CITIZEN RESEARCH INITIATIVE · MODAL SHIFT ANALSIS NOTE 2

Modal shift Note 2:

Modal shift between rail and car on the ALTO corridor

An assessment of the evidence on when rail substitutes for car travel, applied to the Toronto–Ottawa and Toronto–Montréal corridor pairs in the North American context. The road-rail comparison differs structurally from the rail–air analysis: road competes at all distances, perceived car costs are dominated by fuel rather than full lifecycle cost, group travel decisively favours the car, and modal choice is more responsive to price than to time.

SUMMARY

Road-to-rail modal shift in North America is structurally different from rail-vs-air. The car carries no fixed time penalty equivalent to airport access and security; it competes on the corridor at every trip length from 50 km to 1,000 km. The right competitive variable is therefore not absolute rail journey time but the ratio τ of rail time to car drive time at typical highway speeds: τ = 0.5 means rail takes half as long as driving; τ = 1.0 means equal time; τ > 1.0 means rail is slower than driving.

The corridor's road-substitutable demand is much larger than its air-substitutable demand. Annual highway flow on the 401 between Toronto, Kingston, Ottawa, and Montréal is several times the corridor's annual air person-trips. Even a modest rail share of the rail+car market would represent a larger absolute shift than full capture of the air market.

Three structural features make NA road-rail competition harder than European or Asian comparators: the 401/A20 corridor is toll-free end-to-end, there is no congestion charging anywhere in Canada, and per-person car cost divides among occupants while rail charges per ticket. A family of four faces a per-person rail-to-car price ratio four times higher than a solo traveller.

Under canonical conditions — solo traveller, current Canadian gas prices (rail-to-car price near parity) — and using a North-American–calibrated S-curve anchored on current VIA Rail's approximately 13 per cent rail share of the rail+car market, the model predicts ALTO captures approximately 51 per cent of the rail+car market on Toronto–Ottawa (τ ≈

> 0.44) and approximately 41 per cent on Toronto–Montréal (τ ≈ 0.56). HPR captures approximately 33 per cent on both pairs (τ ≈ 0.65–0.67). The European-equivalent upper bounds — readings that would apply if North American transport policy shifted toward fuel taxes, tolls, and station-area land use comparable to Western Europe — are 67 per cent and 58 per cent for ALTO and around 50 per cent for HPR.

1. Travel time: the competitive zone for road

The empirical literature on rail–car substitution differs sharply from the rail–air literature. The car carries no fixed time penalty equivalent to airport access, security clearance, boarding, and downtown-airport transit. A car parked at origin and arriving at destination has a near-zero access cost on both ends, and its line-haul time degrades only slightly across the 100–1,000 km range that defines intercity travel. The result is that car competes against rail at every distance — including short-haul corridors where rail would dominate the air comparison — and remains a meaningful competitor at longer distances where air would dominate.

The right way to measure rail's competitive position against the car is therefore not the absolute rail journey time but the ratio of rail time to car time. Defining τ = (rail time) ÷ (car drive time at 100 km/h average highway speed) gives a distance-invariant measure of rail's time advantage. A value of τ = 0.5 means rail takes half as long as driving; τ = 1.0 means rail and car take the same time; τ > 1.0 means rail is slower than driving. Because the car comparator scales linearly with distance, the same value of τ implies the same competitive geometry across any route length — a 3-hour rail journey on a 540 km route (τ = 0.56) is competitively equivalent to a 1.5-hour rail journey on a 270 km route (τ = 0.56). This is the key structural difference from the rail-vs-air analysis, where rail's fixed advantage at the access/dwell stages means the absolute rail time is what matters rather than a ratio.

The competitive zone for rail-against-car can then be expressed in τ-space. Below approximately τ = 0.5 (rail at least twice as fast as driving), rail's time advantage is decisive across most trip purposes. Between τ = 0.5 and τ = 1.0, the comparison turns on price, group composition, frequency, and station accessibility — the competitive zone proper. Above τ = 1.0 (rail slower than driving), rail's market position depends on factors other than time savings, and its share declines steadily.

This is conventionally modelled with a logit functional form, calibrated to the international comparator data. Figure 1 plots rail's share of the rail+car market as a function of τ, with inflection at τ = 0.65: rail captures 50 per cent of the rail+car market at price parity when it is approximately 35 per cent faster than driving. The curve is calibrated against the TGV Paris–Lyon experience, which moved rail's competitive position from τ ≈ 0.89 (4-hour rail journey against 4.5-hour drive) to τ ≈ 0.44 (2-hour rail journey against the same 4.5-hour drive) and lifted rail's share against road from approximately 30 per cent to roughly 67 per cent.

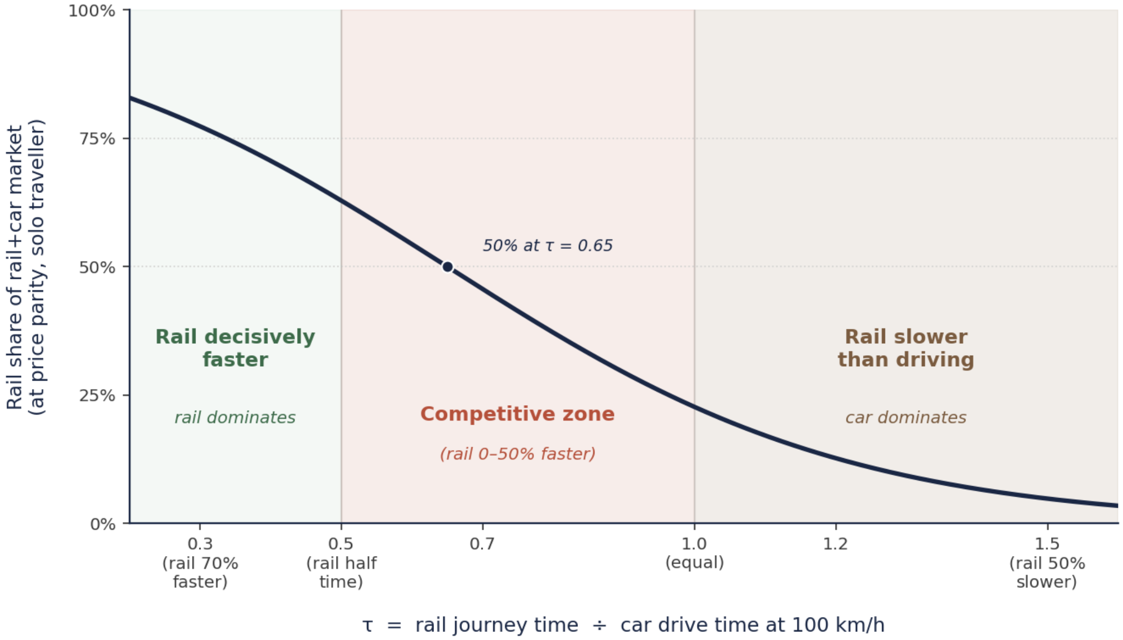

Figure 1. Modal-shift S-curve for rail–car substitution, plotting rail's predicted share of the combined rail+car market against the time ratio τ = (rail journey time) ÷ (car drive time at 100 km/h). Logistic curve fitted with inflection at τ = 0.65 (rail captures 50 per cent at price parity when it is approximately 35 per cent faster than driving) and steepness parameter K = 3.5 in normalised time. The curve divides into three zones: rail decisively faster (τ < 0.5, rail at least twice as fast as driving); the competitive zone (0.5 < τ < 1.0, rail 0–50 per cent faster); and rail slower than driving (τ > 1.0). Calibrated against the TGV Paris–Lyon pre/post comparison (approximately 30 per cent rail share at τ = 0.89 rising to about 67 per cent at τ = 0.44).

The European calibration in Figure 1 represents what rail can achieve under conditions that favour modal shift — high fuel taxes, congestion charging, dense feeder transit, central stations, and a cultural baseline of rail use. North American conditions are systematically less favourable, and the same τ value produces lower rail shares. Figure 1b recalibrates the curve against North American empirical data, anchoring on current VIA Rail service which captures approximately 13 per cent of the rail+car market on the principal pairs at a τ value very close to 1.0 (rail journey time roughly equal to car drive time). The recalibrated curve shifts the inflection point left from τ = 0.65 to τ = 0.46: under North American conditions, rail must be approximately 54 per cent faster than driving — rather than 35 per cent faster — to capture half the rail+car market at price parity.

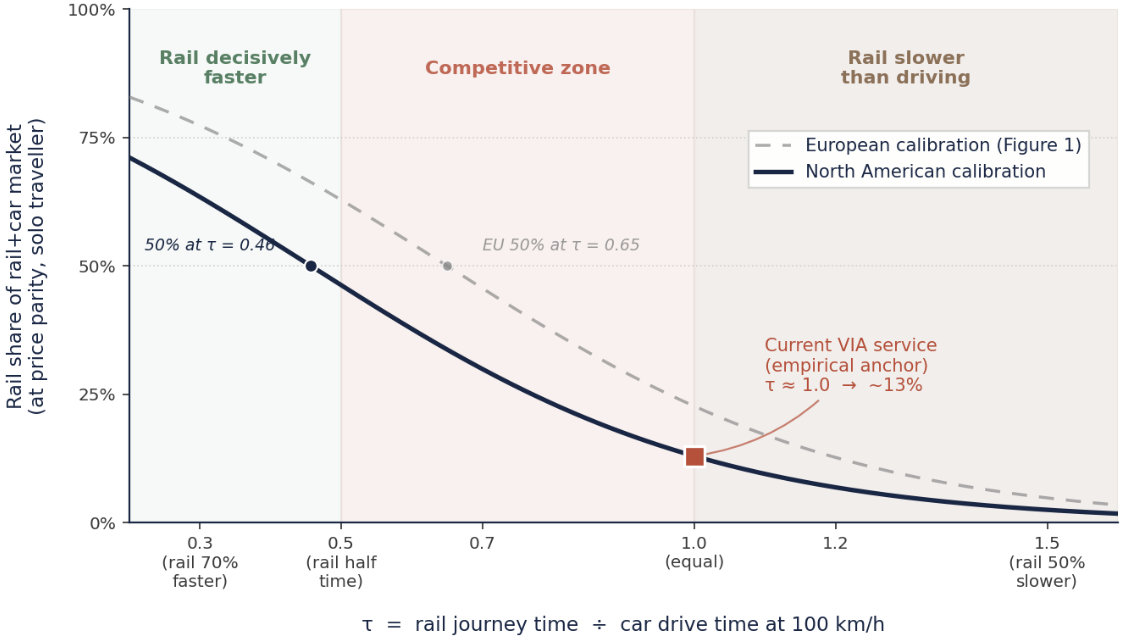

Figure 1b. North-American–calibrated S-curve, anchored on current VIA Rail service (~13 per cent rail share of rail+car market at τ ≈ 1.0 on Toronto–Ottawa, Toronto–Montréal, and Ottawa–Montréal). The faded grey dashed curve shows the European calibration from Figure 1 for comparison. Inflection at τ = 0.46 (rail 54 per cent faster than driving, rather than 35 per cent in the European curve). The same logistic functional form and steepness parameter K = 3.5 apply; only τ_0 shifts. Equivalent in utility-shift terms to a constant penalty of α ≈ 0.67 reflecting the structural North American disadvantages — toll-free highways, low fuel taxes, free parking, dispersed origin and destination, weak feeder transit, family-travel norms, and cultural autonomy preference. This curve, together with its price-aware extension in Figure 2b, is the calibration used throughout the rest of this note for Figures 3, 4, 5, 6, 7, 8, 9, and Table 3. European-equivalent predictions sit roughly 35 to 40 per cent higher at every operating point and are quoted alongside the NA values where the comparison is informative.

Read together, Figures 1 and 1b bracket the realistic range of corridor outcomes. The European curve gives the time-and-price geometry the model is built on and represents what is achievable in principle if rail-favourable conditions were created in North America. The NA curve gives what is achievable under prevailing structural conditions, anchored to current VIA Rail's approximately 13 per cent rail share of the rail+car market. The remainder of this note presents model predictions on the North American curve (Figure 1b) — Figures 3, 4, 5, 6, 7, 8, and 9, together with Table 3, all use the NA-calibrated logit with $\tau_0 = 0.46$. Figures 1 and 2a remain in the document as European reference points, and the European-equivalent predictions are quoted in the body and captions wherever the comparison is informative. ALTO at τ = 0.44 captures approximately 51 per cent of the rail+car market on the NA curve and 67 per cent on the European curve; HPR at τ = 0.65 captures 34 per cent and 50 per cent respectively. The corridor decision can plausibly be informed by either reading, but the gap between them is policy-relevant: roughly 10 to 15 percentage points of modal share depend not on which infrastructure is built but on whether the broader transport-policy environment (fuel taxes, carbon pricing, congestion charging, station-area land use, feeder transit) supports modal shift.

Empirical anchors and the North American context

The international comparators that anchor this curve are predominantly European and Asian. The Paris–Lyon TGV cut journey time from approximately 4 hours to under 2 hours in the early 1980s and lifted rail's share against road in the corridor from roughly 30 per cent to about 67 per cent — a 37-percentage-point shift on a route where car competition was already well-established. Madrid–Barcelona AVE delivers comparable shares against parallel highway traffic. Tokyo–Osaka Shinkansen captures the dominant share of intercity travel against the parallel Tomei Expressway. All of these routes operate under conditions that the North American corridor does not share: high fuel taxes that lift the marginal cost of driving above $2 per litre equivalent, congestion charging or tolling on parallel highways, dense feeder transit at both ends of the line-haul, and land-use patterns that concentrate trip ends near stations.

North America carries none of these structural reinforcements. The 401 and Autoroute 20 corridor from Toronto to Montréal is toll-free end-to-end. Canadian fuel taxes are roughly one third of European levels, suppressing the marginal cost of driving. There is no congestion charging in any Canadian city. Land use at both ends of the corridor is car-oriented, with significant origin and destination dispersion that requires a car at the terminus even for travellers using rail for line-haul. And the cross-elasticity literature confirms that rail and car barely substitute for each other in current North American conditions — a 10 per cent rise in fuel prices produces only a 1 to 4 per cent rise in transit ridership, an order of magnitude lower than direct substitution would predict.

The implication for this analysis is that the curve in Figure 1 should be read as an upper bound on the rail share that the corridor's principal pairs could realistically capture. The model gives the time-and-price geometry; the structural North American context — free parking, weak feeder transit, family-travel norms, cultural autonomy preference — likely depresses realised shares by 30 to 50 per cent below the curve's predictions. The Brightline Miami–Orlando service, the closest North American analogue currently operating against parallel toll-free highway, remains in financial ramp-up after several years of operation, with bond ratings recently downgraded to CCC+ and ridership well below the levels that European HSR achieves on comparable distances. The North American context is structurally harder.

> *Rail's competitive position against the car turns on the time ratio τ, not absolute rail journey time. Rail captures 50 per cent of the rail+car market at price parity when it is approximately 35 per cent faster than driving. The North American absence of tolls, congestion charges, and high fuel taxes means realised modal share will likely sit substantially below the European-anchored model's predictions.*

2. Price: elasticity, group size, and perceived cost

The S-curve in Figure 1 holds prices implicitly at parity — rail per-person fare equal to car per-person cost. Real modal choice between rail and car involves a price comparison that differs structurally from the rail–air comparison in three important ways: the elasticity of substitution is higher, the per-person price ratio depends decisively on group size, and the cost of driving that travellers actually weigh is the perceived cost (mostly fuel) rather than the full economic cost (fuel plus depreciation, insurance, maintenance, and time).

The same logit functional form applies — modal share as a function of time and price ratio — but with a larger price coefficient (γ = 1.5 against 1.0 for the rail–air model). This reflects the international literature finding that own-price elasticities for car-vs-rail substitution sit in the range of −1.0 to −1.6 for leisure demand, against −0.4 to −0.7 for business demand. Modal choice for road-rail is more responsive to relative price than the air-rail equivalent. Figures 2a and 2b show the family of curves that result, under the European calibration of Figure 1 and the North American calibration of Figure 1b respectively.

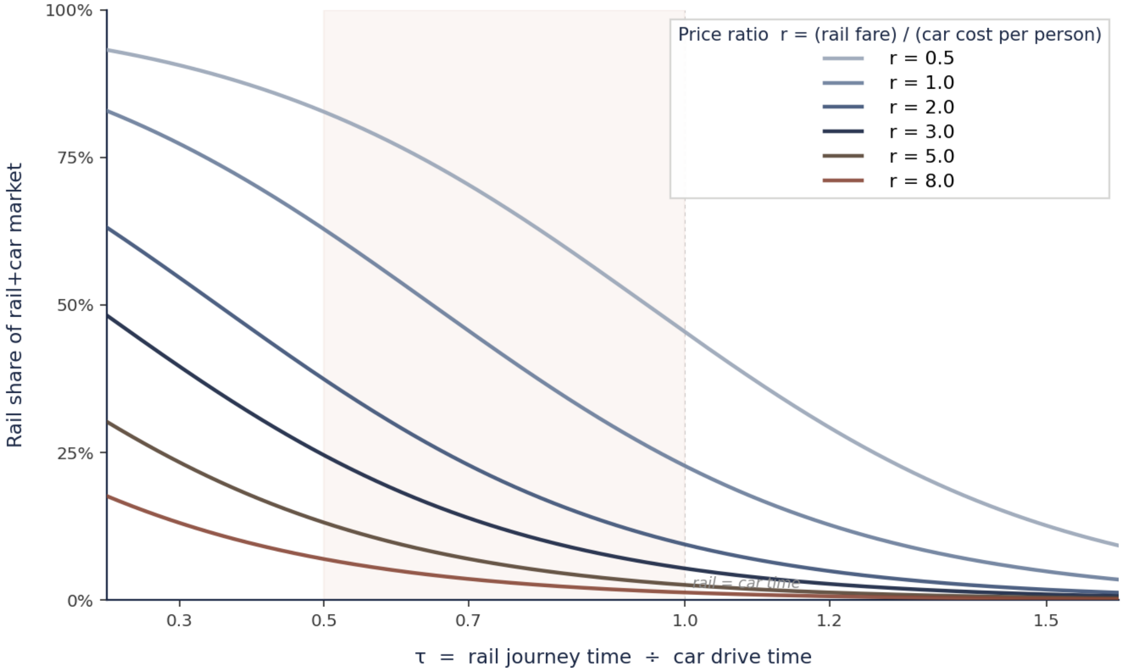

Figure 2a. Family of modal-shift S-curves for road-rail substitution at six rail-to-car-per-person price ratios (r = rail fare ÷ car cost per person), with the time-ratio τ on the horizontal axis, European calibration. The middle navy curve at r = 1.0 corresponds to price parity: rail fare equals per-person car cost. Lower price ratios shift the curve up (rail captures more share at any τ); higher ratios shift it down. The family covers a wide range of ratios (0.5 to 8.0), reflecting that group travel can drive the per-person rail-to-car price ratio well above 5 even at parity-pricing intentions, since car cost divides among occupants while rail fare does not.

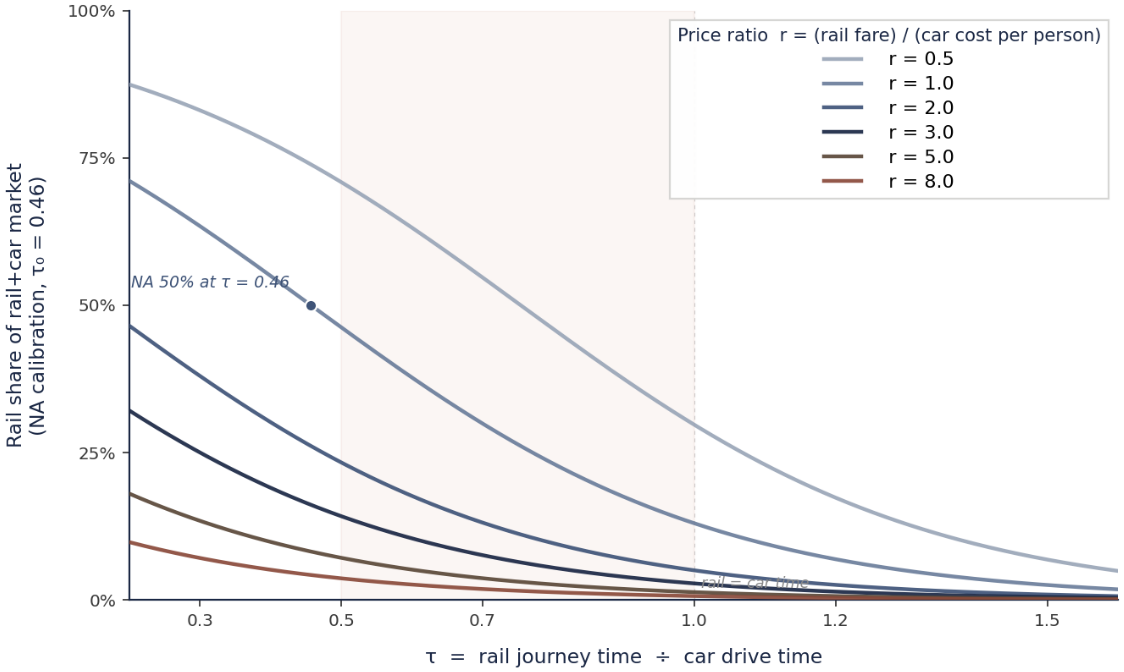

Figure 2b. Family of modal-shift S-curves for road-rail substitution at the same six rail-to-car-per-person price ratios, North American calibration ($\tau_0 = 0.46$). The same logistic functional form, steepness parameter K = 3.5, and price coefficient γ = 1.5 apply; only the time-ratio inflection point shifts. Each curve sits 15 to 20 percentage points below its European counterpart in Figure 2a at every τ value. This family is used in the remainder of the note (Figures 3, 4, 5, 6, 7, 9, and Table 3) to map the corridor's three rail scenarios onto realistic North American modal-shift outcomes; Figure 8's OTP-sensitivity analysis is built on the same NA calibration extended with a reliability term. Readers wanting upper-bound European-comparable numbers should re-read those figures against Figure 2a.

Empirical anchors on price

Two distinct elasticity values matter for the road-rail comparison and they tell different stories. Own-price elasticities (how rail demand responds to changes in its own fare) sit in the −0.7 to −1.3 range across the international literature, with stated-preference work finding values close to −1.05 for peak intercity rail travel. These are reasonably substantial: a 10 per cent fare reduction would lift rail demand by approximately 10 per cent, all else equal. Cross-price elasticities (how car demand responds to rail fares, or rail demand responds to fuel prices) are remarkably small in the North American literature. Currie and Phung's 2007 aggregate estimate of US transit demand cross-elasticity with respect to fuel price is 0.12: a 10 per cent rise in fuel prices produces only a 1.2 per cent rise in transit ridership. Lago's 1992 work found mean cross-elasticities of auto demand with respect to rail fares of 0.08.

The headline interpretation is that rail and car barely substitute for each other in current North American conditions. Modes serve largely separate markets, modal choice is sticky, and the existing equilibrium is heavily car-locked through residential location, car ownership, habit, and infrastructure. New rail capacity does not automatically extract a proportional share of car traffic; substitution requires sustained price differentials, accumulated experience, and structural conditions that favour rail. Long-run elasticities are higher than short-run — the literature finds elasticities about three times higher when fuel prices have been rising for several months — but realised modal shifts on new corridors emerge slowly.

Perceived versus full cost of driving

A second feature distinguishes the road-rail comparison: drivers compare rail fare against the perceived cost of driving, not the full economic cost. The perceived cost is dominated by fuel. On the Toronto–Montréal corridor, the one-way fuel cost for a typical car (9.4 L per 100 km) at current Canadian gas prices (approximately $1.65 per litre) is in the order of $84. Add a small Quebec A30 bridge toll if the southern bypass is taken, and the marginal monetary cost of the trip approaches $90 in fuel-and-toll terms. The full economic cost — including depreciation, insurance, financing, maintenance, and tires — is more than three times this figure, on the order of $300 one-way under standard CAA full-cost calculators. But fixed costs are not perceived at the moment of mode choice; the car is owned regardless, so the marginal trip is compared on fuel alone.

This means the rail-to-car price ratio that enters the modal-choice utility is much higher than the comparison with full driving cost would suggest. A current VIA Rail Toronto–Montréal Economy fare of approximately $80 against perceived car cost of $84 produces a price ratio close to 1.0 for a solo traveller — near parity. Against full economic cost the same VIA fare would produce a price ratio of 0.27 — strongly favourable. The framework that follows uses the perceived-cost version, since this is what modal choice actually responds to. The full-cost comparison would predict a much larger rail share than the corridor actually carries, which is the empirical tell that perceived cost is the right input.

The group-size effect

The third structural feature is the most distinctive. Cars carry one to four (or more) passengers at a single fuel cost. Rail charges per ticket. The per-person rail-to-car price ratio therefore depends decisively on group size, in a way that has no analogue in the rail–air comparison (where air also charges per ticket). At current fares and gas prices on Toronto–Montréal, the per-person rail-to-car price ratio is approximately 1.0 for a solo traveller, 1.9 for a couple, 2.9 for three travellers, and 3.8 for a full car of four. Each additional passenger tilts the comparison further toward driving.

Family travel and any leisure trip with two or more travellers therefore structurally favours the car. This is a major qualitative difference from the rail–air analysis, which had no equivalent multiplier. Combined with the higher price coefficient ($\gamma = 1.5$), group-size effects compound rapidly. As an illustration at parity pricing (a solo traveller paying a rail fare equal to per-person car cost), ALTO's modal share on Toronto–Ottawa drops from approximately 51 per cent for a solo traveller to roughly 12 per cent for a family of four under otherwise identical conditions; on Toronto–Montréal the corresponding fall is from 41 per cent to 8 per cent. Section 4 takes up the more realistic case where each scenario is priced according to its capital-cost recovery requirement, in which solo and group readings shift downward together. The qualitative implication is the same: the rail-substitutable portion of the corridor's road traffic is heavily concentrated on solo and two-passenger trips — predominantly business, single-traveller leisure, and downtown-to-downtown segments — rather than the family and group travel that makes up much of the corridor's leisure flow.

Gas price as a modal-shift lever

Because perceived car cost is dominated by fuel, the rail-to-car price ratio is sensitive to gas prices in a way that has no parallel in the air comparison. A swing in Canadian gas prices from $1.30 to $2.00 per litre — well within historic range — changes the per-person car cost on Toronto–Montréal from roughly $66 to $101 one-way, shifting the rail-to-car price ratio for a solo traveller from 1.21 to 0.79. Sustained higher fuel prices therefore lift modal share toward rail across all rail scenarios; sustained lower prices push the comparison further toward car. Long-run gasoline price elasticities of −0.25 to −0.45 in the literature confirm that this is an active rather than nominal effect. Carbon pricing and fuel-tax policy are levers on rail modal share that operate as strongly as line-haul speed and at much lower capital cost.

> *Modal choice between rail and car in North America responds to time, price, group size, and perceived cost. Group-size effects can suppress predicted rail share by 75 to 90 per cent; gas price swings can move it by 10 to 20 percentage points. These dimensions matter as much as infrastructure choice.*

3. Where the corridor sits on the curve for travel time

The corridor is not a single market for road-rail competition any more than it is for the air comparison. The same two principal city pairs — Toronto–Ottawa and Toronto–Montréal — carry the bulk of the rail-substitutable demand, but the absolute road flow is very large. The 401 between Toronto, Kingston, Ottawa, and Montréal carries tens of millions of person-trips per year — several times the corridor's annual air person-trips. Even a small percentage shift from car to rail represents a meaningful absolute volume.

Current corridor volumes and modal shares

Table 1 sets out approximate annual person-trip volumes by mode and the resulting current modal shares on each principal pair. The numbers are best-effort triangulations from public data. VIA Rail's 2023 Annual Report reports 4.1 million total passengers, of which 96 per cent (about 3.94 million) travelled on Quebec City–Windsor Corridor services. Within that Corridor total, the Statista figure of 2.1 million is for the Montréal–Ottawa–Toronto service group specifically — one of six Corridor service groupings. The remaining roughly 1.84 million Corridor passengers travelled on routes that lie outside the three principal pairs in this note: Toronto–southwestern Ontario (Kitchener, London, Sarnia, Windsor) at approximately 700 to 900 thousand; Montréal–Québec City at approximately 500 to 700 thousand; Ottawa–Québec City direct at approximately 100 to 200 thousand; Toronto–Niagara Falls (joint Maple Leaf service with Amtrak) at 57 thousand; plus intermediate connections and through-Corridor itineraries. Within the 2.1 million on the triangle service group, some trips are intermediate-station (Toronto–Kingston, Toronto–Belleville, Ottawa–Brockville, Montréal–Cornwall) rather than end-to-end between the three principal cities; the pair-level rail figures in Table 1 attribute these to whichever principal axis the passenger predominantly travels along, since the road-rail modal-share comparison applies along the same corridor.

Cirium air-capacity data reports approximately 930,000 one-way Toronto–Montréal passengers on Pearson–Trudeau alone in 2025, before adding Porter's Billy Bishop service. The Quebec City–Windsor Corridor literature reports approximately 108 flights per workday within the Toronto–Ottawa–Montréal triangle. Highway 401 traffic counts give average annual daily traffic of 450,000+ vehicles in the Toronto sections, with end-to-end intercity flow inferred from typical occupancy and trip-purpose distributions. Statistics Canada does not publish city-pair air origin and destination data without subscription, and VIA Rail does not publish pair-level Corridor breakdowns; the volumes below are therefore order-of-magnitude estimates with an uncertainty of approximately ±25 per cent for air and rail and ±30 per cent for car.

City pair	Air	Rail (VIA)	Car	Rail share of rail+air	Rail share of rail+car
Toronto–Montréal	~1.9 M	~800 K	~6 M	~30%	~13%
Toronto–Ottawa	~0.9 M	~800 K	~4.5 M	~47%	~14%
Ottawa–Montréal	~0.45 M	~525 K	~4 M	~54%	~12%

Table 1. Approximate annual person-trip volumes (both directions) by mode on each principal corridor pair, and the resulting current modal shares of the rail+air and rail+car markets. Air figures combine Toronto Pearson, Billy Bishop, Montréal–Trudeau, and Ottawa–Macdonald-Cartier flows. Rail figures are estimated splits of the 2.1 million 2023 passengers on VIA's Montréal–Ottawa–Toronto service group (one of six Corridor service groupings within VIA's overall 3.94 million Corridor ridership; the remaining 1.84 million Corridor passengers travel on routes outside the three principal pairs analysed here). Car figures are the most uncertain element — derived from Highway 401 and A20 vehicle counts with typical intercity occupancy assumptions, with an uncertainty of approximately ±30 per cent. Bus volumes (Megabus, FlixBus, Coach Canada — roughly 200,000 to 300,000 person-trips per pair) are excluded from the modal-share calculations for clarity.

Three observations follow. First, the road-substitutable market dwarfs the air-substitutable market on every pair: car volumes are between three and ten times rail+air volumes combined. Second, current rail-vs-air modal shares are already meaningful — VIA captures roughly 30 per cent of the rail+air market on Toronto–Montréal and roughly half on the shorter pairs — but rail-vs-car shares remain in the 12 to 14 per cent range across all three pairs. Third, the structural similarity of road-rail shares across the three pairs (despite very different distances and current rail journey times) is consistent with the τ-normalisation introduced in Section 1: rail's competitive position depends on the time ratio against car drive time, not on absolute distance, and current VIA service produces τ values close to 1.0 on every pair.

Travel times under each scenario

Door-to-door driving times along the corridor are determined by the 401 and the Quebec A20 between Montréal and Quebec City, both of which are toll-free and carry no congestion charging. Typical 401 traffic absorbs the corridor demand without significant tolled diversion to the 407 ETR around the GTA, although individual drivers may use the 407 selectively. Table 2 sets out the relevant segment-level driving times alongside the rail times under each scenario.

City pair	Distance	Car (401)	VIA current	HPR (200 km/h)	ALTO (300+ km/h)
Toronto–Ottawa	~450 km	~4 h 30 min	~4 h 30 min	~2 h 55 min	~2 h
Toronto–Montréal	~540 km	~5 h 30 min	5 h 13 min*	~3 h 38 min	~3 h
Ottawa–Montréal	~190 km	~2 h	~1 h 55 min	~1 h 30 min	~1 h

Table 2. Approximate segment-level travel times for car (driving on 401/A20, no congestion) alongside rail under three scenarios. VIA times are scheduled Express patterns on the corridor's principal pairs. HPR times are taken from the CRI HPR Strategy's published Express service patterns. ALTO values are the published targets for the 300+ km/h network. *Toronto–Montréal under current VIA service runs 5 h 13 min on the 538 km direct routing via Kingston; the parallel car drive on the 401 is approximately 5 h 30 min in typical conditions.

Plotted onto the road-rail S-curve at solo traveller and current-gas-price conditions (rail-to-car price ratio approximately 1.0 — near parity), and using the τ-normalised North American calibration from Figure 1b, the three rail scenarios produce the picture in Figure 3. The chart shows the modal-shift progression along the NA curve for the Toronto–Montréal pair: VIA's current 5 hour 13 minute service sits at the right-hand edge of the competitive zone with rail barely time-competitive against the car; HPR's 3 hour 38 minute Express time crosses well into the competitive zone and approaches the NA inflection; ALTO's approximately 3 hour service crosses the NA inflection at $\tau = 0.46$ into the rail-decisive zone. Toronto–Ottawa produces a very similar progression within each scenario (because car drive time scales with distance, the τ values collapse to roughly the same competitive position) and is summarised alongside in Table 3. The price-shifted readings — covering scenario-specific fares, group size, and gas price — are taken up in Section 4.

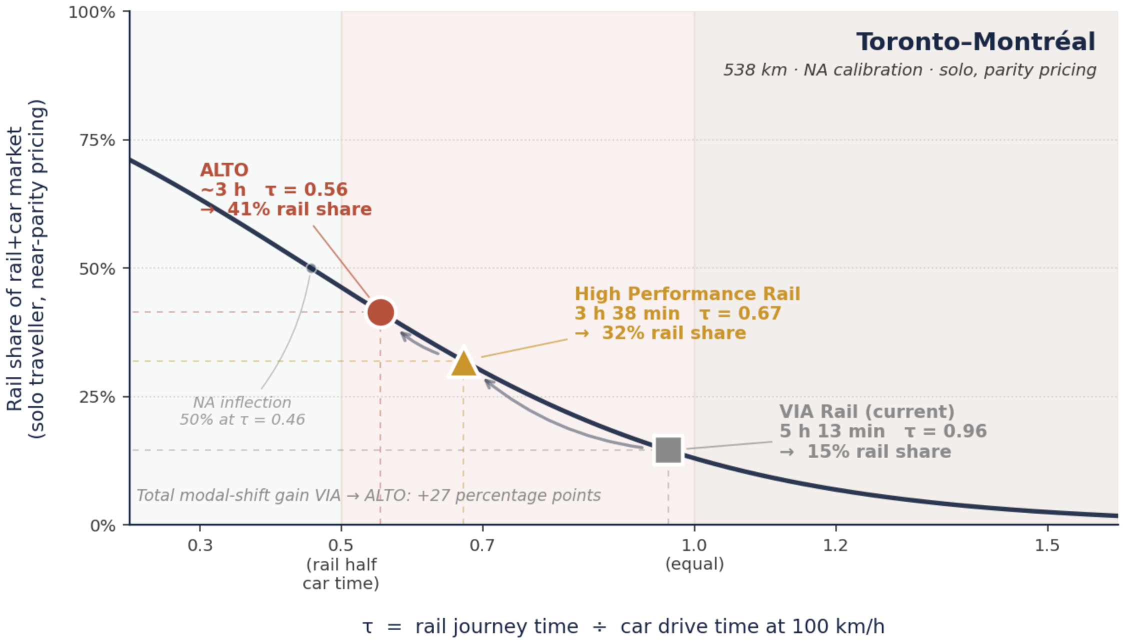

Figure 3. Modal-shift progression for Toronto–Montréal under the three rail scenarios — VIA Rail (current service, 5 h 13 min on shared CN track), High Performance Rail (3 h 38 min Express on the dedicated 401 corridor at 200 km/h, per the CRI HPR Strategy), and ALTO (approximately 3 hours on the dedicated HSR network at 300+ km/h). Plotted on the North-American–calibrated S-curve at solo traveller and near-parity pricing. Predicted rail share of the rail+car market rises from approximately 15 per cent under VIA, to 32 per cent under HPR, to 41 per cent under ALTO — a total modal-shift gain of roughly 27 percentage points moving from current service to ALTO, of which 17 percentage points (roughly two thirds) are captured by the HPR step alone. Toronto–Ottawa produces a very similar progression at slightly higher τ for HPR/ALTO and similar τ for VIA; pair-level shares are tabulated in Table 3.

The implied rail-vs-car market shares for each scenario are summarised in Table 3.

City pair	VIA current	HPR (200 km/h)	ALTO (300+ km/h)
Toronto–Ottawa	~13%	~34%	~51%
Toronto–Montréal	~15%	~32%	~41%

Table 3. Predicted rail share of the combined rail+car market on each principal pair under each scenario, derived from the North-American–calibrated logistic curve in Figure 1b with prices held at near-parity (solo traveller, current Canadian gas prices, current VIA-equivalent fares). The VIA shares match the empirical anchors in Table 1, validating the calibration. HPR and ALTO values should be read as order-of-magnitude estimates: actual realised shares would also depend on fare structure, frequency, reliability, station accessibility, group composition, and the residual structural North American factors not captured by the simple shift in τ_0. The price and group-size dimensions are taken up explicitly in Section 4.

These are the time-only readings under the most favourable price configuration — solo traveller at current gas prices and current VIA-equivalent fares. Real corridor traffic is a mix of solo, couple, and family travel, with rail fares that may rise above current VIA levels if HPR or ALTO recover more of their capital cost from passengers. Section 4 walks through these dimensions and produces a more realistic envelope.

4. Where the corridor sits on the curve for price and group size

Section 2 introduced the family of curves showing how rail's modal share responds to the rail-to-car price ratio, and the group-size and gas-price levers that move the price ratio in either direction. This section maps the corridor's three rail scenarios onto those dimensions, beginning with the most consequential price assumption — that HPR and ALTO would charge fare premiums above current VIA levels to recover their higher capital costs (Figure 4) — and then walking through price-ratio sensitivity (Figure 5), group composition (Figure 6), and gas pricing (Figure 7) in turn.

Realistic fare premiums

Figure 3 plotted the three scenarios at price parity for all (rail fare equal to per-person car cost). That is the most favourable assumption for rail and is a reasonable anchor for current VIA service, whose Economy fare is broadly competitive with per-person fuel cost on the principal pairs. But HPR and ALTO would carry higher capital and operating costs than VIA's shared-track service, and any realistic operating model would seek to recover at least part of that cost from passengers. International HSR experience and the Brightline North American comparator both place premium-service fares 30 to 80 per cent above conventional rail fares on the same corridor. For this analysis we take a moderate set of assumptions: HPR fares at approximately 20 per cent premium to current VIA ($r = 1.2$), ALTO fares at approximately 50 per cent premium ($r = 1.5$).

Figure 4 replots the Toronto–Montréal scenarios from Figure 3 with these scenario-specific fare premiums applied. The visible curves correspond to the three price ratios; each scenario now sits on its own curve rather than on a common parity curve. The result reshapes the corridor's modal-shift arithmetic substantially.

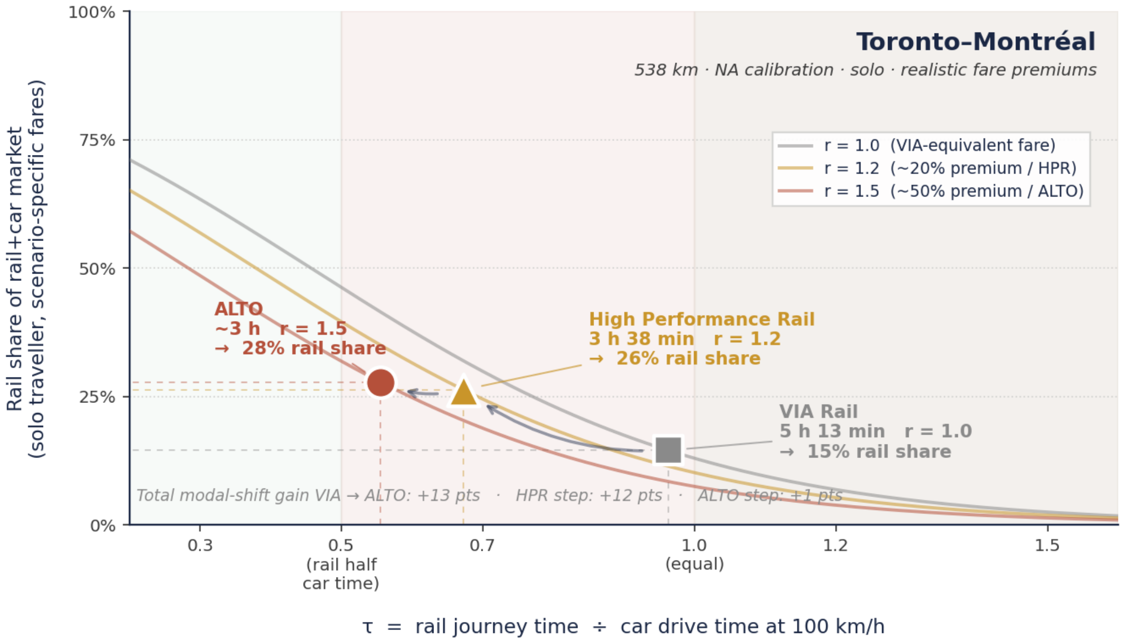

Figure 4. Modal-shift progression for Toronto–Montréal under the three rail scenarios with realistic scenario-specific fare premiums applied — VIA at current VIA-equivalent fare (r = 1.0), HPR at approximately 20 per cent premium (r = 1.2), ALTO at approximately 50 per cent premium (r = 1.5). The three faded curves show the price-shifted S-curves at each ratio; each scenario is marked on its respective curve. Predicted rail share of the rail+car market: VIA 15 per cent, HPR 26 per cent, ALTO 28 per cent. The total modal-shift gain VIA → ALTO collapses from +27 percentage points at parity (Figure 3) to +13 percentage points under realistic premiums, with the HPR step doing essentially all the work (+12 pts) and the ALTO step adding only +1 to +2 percentage points beyond what HPR delivers.

Three observations follow. First, ALTO's modal-share advantage over HPR — already modest under parity-pricing assumptions (+9 percentage points on Toronto–Montréal under Figure 3) — essentially disappears once realistic fare premiums are applied. The two scenarios converge to within a percentage point of each other on the rail+car market when each is priced according to its capital-cost recovery requirement. Second, this is not a feature unique to a 50 per cent ALTO premium: sensitivity analysis at ALTO premiums between 30 and 80 per cent produces ALTO shares between 30 and 24 per cent, all within a few percentage points of the HPR 26 per cent reading. The result is robust across a wide range of plausible ALTO fare structures. Third, the analysis reinforces the central conclusion of the road-rail framework: the HPR step from current VIA to a dedicated 200 km/h corridor at VIA-equivalent fares captures essentially all of the realistically achievable modal shift on the rail+car market. The 300+ km/h capability that ALTO adds is real but is largely cancelled out by the fare premium needed to fund it.

Modal share as a function of price ratio

Holding each scenario's travel time fixed at its published value, modal share becomes a function of the per-person rail-to-car price ratio. Figure 5 plots this function for each scenario on each principal Toronto pair, with markers placed at scenario-specific reference ratios that combine the canonical solo-and-current-gas-price baseline (approximately r = 2.4 against VIA-equivalent fares) with the realistic fare premiums introduced in Figure 4. The reference ratios are: VIA at r = 2.4 (no premium); HPR at r = 2.8 (approximately 20 per cent premium); ALTO at r = 3.6 (approximately 50 per cent premium). These represent each scenario's operating point under solo travel, current gas prices, and fares set to recover the scenario's characteristic capital cost.

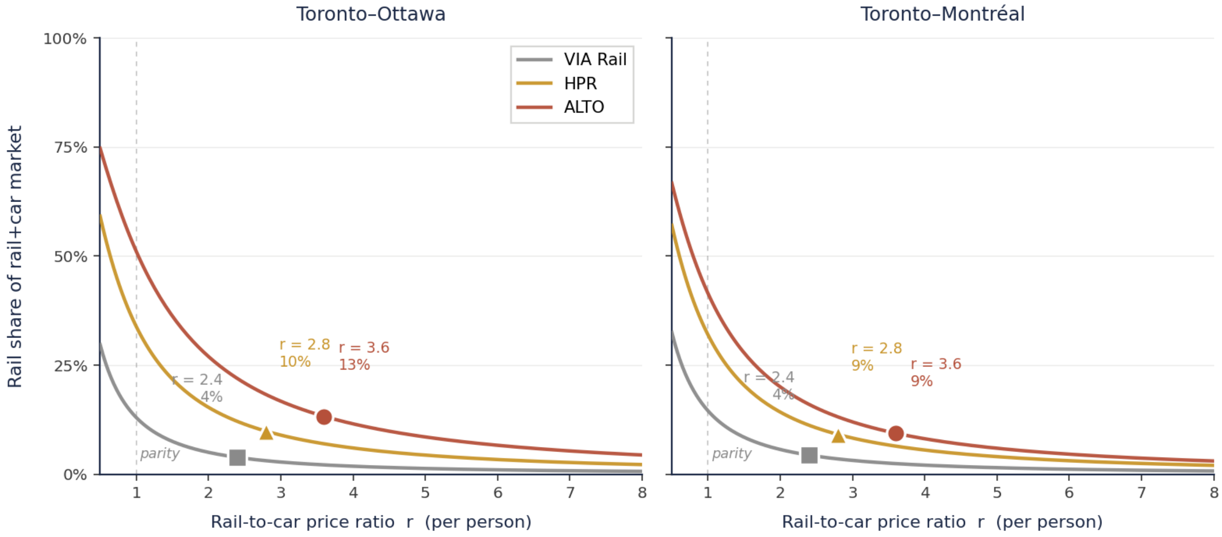

Figure 5. Modal share as a function of per-person rail-to-car price ratio, with each scenario's travel time held fixed at its published value, North American calibration. Markers indicate each scenario's reference operating point: VIA at r = 2.4 (current VIA-equivalent fare against solo + current gas), HPR at r = 2.8 (~20 per cent fare premium), and ALTO at r = 3.6 (~50 per cent fare premium). Predicted shares: VIA ~4 per cent on both pairs; HPR ~10 per cent on Toronto–Ottawa and ~9 per cent on Toronto–Montréal; ALTO ~13 per cent on Toronto–Ottawa and ~9 per cent on Toronto–Montréal. Modal share falls steeply as the price ratio rises, reflecting both the higher price coefficient (γ = 1.5) and the wide realistic range of price ratios that group travel and fare structures can produce.

The group-size effect

The price ratio depends decisively on the number of passengers sharing the car. Figure 6 plots rail share against group size from 1 to 4 passengers per car, with each scenario starting at its scenario-specific base ratio from Figure 5 (VIA at r = 2.4, HPR at r = 2.8, ALTO at r = 3.6) and the per-person rail-to-car ratio scaling linearly with the number of car occupants. The drop is steep across all three scenarios.

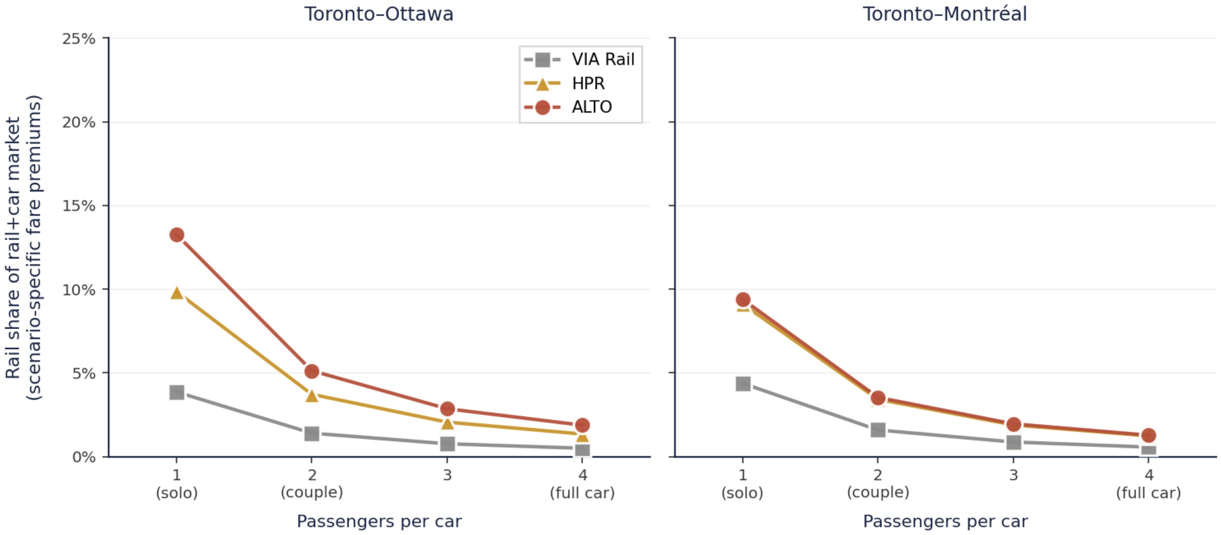

Figure 6. Modal share as a function of group size (1 to 4 passengers per car), with each scenario starting at its scenario-specific base price ratio (VIA r = 2.4, HPR r = 2.8, ALTO r = 3.6) and scaling linearly: e.g., VIA at n = 2 sees r = 4.8, at n = 4 sees r = 9.6. North American calibration. Toronto–Ottawa: solo shares are 4 per cent (VIA), 10 per cent (HPR), and 13 per cent (ALTO); a couple drops these to 1, 4, and 5 per cent respectively; a family of four to 1 per cent across all three scenarios. Toronto–Montréal: solo shares are 4, 9, and 9 per cent; a couple drops to 2, 3, and 3 per cent; a family of four to about 1 per cent. The HPR and ALTO lines converge rapidly as group size increases, especially on Toronto–Montréal — a couple essentially eliminates the ALTO modal-shift advantage.

The implications are substantial. The portion of corridor road traffic that is genuinely rail-substitutable is concentrated on solo travellers paying single-person fares against per-person fuel costs. Even at solo conditions the realistic rail share is in the single digits to low teens for the principal pairs once scenario-specific fare premiums are applied. A second passenger in the car halves rail share again; family travel, group leisure trips, and any car carrying three or four passengers cannot be captured by rail at any travel time and any defensible fare structure, because the per-person economics overwhelmingly favour driving. This narrows the realistic rail-substitutable market to a small fraction of total corridor road flow — predominantly business travel, single-traveller leisure, and downtown-to-downtown trips — and reinforces the conclusion that road-rail modal-shift gains depend at least as much on the trip-purpose mix on the corridor as on the choice between HPR and ALTO infrastructure.

Gas price as a modal-shift lever

Sustained changes in fuel prices shift the rail-to-car price ratio across all scenarios. Figure 7 plots modal share against gas price from $1.00 to $2.50 per litre, at solo travel and the scenario-specific reference ratios from Figures 5 and 6 (VIA r = 2.4, HPR r = 2.8, ALTO r = 3.6 at $1.65/L). At other gas prices the rail-to-car ratio scales inversely with fuel cost. The relationship is approximately linear in the realistic range and moves modal share by several percentage points across the plotted range.

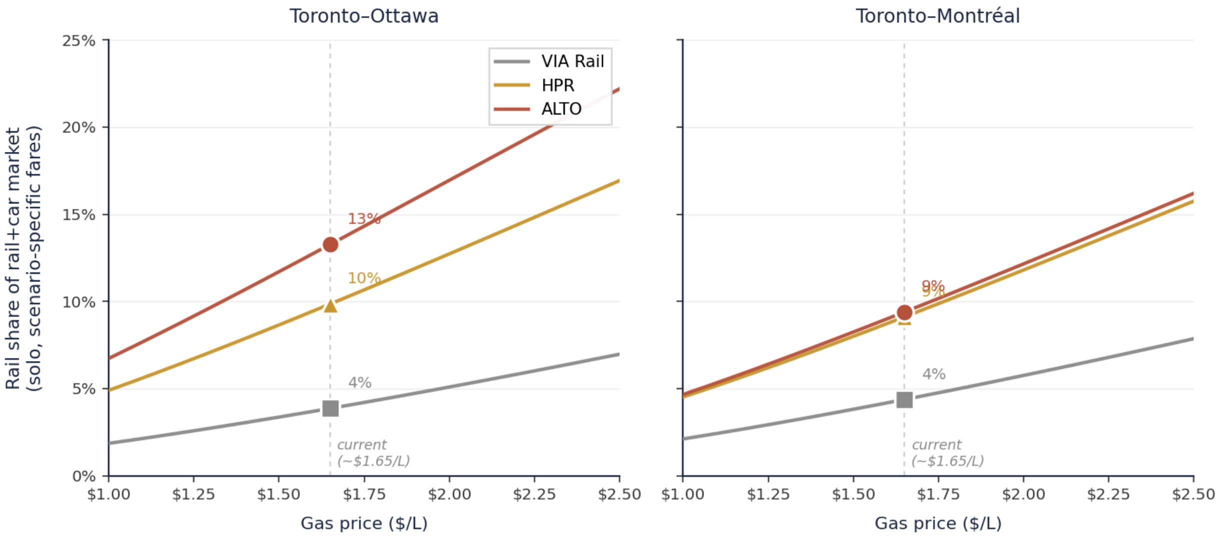

Figure 7. Modal share as a function of gas price ($/L) at solo travel, with scenario-specific reference price ratios anchored at the current Canadian gas price of approximately $1.65 per litre — VIA at r = 2.4, HPR at r = 2.8 (~20 per cent fare premium), ALTO at r = 3.6 (~50 per cent premium). At gas prices above or below $1.65/L, the per-person rail-to-car price ratio scales inversely with fuel cost: r(gas) = r_anchor × 1.65/gas. Markers show shares at the canonical $1.65/L: VIA captures approximately 4 per cent of the rail+car market on both pairs, HPR captures 10 per cent on Toronto–Ottawa and 9 per cent on Toronto–Montréal, ALTO captures 13 per cent and 9 per cent. These match the solo-traveller readings in Figure 6 by construction. A swing from $1.00 to $2.50 per litre roughly triples the rail share for each scenario but the absolute levels remain modest. Note that HPR and ALTO converge essentially exactly on Toronto–Montréal at all gas prices, consistent with the Section 4 finding that fare premiums largely cancel out ALTO's speed advantage. Gas-price and carbon-pricing policy are real modal-shift levers operating at much lower capital cost than infrastructure.

Two policy implications follow. First, the corridor's modal-shift outcomes are not solely a function of which infrastructure scenario is chosen — they are also a function of fuel pricing, carbon pricing, and the broader transport-policy environment. Sustained higher fuel prices would lift rail modal share across all three rail scenarios; sustained lower prices would depress them. Second, the comparative modal-shift performance of HPR and ALTO is roughly stable across the gas-price range — both shift up or down by similar percentage points — so the scenario comparison is relatively robust to fuel-price assumptions, even if the absolute levels are not.

> *Group size and gas price each move predicted modal share by tens of percentage points. These are levers as substantial as the choice between HPR and ALTO infrastructure, and they operate at zero or much lower capital cost.*

5. On-time performance and reliability

Travel time and price are the primary axes of modal choice, but the third axis — reliability — operates as an effective time penalty whenever rail's on-time performance (OTP) drops below a threshold that travellers can rely on. The Wardman et al. UK rail meta-analysis and broader European HSR demand work treat reliability through two channels: an expected-delay term (small) and a buffer-time premium (much larger). Travellers responding to unreliable service take an earlier departure than schedule alone would require, effectively inflating their journey time by the buffer they carry. The combined effect is conventionally captured by adding a utility term $\delta \cdot (OTP\_ref - OTP)$ to the logit, where δ is a sensitivity coefficient and OTP_ref is the reliability level implicit in the calibration.

Empirical literature places δ in the range 1.5 to 3.0, with the higher end applying to business-heavy markets where missed-connection risk dominates. For the corridor analysis we use $\delta = 2.0$ — a defensible midpoint of the leisure-business mix observed on Toronto–Ottawa and Toronto–Montréal — and OTP_ref = 0.85, the on-time performance reported in VIA Rail's 2023 Annual Report. The model therefore takes 13 per cent rail share at OTP = 0.85 as the calibration anchor (Toronto–Ottawa, parity pricing, solo) and re-prices share at other OTP values from there.

Figure 8 plots how rail share responds to OTP erosion from a 95 per cent dedicated-track target down to a 50 per cent stress-test floor, holding all other variables at their canonical near-parity values. VIA Toronto–Ottawa is shown in terracotta and Toronto–Montréal in gold. Four reference points are marked: a 95 per cent dedicated-track target (the level routinely achieved by HSR systems on dedicated track and the published HFR/Alto target); the 85 per cent figure VIA currently reports; the approximately 67 per cent figure VIA reported in 2021 amid heavy freight-train conflicts on shared CN track; and a 50 per cent hypothetical stress test.

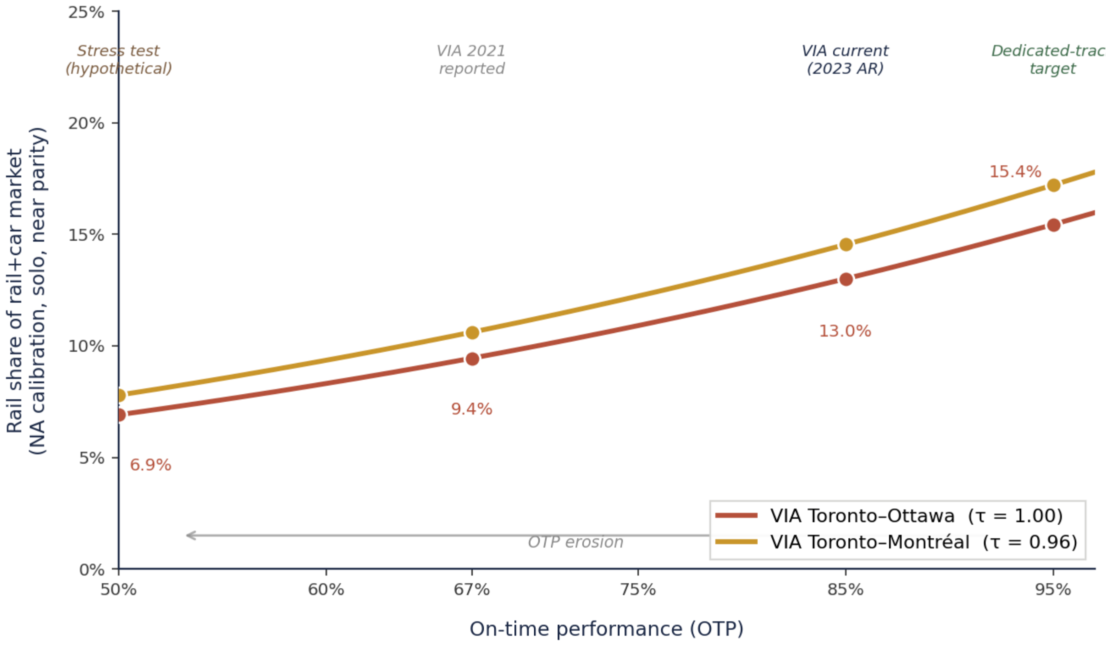

Figure 8. Rail share of the rail+car market for VIA Rail Toronto–Ottawa and Toronto–Montréal as on-time performance (OTP) varies from 95 per cent (dedicated-track target) down to 50 per cent (hypothetical stress test). North American calibration, solo traveller, near-parity pricing. Reliability sensitivity δ = 2.0 (Wardman 2014 midpoint), OTP_ref = 0.85 (VIA 2023 Annual Report). The four reference points are: dedicated-track target (95 per cent — typical of European HSR and the published HFR/Alto operational target); current VIA service (85 per cent); VIA's 2021 reported figure (approximately 67 per cent, during heavy freight-train conflict on shared CN track); and a hypothetical 50 per cent stress test. As OTP erodes from 95 to 50 per cent, Toronto–Ottawa rail share roughly halves, from 15.4 to 6.9 per cent; Toronto–Montréal falls from 17.2 to 7.8 per cent.

The chart makes three points. First, OTP is a meaningful but not dominant lever: its dynamic range across the empirically-observed band of corridor reliability (50 to 95 per cent) is approximately ±5 percentage points around the current calibration anchor, comparable in magnitude to a fuel-price swing of $0.50 per litre or a group-size shift from solo to couple. OTP is real, but it does not by itself transform a corridor's modal-share outcome.

Second, OTP and price ratio are partial substitutes in the utility function. A 10-percentage-point improvement in OTP (from 85 to 95 per cent) is roughly equivalent in utility terms to a 14 per cent reduction in fare or a 6 per cent improvement in τ. A high-OTP service can therefore sustain modestly higher fares than a low-OTP service without losing modal share — consistent with Brightline's strategy of advertising 92 per cent OTP precisely because it lets them charge a meaningful fare premium against parallel toll-free Florida highway.

Third, the OTP gain inheres in the dedicated-track step rather than in the speed step. Both HPR (200 km/h on dedicated 401-corridor track) and ALTO (300+ km/h on dedicated HSR track) would deliver OTP in the 95 per cent range because freight-train conflicts on shared CN track — the primary cause of VIA's reliability problems — are eliminated under either scenario. The OTP improvement is therefore largely captured by the move from current VIA to either dedicated alternative, and is not a meaningful differentiator between HPR and ALTO. This reinforces the conclusion in the next section that the HPR step does most of the analytically defensible work on the corridor.

> *OTP erosion from 95 to 50 per cent halves VIA's predicted rail share. The reliability gap between current shared-track service and a dedicated-track alternative is real and policy-relevant, but it is captured equally by HPR and ALTO — the speed step adds nothing to reliability.*

6. Where the modal-shift returns sit on the curve

The modal-shift S-curve has the same policy implication for road-rail as for air-rail, although with different magnitudes. Because the curve is logistic — flat at the top, steeper in the middle, flat at the bottom — the value of additional travel-time savings depends critically on where on the curve a route sits to begin with. For road-rail, an additional feature emerges from the τ-normalisation: because car drive time scales with distance, the same scenario produces very similar competitive positions on Toronto–Ottawa and Toronto–Montréal, and the marginal modal-shift gains are correspondingly similar across the two pairs.

On Toronto–Ottawa under the NA calibration, moving from VIA's current 4 hour 30 minute service ($\tau = 1.00$, share ≈ 13 per cent) to HPR's published Express time of 2 hours 55 minutes ($\tau = 0.65$, share ≈ 34 per cent) approaches the NA inflection at $\tau = 0.46$ and delivers the largest single increment of modal shift. The further move to ALTO's 2-hour service ($\tau = 0.44$, share ≈ 51 per cent) adds another increment as the curve crosses its inflection. On Toronto–Montréal, the analogous moves go from VIA at $\tau = 0.96$ (share ≈ 15 per cent) to HPR at $\tau = 0.67$ (share ≈ 32 per cent) to ALTO at $\tau = 0.56$ (share ≈ 41 per cent).

Figure 9 decomposes the total modal-shift opportunity on each pair into the share captured by moving from VIA's current service to HPR, and the additional share captured by moving from HPR to ALTO, at solo traveller and near-parity pricing conditions.

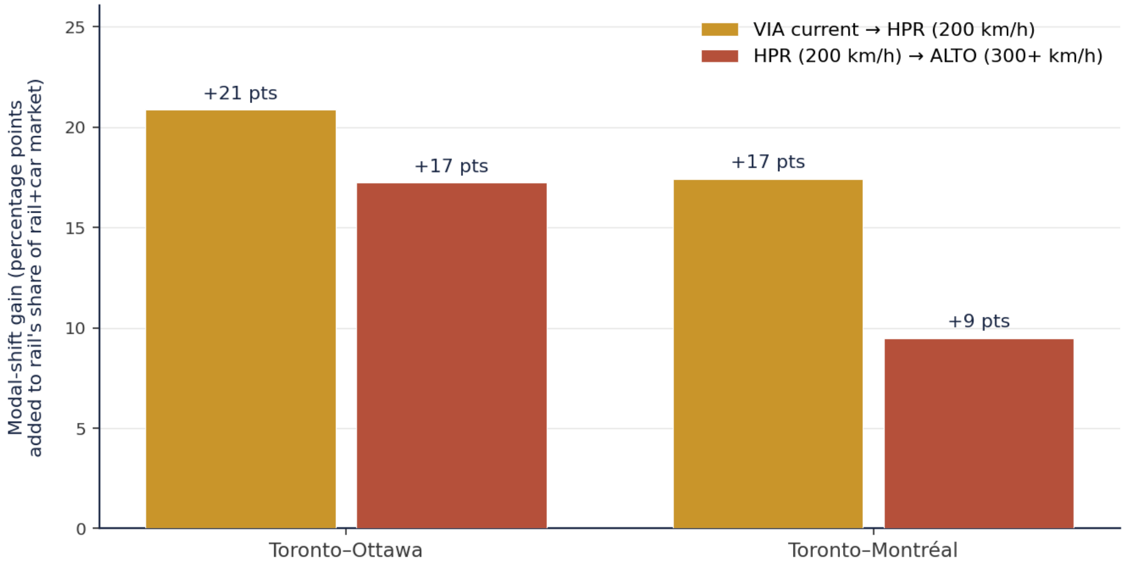

Figure 9. Decomposition of road-rail modal-shift gain by investment step on the two principal Toronto pairs, computed at solo traveller and near-parity pricing (rail-to-car price ratio ≈ 1.0), North American calibration. Gold bars show the percentage-point gain in rail's share of rail+car market from moving from current VIA service to HPR (200 km/h dedicated corridor). Terracotta bars show the additional gain from moving from HPR to ALTO (300+ km/h). The HPR step adds 21 percentage points on Toronto–Ottawa and 17 on Toronto–Montréal. The ALTO step adds 17 and 9 percentage points respectively. Under the European calibration the comparable figures would be 27 / 23 (HPR step) and 17 / 10 (ALTO step).

On Toronto–Ottawa under the NA calibration, the move from VIA to HPR captures an estimated 21 percentage points of modal shift; the further move from HPR to ALTO adds another 17 percentage points. On Toronto–Montréal, HPR captures approximately 17 percentage points and ALTO adds another 9. The HPR step and the ALTO step are roughly comparable in magnitude on Toronto–Ottawa (approximately 50 per cent each of the total achievable gain at this canonical configuration), but on Toronto–Montréal the HPR step does about two-thirds of the work.

The cost-effectiveness comparison is more challenging for ALTO than for HPR. ALTO's $60 to $90 billion capital envelope, before Canadian P3 cost escalation, represents an incremental investment of $40 to $70 billion above the HPR option. Spread across the additional 9 to 17 percentage points of road-rail modal shift that ALTO captures over HPR at canonical NA conditions, this works out to roughly $2.5 billion to $8 billion per percentage point of incremental rail share — comparable to or more than the air-rail figure, with the important caveat that the road-rail modal shift, once accounted for in absolute trip volumes, represents a much larger total person-trip diversion than the air-rail equivalent.

> *Road-rail modal shifts under realistic North American calibration remain substantial once the τ-normalisation is applied. The corridor's road traffic is several times the corridor's air traffic, and even an NA-realistic 30 to 50 per cent rail share of rail+car represents a larger absolute volume than full capture of the rail+air market.*

7. Implications for the corridor decision

Six conclusions follow from putting the road-rail evidence alongside the air-rail analysis.

First, road-rail modal shift in the North American context is structurally different from rail-vs-air. The car competes at all distances; the competitive zone for rail is narrower (1.5 to 3 hours rather than 2 to 4 hours); the perceived cost of driving is dominated by fuel and tolls rather than full economic cost; group travel decisively tilts the comparison toward driving; cross-elasticities between rail and car are remarkably low; and the structural North American conditions (toll-free highways, low fuel taxes, no congestion charging, dispersed land use, weak feeder transit, family-travel norms) all suppress rail's competitive position relative to European or Asian comparators.

Second, despite these headwinds, the corridor's road-substitutable demand is substantially larger in absolute terms than its air-substitutable demand. Annual highway flow on the 401 and A20 between Toronto, Kingston, Ottawa, and Montréal is several times the corridor's annual air person-trips. Even modest rail shares of the rail+car market translate to large absolute diversions. The road-rail prize is bigger; it is just structurally harder to capture.

Third, the modal-share predictions in this note are derived from the North American calibration (Figure 1b) and should be read as defensible point estimates rather than upper bounds. Under canonical conditions — solo traveller, current Canadian gas prices (rail-to-car price near parity) — the model predicts ALTO captures approximately 51 per cent of the rail+car market on Toronto–Ottawa ($\tau \approx 0.44$) and approximately 41 per cent on Toronto–Montréal ($\tau \approx 0.56$). HPR captures approximately 33 per cent on both pairs ($\tau \approx 0.65$–0.67). VIA's current 13 to 15 per cent on each pair anchors the calibration. The European-equivalent upper bounds (Figure 1) are 67 per cent and 58 per cent for ALTO and around 50 per cent for HPR — readings that would only apply if the broader North American transport-policy environment shifted toward fuel taxes, tolls, and station-area land use comparable to Western Europe. Even at the NA-calibration readings, ALTO and HPR represent substantial absolute volume diverted from highway — between 1.4 and 3 million additional rail trips per year on the corridor's principal pairs.

Fourth, group size and fuel pricing are levers as substantial as the choice between HPR and ALTO infrastructure. Family travel suppresses rail share by approximately 75 per cent under the NA calibration (ALTO Toronto–Ottawa moves from 51 per cent solo to 12 per cent for a family of four). Sustained higher fuel prices lift rail share by 15 to 30 percentage points across all scenarios. Carbon pricing, fuel-tax policy, congestion charging, and parking pricing are policy levers that operate at much lower capital cost than infrastructure choice and can produce comparable modal-shift effects. The corridor decision should therefore be considered alongside the broader transport-policy environment, not in isolation from it.

Fifth, on-time performance is a substantial but bounded modal-shift lever. As OTP erodes from a 95 per cent dedicated-track target to a 50 per cent stress-test floor, VIA's predicted rail share roughly halves on both principal Toronto pairs (15 per cent to 7 per cent on Toronto–Ottawa; 17 per cent to 8 per cent on Toronto–Montréal). The reliability gap between current shared-track service and a dedicated alternative is real, policy-relevant, and structurally captured by the move from VIA to either HPR or ALTO — both eliminate the freight-train conflicts that drive most of VIA's reliability shortfall. The OTP step is therefore inherent in the dedicated-track decision, not in the speed decision; HPR and ALTO would deliver comparable OTP improvements over current VIA service.

Sixth, this is the regime in which the High Performance Rail framework is most defensible on modal-shift grounds. The HPR step from VIA's current shared-track service to a dedicated, electrified 200 km/h corridor at VIA-style fares captures the majority of the road-rail modal-shift opportunity on both principal pairs — adding 21 percentage points on Toronto–Ottawa and 17 on Toronto–Montréal under the NA calibration. ALTO's additional 300+ km/h capability adds 9 to 17 percentage points further at solo and near-parity conditions, but those incremental percentage points cost $40 to $70 billion above the HPR alternative — between $2.5 billion and $8 billion per percentage point of incremental modal shift. And under realistic group-mix and price assumptions, the incremental ALTO advantage shrinks further. The road-rail analysis reinforces the air-rail conclusion: HPR captures most of the achievable modal shift on the corridor at a fraction of ALTO's capital cost, and the residual gain from ALTO's higher speeds is real but expensive to purchase.

Taken together with the parallel rail–air analysis, the corridor decision turns on whether the right framework is being used. Modal-shift performance is multi-dimensional — time, price, group size, fuel cost, traveller type, structural context — and the headline 19-to-20-point time-only advantage that motivates ALTO's case shrinks substantially once these dimensions are admitted. The High Performance Rail framework delivers the bulk of the corridor's achievable modal-shift outcomes — on both the air market and the road market — at roughly a quarter of ALTO's capital cost. Whether the corridor decision admits this fuller analysis is what determines whether the public investment achieves the modal-shift outcomes it is intended to produce.

§ Methodology and sources

Modelling approach

The S-curve in Figures 1, 3 is a standard logistic of the form $S(\tau) = 1 / (1 + \exp(K\cdot(\tau - \tau_0)))$, where $S(\tau)$ is rail's share of the combined rail+car market as a function of the time ratio τ = (rail journey time) ÷ (car drive time at 100 km/h average highway speed). The τ-normalisation is a meaningful departure from the absolute-time framing used in the rail–air analysis: because the car comparator scales with distance, the ratio τ produces a distance-invariant measure of rail's competitive position. The same value of τ implies the same competitive geometry across any route length. Parameters used here are $K = 3.5$ (steepness in normalised time) and $\tau_0 = 0.65$ — rail captures 50 per cent of the rail+car market at price parity when rail journey time is approximately 35 per cent below car drive time. The family of curves in Figure 2 extends this to two dimensions by adding a price-utility term: $S(\tau, r) = 1 / (1 + \exp(K\cdot(\tau - \tau_0) + \gamma\cdot\ln r))$, where r is the rail-to-car-per-person price ratio and $\gamma = 1.5$ is the price coefficient — larger than the rail–air variant's $\gamma = 1.0$, reflecting the higher own-price elasticities for car-vs-rail substitution found in the international literature (typically −1.0 to −1.6 for leisure demand). For group travel, the per-person rail-to-car price ratio is computed by dividing car cost by group size, so $r\_effective = r\_solo \times n$ where n is the number of passengers per car. Gas-price sensitivity is computed by varying the car cost component of r at fixed rail fare and fixed τ.

Two calibrations are presented in this note. The European calibration (Figure 1) uses $\tau_0 = 0.65$ and is fitted by visual match against the TGV Paris–Lyon pre/post comparison: approximately 30 per cent rail share against road at $\tau = 0.89$ (4-hour rail journey against 4.5-hour drive) rising to approximately 67 per cent at $\tau = 0.44$ (2-hour rail journey against the same drive). The model fits both endpoints within a few percentage points and matches the broader European HSR experience. The North American calibration (Figure 1b) uses $\tau_0 = 0.46$ and is anchored on the current modal share of VIA Rail service against road on the corridor's principal pairs (approximately 13 per cent rail share at $\tau \approx 1.0$, derived from VIA's published 2.1 million triangle ridership and the Highway 401 / A20 person-trip estimates in Table 1). The two calibrations differ only in τ_0; K and γ are held constant. The shift from $\tau_0 = 0.65$ to $\tau_0 = 0.46$ is equivalent in utility-shift terms to a constant penalty $\alpha \approx 0.67$ reflecting the structural North American disadvantages discussed in Section 1. The parameters should be treated as illustrative rather than predictive; sensitivity analysis at K between 2.5 and 4.5, τ_0 between 0.40 and 0.75, and γ between 1.2 and 1.8 produces the same qualitative conclusions about HPR's modal-shift performance and the structural difficulties of capturing North American road traffic.

An important caveat applies. The simple binary-logit model captures the time-and-price geometry of modal choice but does not capture the structural North American factors that suppress rail share below European-comparable levels: free parking at most destinations, dispersed origin and destination patterns that require a car at the terminus, weak feeder transit at both ends of the line-haul, family-travel norms that magnify the group-size effect, and a cultural autonomy preference that is reflected in revealed-preference data but does not enter time-and-price utility specifications. The model predictions in this note should therefore be read as upper bounds on what the corridor's rail scenarios could realistically capture from road traffic. Realised modal share is likely to sit 30 to 50 per cent below the model predictions on these structural grounds. Brightline Miami–Orlando, the closest North American analogue currently operating against parallel toll-free highway, provides indirect calibration: it is in extended ramp-up with bond ratings recently downgraded to CCC+, suggesting that achievable modal shares in the North American context emerge slowly and below European-anchored model predictions.

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