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Urban rail construction costs for subways vary greatly between countries.

Source: http://transitcosts.com
State Capacity

State capacity is the ability of the state to execute projects that are either in the public sector or contracted out to the private sector but with state interest (e.g. overseeing a privatized rail network as in the UK).

State capacity is not just one variable! States can be good at some things but not others. Examples:

- Taiwan’s corona response was exemplary (116 domestic cases). But its infrastructure construction costs are high. In general, corona shows a Europe+North America failure vs. East Asia+Southeast Asia+Aus+NZ success, but infrastructure costs don’t.

- Southern Europe has very low infrastructure construction costs, and has done a lot to limit corruption there. But it overall has higher levels of corruption and clientelism than Northern Europe and worse education outcomes.
Rail Costs vs. Complexity

Rail transport is especially important for state capacity, because it is a lower-cost, higher-complexity system than roads. Running an effective passenger rail system today requires integrating the following moving parts:

- Infrastructure construction.
- Rolling stock acquisition.
- Timetabling and operations.
- Development and zoning.

Americans spend around 17% of their expenditures on transportation, nearly all of which goes to cars. This is $10,742 per household, around $5,000 per traveler.

But in transit cities in other developed countries, and even in New York, the proportion is much lower. The Berlin U-Bahn operationally breaks even, charging 86€/month.
The rail tradeoff is organizational complexity. Individual developers and drivers don’t make decisions, there’s centralized planning (by the state, the city, or a large private railroad). This requires good centralized planning, i.e. state capacity.

In developing countries, higher-capacity states (e.g. in East Asia) have better rail transport and lower-capacity ones have domination by cars (e.g. most of Southeast Asia, nearly all of Africa).

The US, too, has worse rail transit than Canada and most of Europe and East Asia because of worse integration between the different moving parts, i.e. worse state capacity on infrastructure. Building roads is easier and can be done one interchange at a time.
Lesson #1 from our database: costs are primarily national (sometimes city-specific), so subways in the same city cost about the same, and usually also in the same country.

Low costs: around $100-200m/km, e.g. Southern Europe, Scandinavia, Turkey, South Korea.

Normal costs: around $200-350m/km, e.g. China, France, Germany.

High costs: around $400-1,000m/km, typical of the Anglosphere (and Quebec).

Very high costs: $1b+/km, just New York plus the occasional HK/SG disaster.
The Anglosphere’s Cost Disease

The Anglosphere doesn’t have general problems with state capacity, on matters like corona (US bad, Australia/NZ very good), education (UK, Canada pretty good), etc. But in infrastructure, it has high costs.

This is a problem of capital expansion. Toronto and London’s operating costs are fine, and Vancouver’s are very low on the Expo and Millennium Lines.

Canada is also generally better with urban upzoning than the US and Europe, which helps cities grow. Calgary and Vancouver have strong CBDs, which no American city of their size and age does.
Civil Service

The ideal situation for good infrastructure is strong civil service, run by apolitical subject matter experts. The role of politicians is to make high-level decisions on where the budget goes.

Example: in Switzerland, the Federal Council limited the budget, so Swiss Federal Railways developed its own system for rail integration (“Rail 2000”) to go to referendum on.

Political interference is one of the causes of high costs for Dutch megaprojects (“early commitment” per Bert van Wee). In contrast, in both Scandinavia and Southern Europe, the civil service leads.

Limits on state power should be bureaucratic and regulatory, not judicial as in the US (“adversarial legalism” by Robert Kagan).

One complication: North American mainline rail is unusually retrograde, e.g. the GO Transit engineers oppose the Toronto RER because it looks to European development in commuter rail.
Costs are Rising

Costs in each country usually rise over time, but usually slowly, and low costs and high costs both persist.

Exception: Italy had a big reduction in costs from the 1970s-80s (around US$300m/km) to the 2000s-present (around US$150m/km) after the mani pulite process reduced corruption.

Costs are rising the fastest in the Anglosphere. There was no general Anglosphere premium until the 1970s (Jubilee line) or even later (Jubilee line extension, 1990s), only an American, esp. New York premium.

The periphery of the Anglosphere has converged to high American (and British) costs in the last twenty years, seen in parts of the US (e.g. LA, Seattle) and in Canada, Singapore, and Australia.
# Toronto Costs

## Figure 1: Toronto Transit Capital Cost History

<table>
<thead>
<tr>
<th>Project</th>
<th>km</th>
<th>Stns</th>
<th>Stns/km</th>
<th>Cost</th>
<th>Open Year</th>
<th>In 2019 ($)</th>
<th>2019 $/km **</th>
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<tr>
<td>Yonge***</td>
<td>7.4</td>
<td>12</td>
<td>1.6</td>
<td>$67M</td>
<td>(1954)</td>
<td>$648M</td>
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<td>Uni-BD***</td>
<td>16.0</td>
<td>25</td>
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<td>$206M</td>
<td>(1966)</td>
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<td>BD exts.</td>
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<td>9</td>
<td>0.9</td>
<td>$77.8M</td>
<td>(1968)</td>
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<td>YSNE</td>
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<td>4</td>
<td>0.5</td>
<td>$140M</td>
<td>(1974)</td>
<td>$751.8M</td>
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<td>Spadina***</td>
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<td>$220M</td>
<td>(1978)</td>
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<tr>
<td>Kip. + Ken.</td>
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<td>2</td>
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<td>$127M</td>
<td>(1980)</td>
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<td>Downsview</td>
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<td>(1996)</td>
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<td>Sheppard</td>
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<td>$934M</td>
<td>(2002)</td>
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<td>TYSSE</td>
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<td>6</td>
<td>0.70</td>
<td>$3.2B</td>
<td>(2017)</td>
<td>$3.3B</td>
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<td>Xtown***</td>
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<td>ON Line***</td>
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<td>Yonge N</td>
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</table>

*Source: Station to Station, by Stephen Wickens, RCCAO*
Costs are also up in the rest of Canada (all figures in 2021 Canadian dollars):

- **Vancouver**: Broadway subway to Arbutus is $520m/km, up from $140m/km for the half-underground Canada Line, $100m/km for the elevated Millennium Line.

- **Calgary’s CTrain—Effective Capital Utilization**: $18m/km for the first three lines, 1980s-2000s; but West LRT was $185m/km. Construction has stalled and the modal split has too after rising quickly up to 2006.

- **Montreal**: the Laval extension was $190m/km, but the current Blue Line extension is $810m/km.
Canada Should Stop Americanizing

The 2005-present cost blowout in Canada has coincided with the Americanization of planning:

- Politicization of route planning (e.g. repeated changes in Metro Vancouver, and the Transit City and Fords sequence).
- Privatization of planning to PPPs and design-build contracts. After comparing the Sheppard Subway unfavorably with Madrid Metro expansion, the TTC decided to adopt design-build, which in fact Spain does not use.
- Indifference to costs for high-benefit projects (Toronto RER, Ontario Line).

Instead, Canada should reembrace the civil service and ensure there’s an adequate-size, professionally appointed planning staff driving infrastructure decisions.