Economics 115:103212. doi:10.1016/j.jue.2019.103212.

Elhorst, J. Paul. 2008. “A Spatiotemporal Analysis of Aggregate Labour Force Behaviour by Sex and Age across the European Union.” Journal of Geographical Systems 10(2): 167. doi:10.1007/s10109-008-0061-9.

Eliasson, Jonas, and Morten Welde. “Does Benefit—Cost Efficiency Influence Transport Investment Decisions?” 49.

Evers, Michiel, Ruud A De Mooij, and Daniel J Van Vuuren. “WHAT EXPLAINS THE VARIATION IN ESTIMATES OF LABOUR SUPPLY ELASTICITIES?”

Fang, Jing, Fanjie Fu, Xiaoqian Zhang, Shujie Yao, and Jinghua Ou. 2024. “Impact of High-Speed Rail on the Mismatch of Labor and Industry Allocations: Evidence from Chinese Cities in 2000–2019.” Journal of Asian Economics 92:101744. doi:10.1016/j.asieco.2024.101744.

Feng, Qiyun, Zhenhua Chen, Chuanchao Cheng, and Haiqing Chang. 2023. “Impact of High-Speed Rail on High-Skilled Labor Mobility in China.” Transport Policy 133:64–74. doi:10.1016/j.tranpol.2023.01.006.

Gallo, Mariano, and Rosa Anna La Rocca. 2022. “The Impact of High-Speed Rail Systems on Tourist Attractiveness in Italy: Regression Models and Numerical Results.” Sustainability 14(21): 13818. doi:10.3390/su142113818.

Gao, Yanyan, Wei Su, and Kaini Wang. 2019. “Does High-Speed Rail Boost Tourism Growth? New Evidence from China.” Tourism Management 72:220–31. doi:10.1016/j.tourman.2018.12.003.

Gershenson, Seth. 2013. “The Causal Effect of Commute Time on Labor Supply: Evidence from a Natural Experiment Involving Substitute Teachers.” Transportation Research Part A: Policy and Practice 54:127–40. doi:10.1016/j.tra.2013.07.010.

Gervasi, Osvaldo, Beniamino Murgante, Ana Maria A. C. Rocha, Chiara Garau, Francesco Scorza, Yeliz Karaca, and Carmelo M. Torre, eds. 2023. 14110 Computational Science and Its Applications—ICCSA 2023 Workshops: Athens, Greece, July 3–6, 2023, Proceedings, Part VII. Cham: Springer Nature Switzerland. doi:10.1007/978-3-031-37123-3.

Graham, Daniel J., Antonio Couto, William E. Adeney, and Stephen Glaister. 2003. “Economies of Scale and Density in Urban Rail Transport: Effects on Productivity.” Transportation Research Part E: Logistics and Transportation Review 39(6): 443—58. doi:10.1016/S1366-5545(03)00017-6.

Graham, Daniel J., and Patricia C. Melo. 2011. “Assessment of Wider Economic Impacts of High-Speed Rail for Great Britain.” Transportation Research Record: Journal of the Transportation Research Board 2261 (1): 15–24. doi:10.3141/2261-02.

Guirao, B., and J. L. Campa. 2016. “Cross Effects between High Speed Rail Lines and Tourism: Looking for Empirical Evidence Using the Spanish Case Study.” Transportation Research Procedia 14:392–401. doi:10.1016/j.trpro.2016.05.091.

Guirao, Begoña, Juan Luis Campa, and Natalia Casado-Sanz. 2018. “Labour Mobility between Cities and Metropolitan Integration: The Role of High Speed Rail Commuting in Spain.” Cities 78:140–54. doi:10.1016/j.cities.2018.02.008.

Guirao, Begoña, Antonio Lara-Galera, and Juan Luis Campa. 2017. “High Speed Rail Commuting Impacts on Labour Migration: The Case of the Concentration of Metropolis in the Madrid Functional Area.” Land Use Policy 66:131–40. doi:10.1016/j.landusepol.2017.04.035.

Gutiérrez, Aaron, Daniel Miravet, Òscar Saladié, and Salvador Anton Clavé. 2020. “High-Speed Rail, Tourists’ Destination Choice and Length of Stay: A Survival Model Analysis.” Tourism Economics 26(4): 578–97. doi:10.1177/1354816619855286.

Harchaoui, Tarek M., and Faouzi Tarkhani. 2003. Le capital public et sa contribution à la productivité du secteur des entreprises du Canada. Ottawa : Statistique Canada.

Heuermann, Daniel F, and Johannes F Schmieder. “The Effect of Infrastructure on Worker Mobility: Evidence from High-Speed Rail Expansion in Germany.”

Heuermann, Daniel F, and Johannes F Schmieder. “Warping Space: High-Speed Rail and Returns to Scale in Local Labor Markets.”

Hou, Xinshuo. 2019. “High-Speed Railway and City Tourism in China: A Quasi-Experimental Study on HSR Operation.” Sustainability 11(6): 1512. doi:10.3390/su11061512.

Hou, Yuting. 2022. “Agglomeration Spillover, Accessibility by High-Speed Rail, and Urban Innovation in China: A Focus on the Electronic Information Industry.” Habitat International 126 : 102618. doi : 10.1016/j.habitatint.2022.102618.

Jamaludin, Shahrul Azmal, Shahrin Nasir, and Irwan Ibrahim. 2022. “Railway to Leverage on the Tourism Industry to Increase the Number of the Ridership for the Intercity Train Services.” International Journal of Academic Research in Business and Social Sciences 12(6): Pages 432-443. doi : 10.6007/IJARBSS/v12-i6/13346.

Kaczmarczyk, Patrick, and Andrew Bell. 2022. “Präferenzen Für Arbeit Und Freizeit: Ist Das Arbeitsangebot Eine Funktion Dessen, Was Arbeitnehmer:Innen Bevorzugen?Preferences for Work and Leisure: Is Labor Supply a Function of What Workers Prefer?” doi:10.15203/MOMENTUMQUARTERLY.VOL11.NO4.P204-224.

Kazunobu, HAYAKAWA, Hans R A Koster, TABUCHI Takatoshi, and Jacques-François Thisse. “High-Speed Rail and the Spatial Distribution of Economic Activity: Evidence from Japan’s Shinkansen.”

Kim, Euijune, and Yoojin Yi. “Impact Analysis of High-Speed Rail Investment on Regional Economic Inequality: A Hybrid Approach Using a Transportation Network-CGE Model.” 53.

Kuang, Chun, Zijie Liu, and Wenyu Zhu. 2020. “Need for Speed: High-Speed Rail and Firm Performance.” SSRN Electronic Journal. doi:10.2139/ssrn.3573753.

Kurihara, Takeshi, and Lingling Wu. 2016. “The Impact of High Speed Rail on Tourism Development: A Case Study of Japan.” The Open Transportation Journal 10(1): 35–44. doi:10.2174/1874447801610010035.

Lee, Cheng-Fei, and Kuan-Yang Chen. 2017. “Exploring Factors Determining the Attractiveness of Railway Tourism.” Journal of Travel & Tourism Marketing 34(4): 461–74. doi:10.1080/10548408.2016.1182460.

Legaspi, Julieta, David Hensher, and Baojin Wang. 2015. “Estimating the Wider Economic Benefits of Transport Investments: The Case of the Sydney North West Rail Link Project.” Case Studies on Transport Policy 3(2): 182–95. doi:10.1016/j.cstp.2015.02.002.

Li, Mingwei, and Juan Chen. 2019. “High-Speed Rail Network in China: The Contribution of Fast Trains to Regional Tourism and Economic Development.” Tourism Review 75(2): 414–32. doi:10.1108/TR-12-2018-0197.

Lin, Yatang. 2017. “Travel Costs and Urban Specialization Patterns: Evidence from China’s High Speed Railway System.” Journal of Urban Economics 98:98–123. doi:10.1016/j.jue.2016.11.002.

Liu, Liwen, and Ming Zhang. 2018. “High-Speed Rail Impacts on Travel Times, Accessibility, and Economic Productivity: A Benchmarking Analysis in City-Cluster Regions of China.” Journal of Transport Geography 73:25–40. doi:10.1016/j.jtrangeo.2018.09.013.

Lopresti, Ilaria, and Mario Tartaglia. 2024. “The Relationship Between High-Speed Rail Accessibility and Tourism Demand: The Case Study of Italy.” In Socioeconomic Impacts of High-Speed Rail Systems, Springer Proceedings in Business and Economics, ed. Francesca Pagliara. Cham: Springer Nature Switzerland, 473—91. doi:10.1007/978-3-031-53684-7_22.

Masson, Sophie, and Romain Petiot. 2009. “Can the High Speed Rail Reinforce Tourism Attractiveness? The Case of the High Speed Rail between Perpignan (France) and Barcelona (Spain).” Technovation 29(9): 611–17. doi:10.1016/j.technovation.2009.05.013.

McClelland, Robert, and Shannon Mok. “A Review of Recent Research on Labor Supply Elasticities.”

Melo, Patricia C., Daniel J. Graham, and Robert B. Noland. 2009. “A Meta-Analysis of Estimates of Urban Agglomeration Economies.” Regional Science and Urban Economics 39(3): 332—42. doi:10.1016/j.regsciurbeco.2008.12.002.

Michel, Judelin. “Évaluation de modèles de comportements reproduisant les heures travaillées.”

Michniak, Daniel. 2016. “Role of Railway Transport in Tourism: Selected Problems and Examples in Slovakia.” Quaestiones Geographicae 35(4): 107–20. doi:10.1515/quageo-2016-0039.

Momenitabar, Mohsen, Raj Bridgelall, Zhila Dehdari Ebrahimi, and Mohammad Arani. 2021. “Literature Review of Socioeconomic and Environmental Impacts of High-Speed Rail in the World.” Sustainability 13(21): 12231. doi:10.3390/su132112231.

Monte, Ferdinando, Stephen J Redding, and Esteban Rossi-Hansberg. “Commuting, Migration and Local Employment Elasticities.”

Moyano, Amparo, Ana Rivas, and Jose M. Coronado. 2019. “Business and Tourism High-Speed Rail Same-Day Trips: Factors Influencing the Efficiency of High-Speed Rail Links for Spanish Cities.” European Planning Studies 27(3): 533–54. doi:10.1080/09654313.2018.1562657.

Ommeren, Jos Van, and Joyce Dargay. “The Optimal Choice of Commuting Speed: Consequences for Commuting Time, Distance and Costs.” 40.

Pagliara, Francesca, ed. 2024. Socioeconomic Impacts of High-Speed Rail Systems: Proceedings of the 3rd International Workshop on High-Speed Rail Socioeconomic Impacts, University of Naples Federico II, Italy,

International Union of Railways (UIC), 12–13 September 2023. Cham: Springer Nature Switzerland. doi:10.1007/978-3-031-53684-7.

Pagliara, Francesca, Andrea La Pietra, Juan Gomez, and José Manuel Vassallo. 2015. “High Speed Rail and the Tourism Market: Evidence from the Madrid Case Study.” Transport Policy 37:187–94. doi:10.1016/j.tranpol.2014.10.015.

Pagliara, Francesca, Filomena Mauriello, and Antonio Garofalo. 2017. “Exploring the Interdependences between High Speed Rail Systems and Tourism: Some Evidence from Italy.” Transportation Research Part A: Policy and Practice 106:300–308. doi:10.1016/j.tra.2017.09.022.

Pagliara, Francesca, Filomena Mauriello, and Yin Ping. 2021. “Analyzing the Impact of High-Speed Rail on Tourism with Parametric and Non-Parametric Methods: The Case Study of China.” Sustainability 13(6): 3416. doi:10.3390/su13063416.

Peira, Giovanni, Alessandro Bonadonna, and Riccardo Beltramo. 2024. “Improving the Local Development: The Stakeholders’ Point of View on Italian Railway Tourism.” Leisure Studies 43(2): 327–41. doi:10.1080/02614367.2023.2230535.

Peira, Giovanni, Agata Lo Giudice, and Stefania Miraglia. 2022. “Railway and Tourism: A Systematic Literature Review.” Tourism and Hospitality 3(1): 69–79. doi:10.3390/tourhosp3010005.

RBC Economics. 2024. « Canada’s Growth Challenge: Why the Economy Is Stuck in Neutral ». RBC, https://www.rbc.com/en/thought-leadership/the-growth-project/canadas-growth-challenge-why-the-economy-is-stuck-in-neutral/. Consulted on may 14, 2026.

Ren, Xiaohang, Gudian Zeng, Kangyin Dong, and Kun Wang. 2023. “How Does High-Speed Rail Affect Tourism Development? The Case of the Sichuan-Chongqing Economic Circle.” Transportation Research Part A: Policy and Practice 169:103588. doi:10.1016/j.tra.2023.103588.

Roger, Muriel, and Sébastien Roux. 2009. “Demande de travail et élasticité des heures au salaire :” Recherches économiques de Louvain Vol. 75 (1) : 63–91. doi:10.3917/rel.751.0063.

Rothengatter, Werner. 2017. “Wider Economic Impacts of Transport Infrastructure Investments: Relevant or Negligible?” Transport Policy 59:124—33. doi:10.1016/j.tranpol.2017.07.011.

Schorung, Matthieu. 2022. “A Train Among Cars and Planes in Florida? The Brightline Private Rail Project in the First Touristic Region of the United States.” Mondes du tourisme 21. doi:10.4000/tourisme.4505.

Senesky, Sarah. “Commuting Time as a Measure of Employment Costs: Implications for Estimating Labor Supply Elasticities.”

Shao, Shuai, Zhihua Tian, and Lili Yang. 2017. “High Speed Rail and Urban Service Industry Agglomeration: Evidence from China’s Yangtze River Delta Region.” Journal of Transport Geography 64:174–83. doi:10.1016/j.jtrangeo.2017.08.019.

Shi, Kehan, Jinfang Wang, Xiaojin Liu, and Xiaoying Zhao. 2022. “Impact of High-Speed Rail on Tourism in China” ed. Jun Yang. PLOS ONE 17(12): e0276403. doi : 10.1371/journal.pone.0276403.

Statistics Canada. *Spending by Foreign Residents Travelling in Canada by Country of Residence, Tourism Region and Spending Category, Inactive*. 27 août 2024, https://www150.statcan.gc.ca/t1/tbl1/en/cv!recreate-nonTraduit.action?pid=2410004701.

Sun, Bowen, Haitao Yu, Zhong-Ren Peng, and Ya Gao. 2017. “High-Speed Rail and Manufacturing Agglomeration: Evidence from Beijing—Guangzhou High-Speed Rail in China.” Transportation Research Record: Journal of the Transportation Research Board 2606 (1): 86–95. doi:10.3141/2606-12.

Tombe, Trevor, and Xiaodong Zhu. 2019. “Trade, Migration, and Productivity: A Quantitative Analysis of China.” American Economic Review 109 (5): 1843–72. doi:10.1257/aer.20150811.

Wales, Terence J. 1978. “Labour Supply and Commuting Time.” Journal of Econometrics 8(2): 215–26. doi:10.1016/0304-4076 (78)90030-1.

Wang, Feng, Xianjin Wei, Juan Liu, Lingyun He, and Mengnan Gao. 2019. “Impact of High-Speed Rail on Population Mobility and Urbanisation: A Case Study on Yangtze River Delta Urban Agglomeration, China.” Transportation Research Part A: Policy and Practice 127:99–114. doi:10.1016/j.tra.2019.06.018.

Wetwitoo, Jetpan, and Hironori Kato. 2017. “High-Speed Rail and Regional Economic Productivity through Agglomeration and Network Externality: A Case Study of Inter-Regional Transportation in Japan.” Case Studies on Transport Policy 5(4): 549–59. doi:10.1016/j.cstp.2017.10.008.

Wu, Weilong, Tang Jing, and Yang Xiaoli. 2022. “Can High-Speed Train Improve the Innovation Ability of Enterprises?” Journal of Applied Economics 25(1): 962–82. doi:10.1080/15140326.2022.2096954.

Yang, Xuehui, Shanlang Lin, Jiaping Zhang, and Minghua He. 2019. “Does High-Speed Rail Promote Enterprises Productivity? Evidence from China.” Journal of Advanced Transportation 2019:1–19. doi:10.1155/2019/1279489.

Yang, Zhenzhi, and Taohong Li. 2020. “Does High-Speed Rail Boost Urban Tourism Economy in China?” Current Issues in Tourism 23(16): 1973–89. doi:10.1080/13683500.2019.1696756.

Yao, Shujie, Xu Yan, Chun Kwok Lei, and Feng Wang. 2022. “High-Speed Railway and Tourism Development in China.” Tourism Economics 28(6): 1520–44. doi:10.1177/1354816621998520.

Yin, Ping, Francesca Pagliara, and Alan Wilson. 2019. “How Does High-Speed Rail Affect Tourism? A Case Study of the Capital Region of China.” Sustainability 11(2): 472. doi:10.3390/su11020472.

Zhang, Anqi, Lihua Liu, and Guangqiang Liu. 2020. “High-Speed Rail, Tourist Mobility, and Firm Value.” Economic Modelling 90:108–16. doi:10.1016/j.econmod.2020.05.004.

Zhang, Fan, Feng Wang, Shujie Yao, and Fanjie Fu. 2023. “HIGH-SPEED RAIL AND TOURISM EXPANSION IN CHINA: A SPATIAL SPILLOVER EFFECT PERSPECTIVE.” Technological and Economic Development of Economy 29(6): 1753–75. doi:10.3846/tede.2023.19813.

Zhang, Yuxin, and Dafeng Xu. 2022. “The Effects of High-Speed Rail on Manufacturing and Service Employment: Evidence from Spain.” SSRN Electronic Journal. doi:10.2139/ssrn.4135380.

Zhou, Xiaoxiao, Siyu Chen, and Hua Zhang. 2023. “Travel on the Road: Does China’s High-Speed Rail Promote Local Tourism?” Environmental Science and Pollution Research 30(1): 501–14. doi:10.1007/s11356-022-22114-9.