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A brief history of infrastructure in Canada, 1870-2015

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Infrastructure broadly defined

- The basic physical and organizational structures and facilities (e.g. buildings, roads, power supplies) needed for the operation of a society or enterprise:
  - 'the social and economic infrastructure of a country'
    - » http://www.oxforddictionaries.com/definition/english/infrastructure

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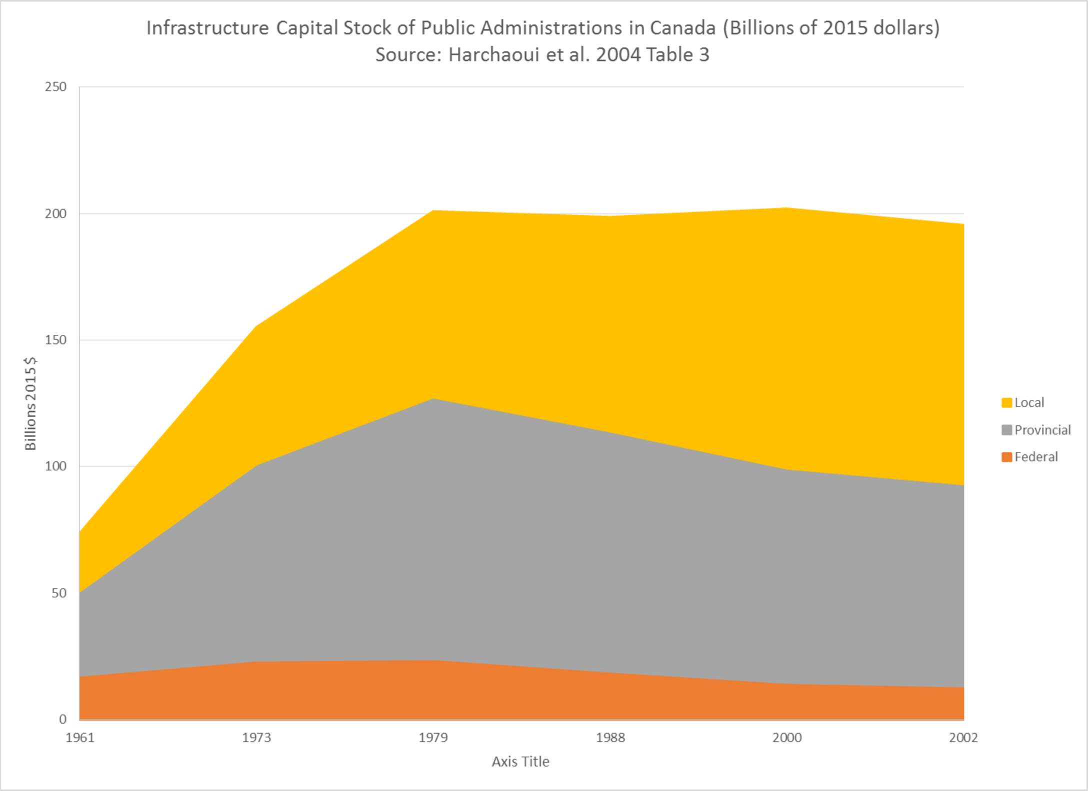
Infrastructure more narrowly defined in the economic and policy literatures

- Large capital intensive natural monopolies such as highways, other transportation facilities, water and sewer lines, communication systems often publicly owned
  - Or
    - The tangible capital stock owned by the public sector
      - Edward Gramlich (1994) “Infrastructure Investment: A Review Essay”, Journal of Economic Literature XXXII September, 1176-1196.

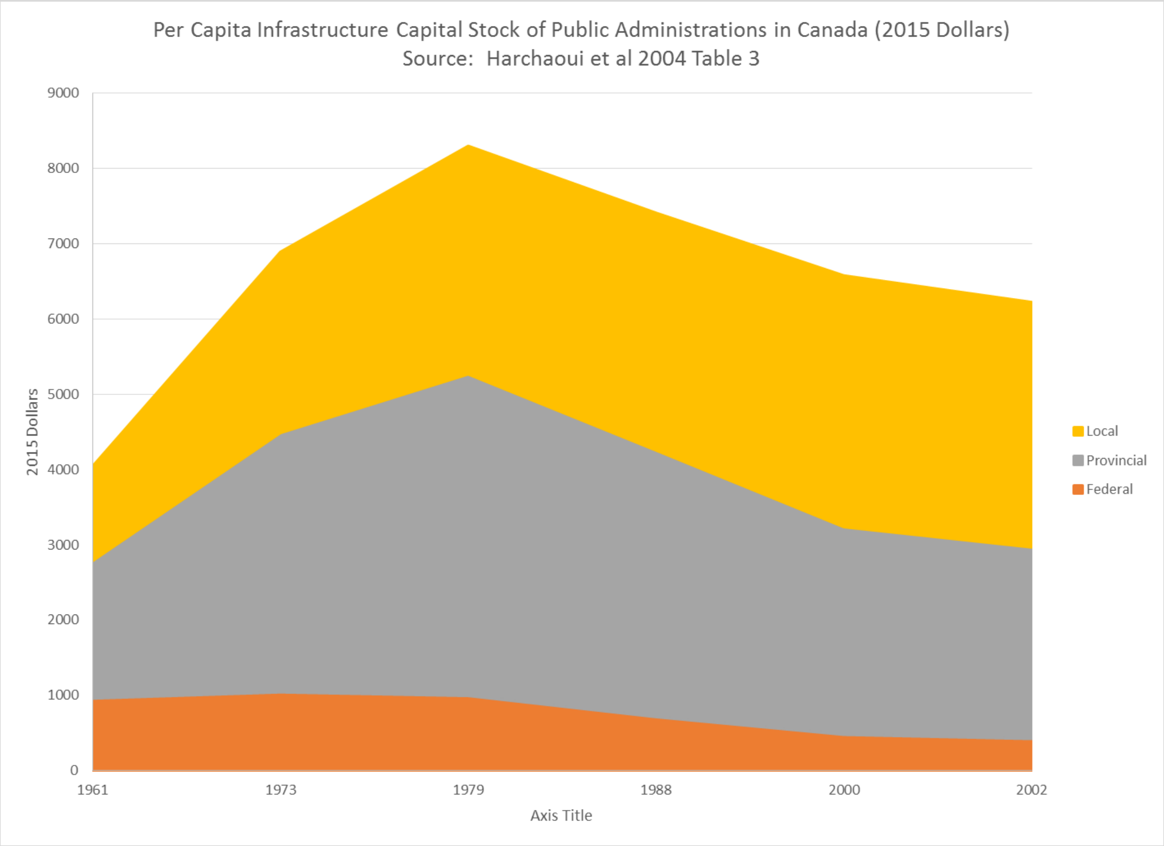
What do we know about <u>public</u> infrastructure capital <u>stocks</u>?

- Since 1961, over 75% has been provincial and local infrastructure
  - By 2002 over 90%
    - local share rising from 30% to 50%, provincial declining from 45% to 42%, and federal share declining from 25% to 7%
- What is in the public capital stock has been consistent over 1961-2002. In 2002:
  - Local – Highways and roads (45%), sewage treatment (12%) and sanitary sewers (17%)
  - Provincial – Highways and roads (69%), bridges (10%), sewage treatment (4%), sanitary sewers (5%)
  - Federal – Highways and roads (19%), trunk and distribution lines (9%), docks, wharves, piers and terminals 13%, sewage treatment (7%), sanitary sewers (12%)
    - Harchaoui, Tarkhani and Warren (2004) "Public Infrastructure in Canada, 1961-2002", Canadian Public Policy/Analyse de politiques 30(3), 303-318
- Reflects that much of economic growth has been urban growth and development - Less around hinterland resource development

Total value of the stock of public infrastructure 1961-2002



Value of public infrastructure stock per capita falling since 1979



History tells us that focusing on publicly owned infrastructure may be misleading…

- Or not the full picture
  - It's mostly telling us about highways, roads and sewers
  - It's reflective of investments with localized benefits, often non-pecuniary (quality of life)
- a lot of infrastructure is developed by private owners
  - Previously publicly owned infrastructure assets are privatized/sold
  - Possible where services can be "tolled", capital costs recouped through pricing
  - Regulated natural monopolies; crown corporations

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Some themes over history

- Infrastructure supported by Federal Government historically:
  - Reflects the standard argument for Federal involvment in infrastructure which is ‘benefit spillovers” (Gramlich 1994, 1190)
    - Citizens outside of the jurisdiction expected to receive some of the benefits of the investment
- Built ahead of demand in the first phase:
  - to open up hinterland to economic activity to provide producers access to international markets
    - Railways, canals, roads and pipelines
      - Prairie settlement, ports, northern development
    - Research facilities to turn resources into reserves
- Connecting and filling in in the second stage
  - to encourage integration of regional economies
    - Communications, road networks, broadcasting
      - Postal service, radio, TV

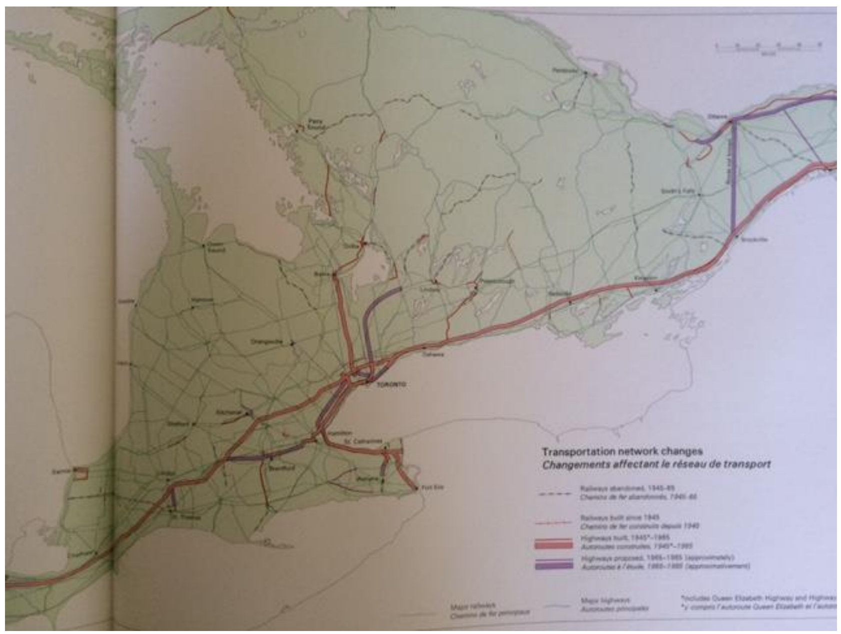
Infrastructure supported by provincial governments and local governments

- Greater retention of wealth from exports from competitive transportation services
  - Churchill railway
- Attract capital to local economy
- Improve amenity value of locale
    - Removal of disamenity eg. Sewage/waste/garbage

Technical innovation in transportation and communication triggers “lumpy investment”

- Wagon Roads to Canals to Rail to Asphalt
  - Telegraph to telephone to fibre optic cable and the internet
    - Radio, television, internet

1945 to 1965, Rail abandonment and highway construction (From plate 85 Economic Atlas of Ontario, 1969)



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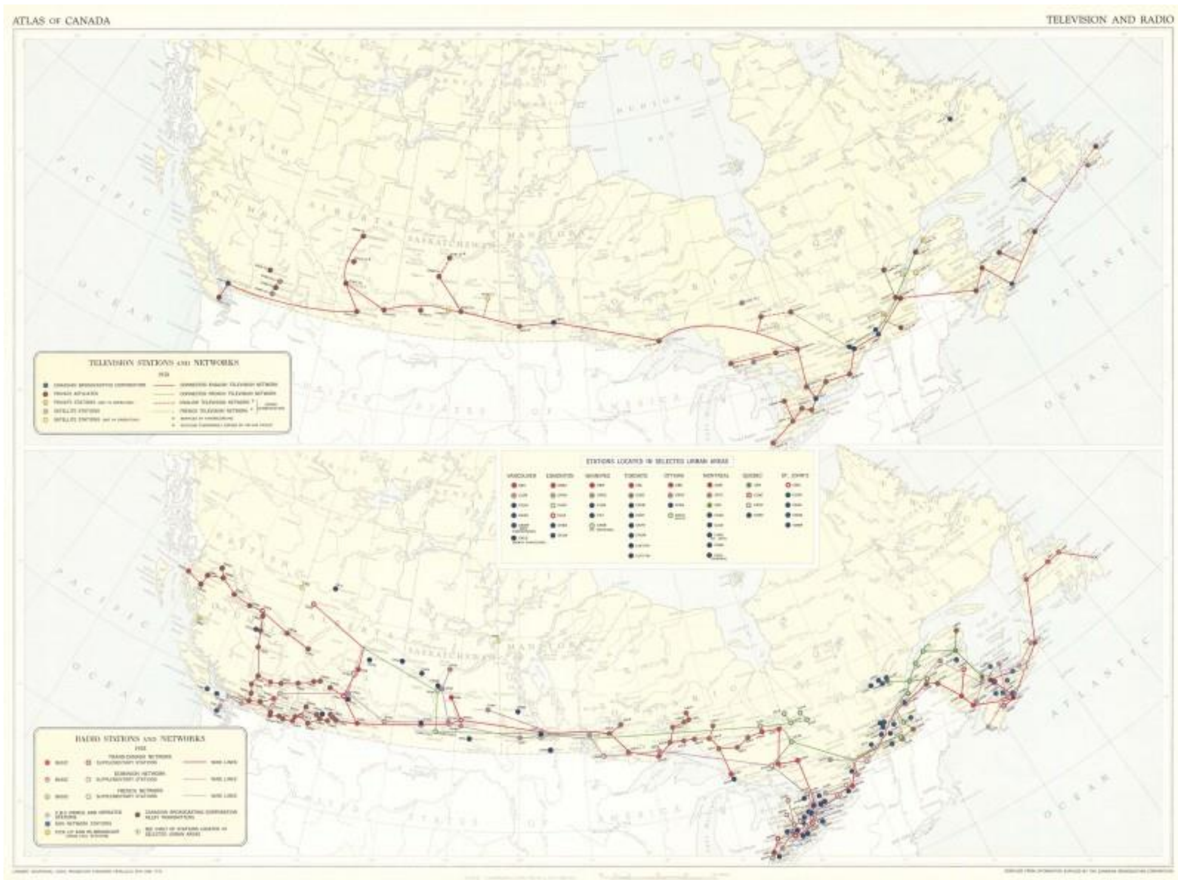
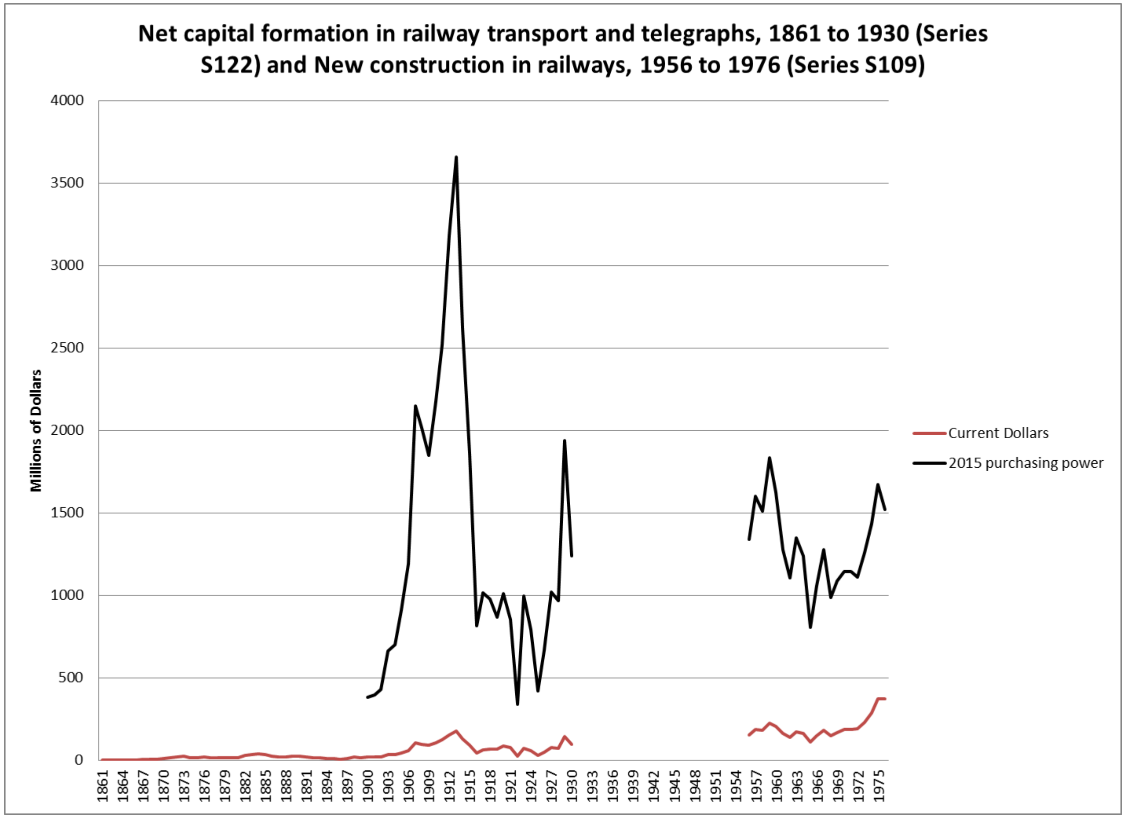
TV and Radio



Lumpy investments -- what was being built and when?

- A lot of building 1881-1913, 1945-1965
  - A lot of building when
    - Expectations for the economy are high
    - With technologies, modalities
    - With new resource developments
    - With strong growth and flush government budgets and access to capital markets
      - Gramlich (1994) – infrastructure investment greatest when there is high economic growth, as opposed to the other causality.

Example: Railway construction



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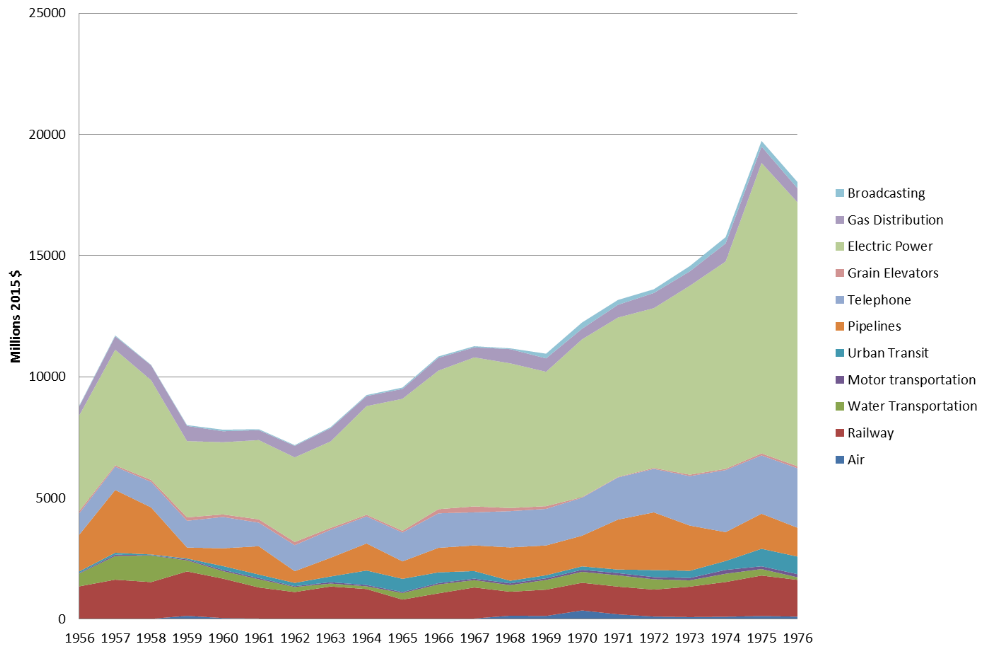
New construction in transportation, communication, electric power, gas and water utilities, 1956 to 1976 (millions of dollars, 2015 purchasing power)



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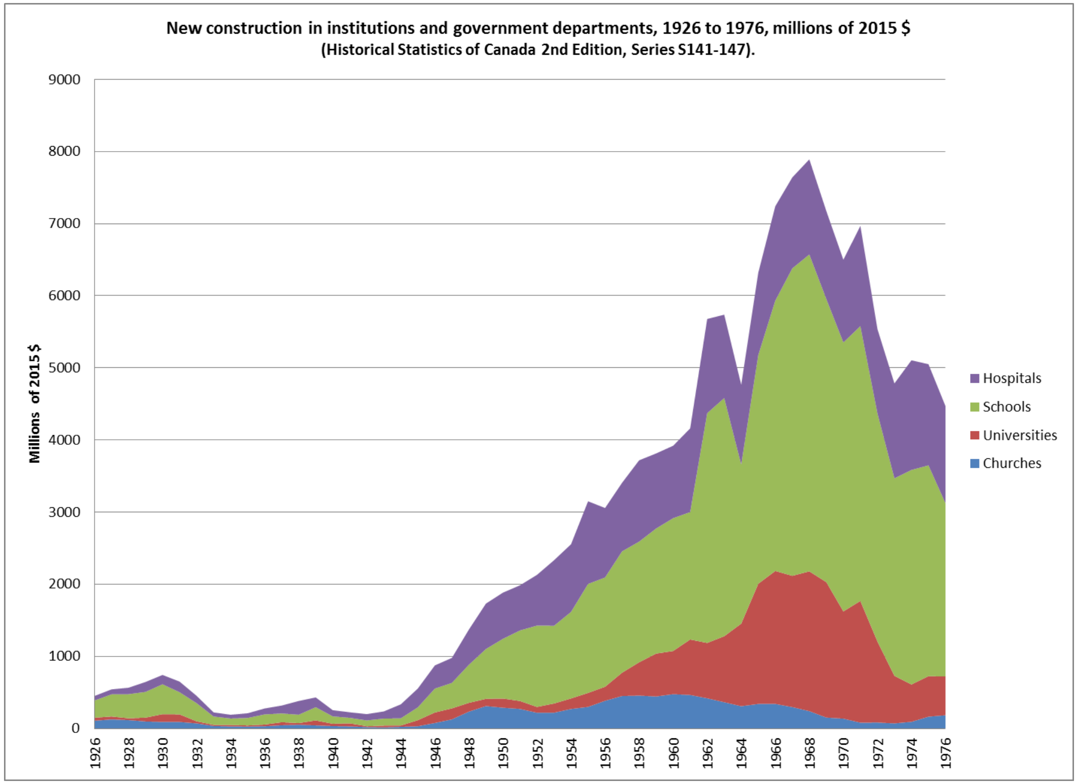

INTERESTING "FACTS" BUT SO WHAT?

Current issue: Is investment in infrastructure in Canada sufficient?

- Comparing rates of investment of today to that of the past
- The problem of "lumpy investments" "ahead of demand":
    - many infrastructure projects are front end loaded in the development process
  - The issues may be more the spatial and the "vintage" of infrastructure:
    - Investment based on on historical needs and historical expectations of needs today
      - (Winnipeg did not become bigger than Chicago; technical change alters the type of wires we need for communication; people are not cool with Victoria BC's raw sewage going into the local waters)
    - Schools built 1950 to 1970 in new neighbourhoods are now in mature neighbourhoods with few children to attend; children are more in the newer neighbourhoods
    - Which technology do you "lock in" on?
      - Should you adopt early or wait until you know how things will work out?

Financing infrastructure: History shows that economic issues are surmountable

- Especially during “Boom Times” when expectations for future growth are high
  - Lots to spend, lots of willingness to borrow
- Focus on direct “public investment” in infrastructure and challenges of finance really seems like a recent thing
  - Emphasis on “public goods” (nonexclusion, non rivalry) aspects
  - Historically, many projects were not necessarily of this kind but were more “natural monopoly” issues
    - Government used monopoly market structure to incent investment by private interests, and crown corporations
    - Where tolling possible, private investors supported with public subsidies
    - Monopoly or limited competition to encourage investment
  - With roads, we choose not to toll and then appeal to the public goods arguments to justify reliance on public monies
    - Same issue with choice for “Public ownership” -- Public transit is a curious situation since it can toll – preference seems to be not to privatize or fully toll for the service

The problems of publicly owned infrastructure are the political choices for how to finance them…

- Public ownership and pay-as-you-go finance along with cost sharing from more senior levels of government
  - Reliance on voter support for projects
  - May be challenging to fully price the project to include monies to offset future depreciation
  - Grants from feds or province may be for construction but not operation and maintenance
  - Or taxes collected nominally for maintenance of roads are absorbed into general revenues

- "States and localities propose bond issues and voters decide whether to build the structure… voters are influenced by the financial and other terms of the deal, and these are set by governments and could be altered. The most important way this is done now is by federal grants."
  - Gramlich (1994, 1190)