

# *Does rail have a future in New Zealand?*



Dave Heatley

Research Fellow

NZ Institute for the Study of Competition and Regulation

# Outline

---

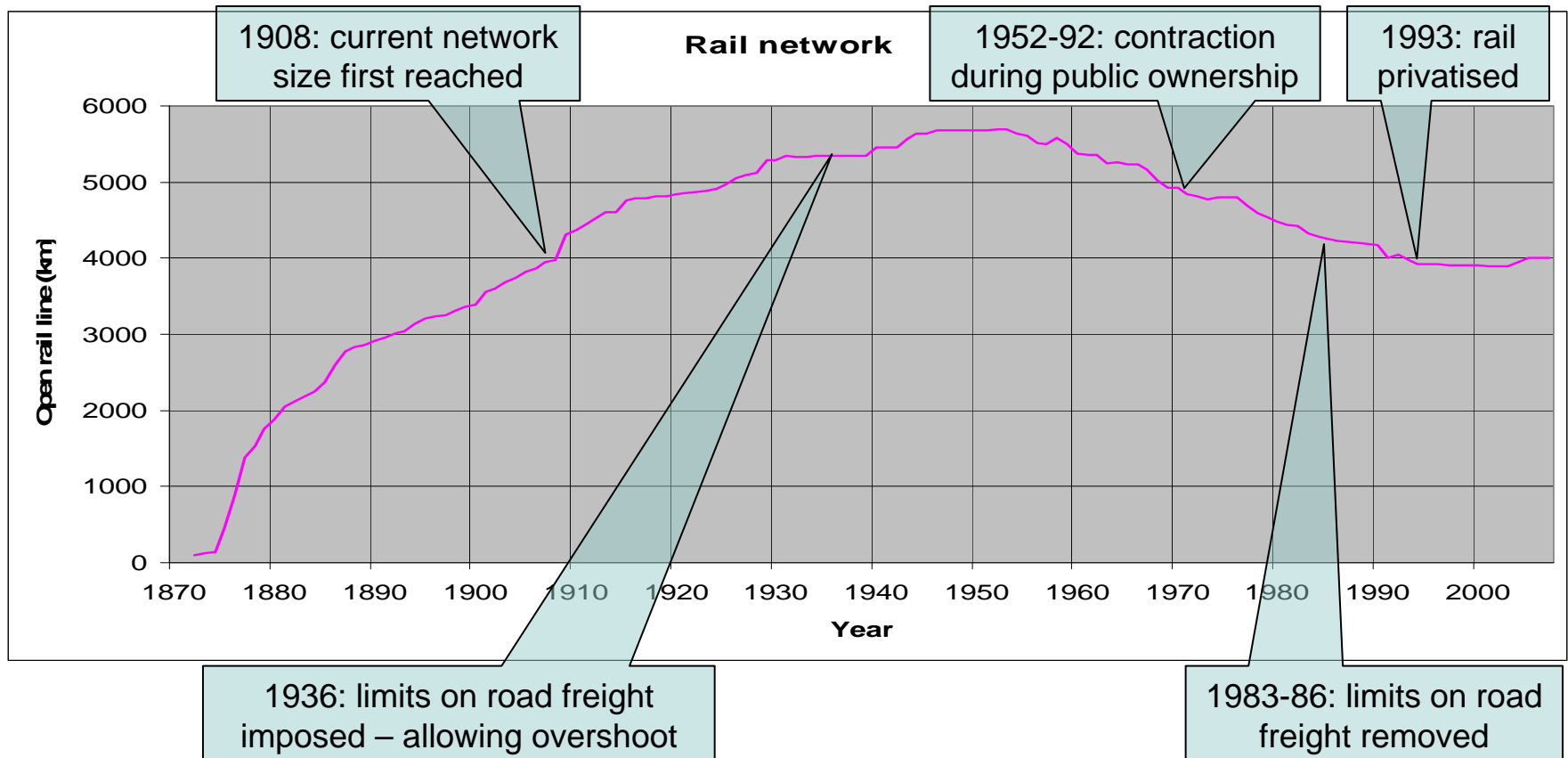
- A quick history
- Poor economic performance for decades
  - Important because economic performance is a measure of net benefit to society
- Can the problem be improved by changing governance or ownership?
  - Implicit reason in the recent re-nationalisation
- Do other social benefits (externalities) justify having rail anyway?
- Is there a future for rail?

# History: how has rail evolved?

---

- First railway opened 1863
- Lines built by provincial governments but came under central government control from 1876
- Initially fragments of rail connected ports to the hinterland
- Joining the fragments into one network took a century
  - North Island Main Trunk completed 1908
  - South Island Main Trunk completed 1945
  - Rail ferries joined islands in 1962

# Rail network growth and decline



- The rail network has evolved as it adapted to competition
- Adaptation has slowed since 1991, but external conditions continue to change

# Rail's evolution driven by competition

---

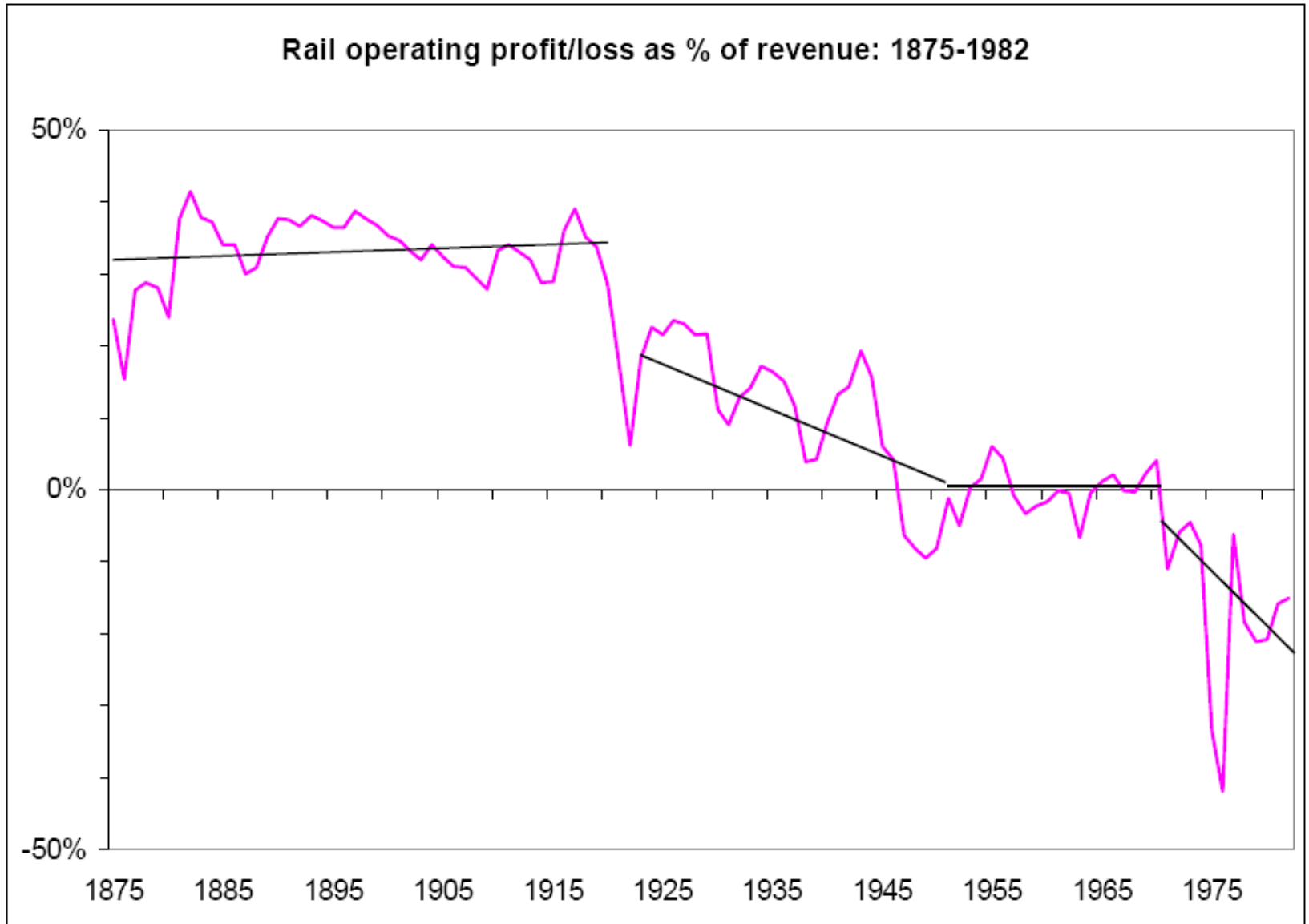
- Rail's initial purpose was to connect ports to the agricultural hinterland – “opening up the country”
  - Branch lines up every major valley were eventually out-competed by roads and subsequently closed
- As the country industrialised, rail connected ports to mines and industrial sites
  - Rail still has this role for transporting large volumes of non-urgent bulk goods
- Moving people between urban centres was the primary motivation for connecting into one big network
  - Rail took over from sea travel, but was eventually supplanted by road and air
- Moving general freight was a complementary use of the network
  - But as the road network grew, it offered better connectivity and even better economies of scope
  - Rail today needs road for door-to-door delivery (“intermodal”)
  - Intermodal is competitive over long distances only

# Economic performance: characteristics

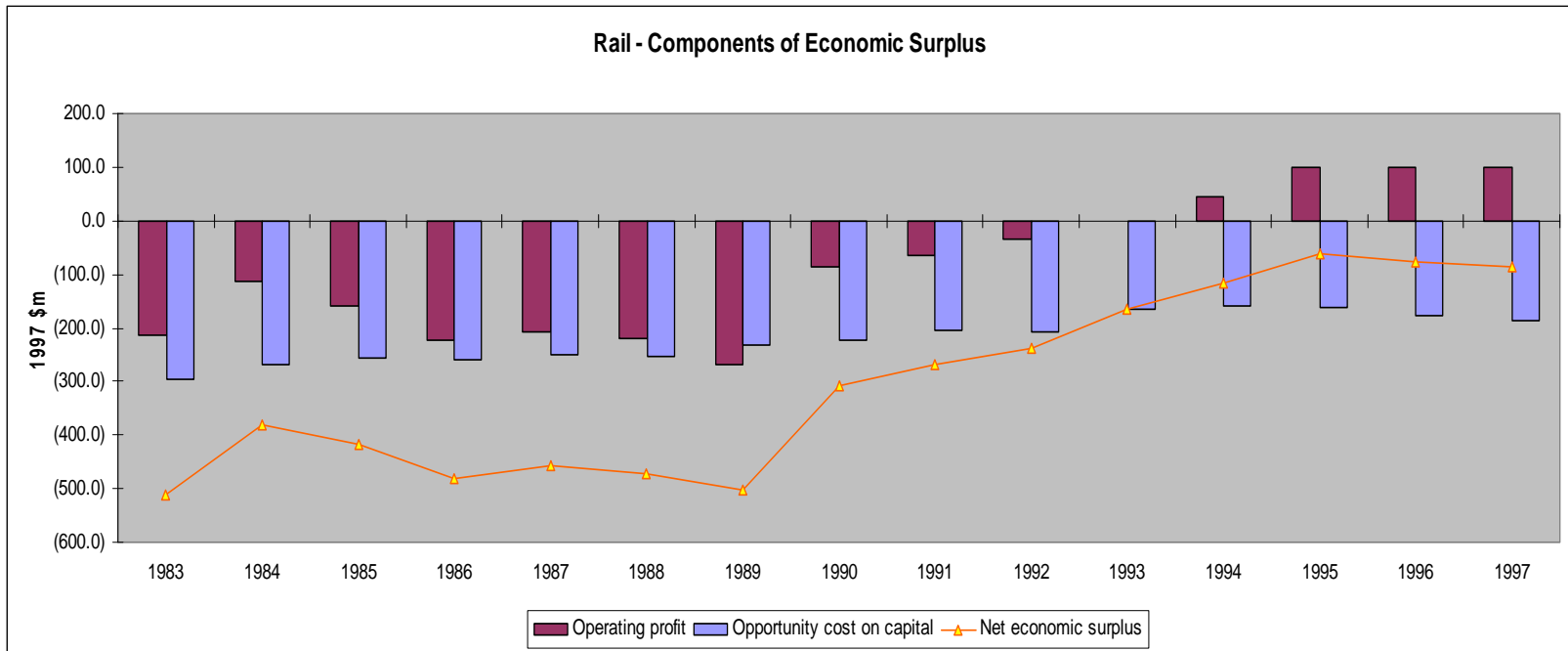
---

- Rail is a very long-lived asset
  - Most rail today runs along formations built in the 1800s
  - Maintenance and renewal are expensive, and get more costly as the network ages
- The majority of assets are fixed, and most of those are sunk
- Individual lines have different profit characteristics
  - Need volume to be profitable
- Railways exhibit economies of density, but not economies of network size (Waters II, 2007)
- Evaluations of the economics of rail are very sensitive to:
  - Rates of maintenance and renewal
    - Deferring maintenance can make things look good in the short term
  - Valuation of assets
    - E.g. Is the fixed rail infrastructure worth \$81m (market value) or \$6bn (ONTRACK valuation)?
  - Choice of required rate of return
  - Choice of reference point(s)

# Financial performance 1875-1982

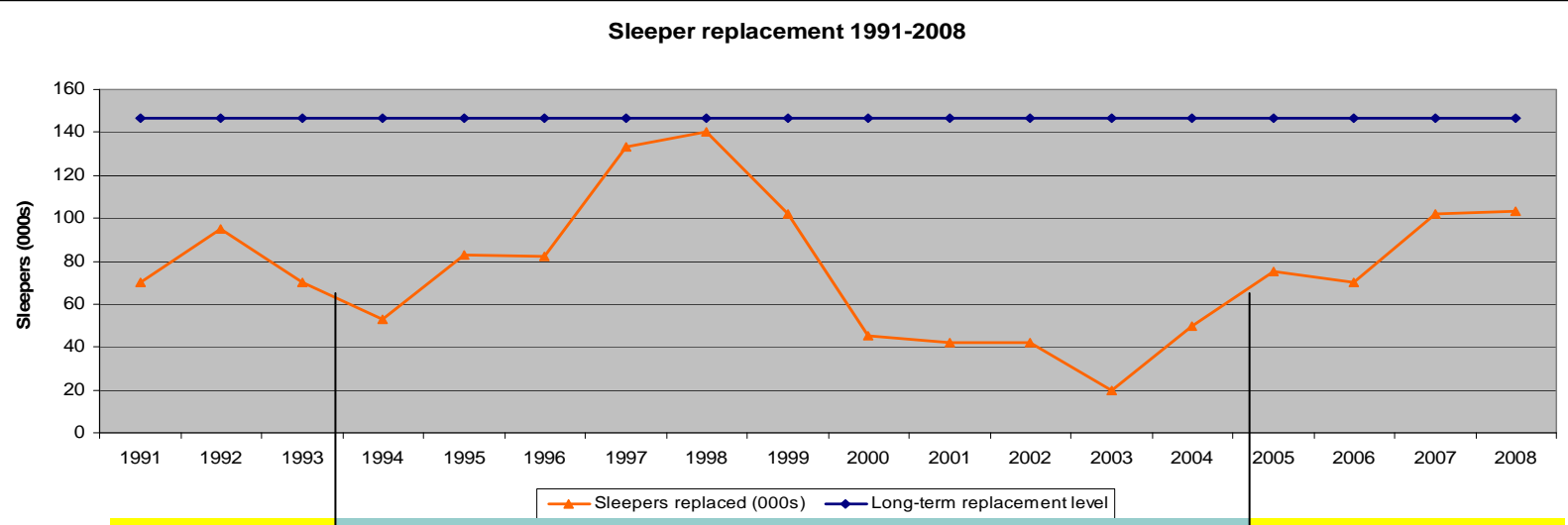


# Economic performance 1983-1997

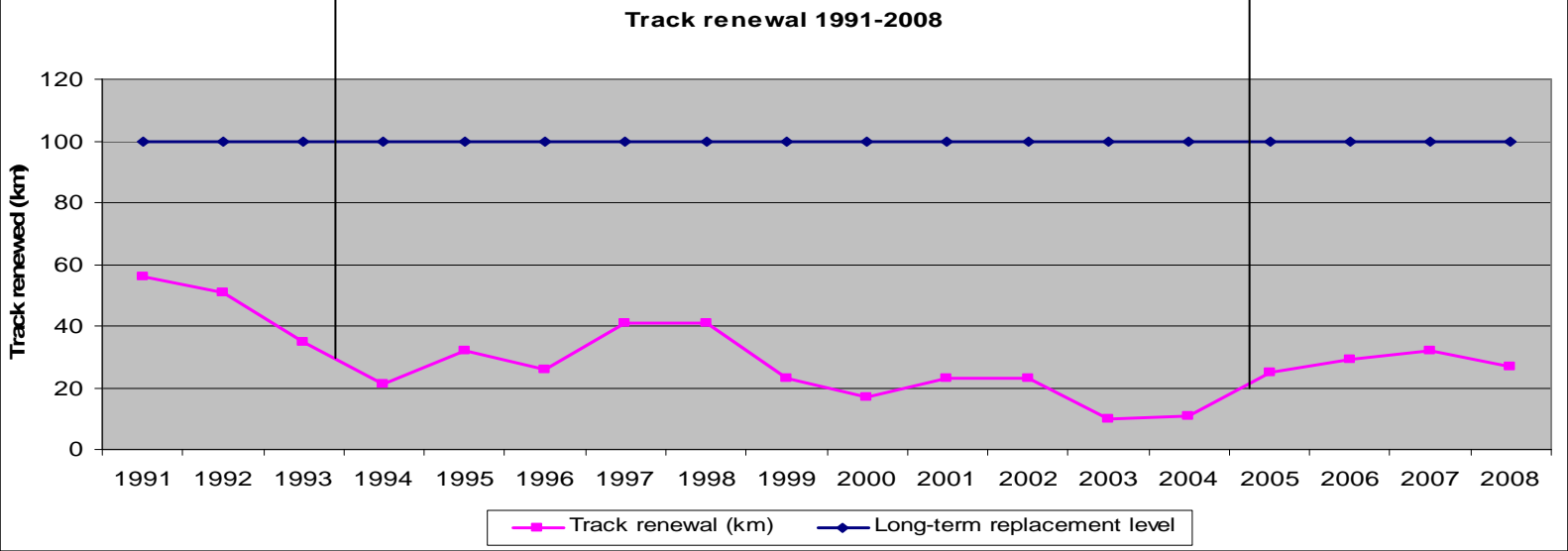


- “the history of rail in New Zealand has been one of enormous taxpayer and social cost entailed in retaining rail as a state-owned enterprise” (ISCR, 1999)

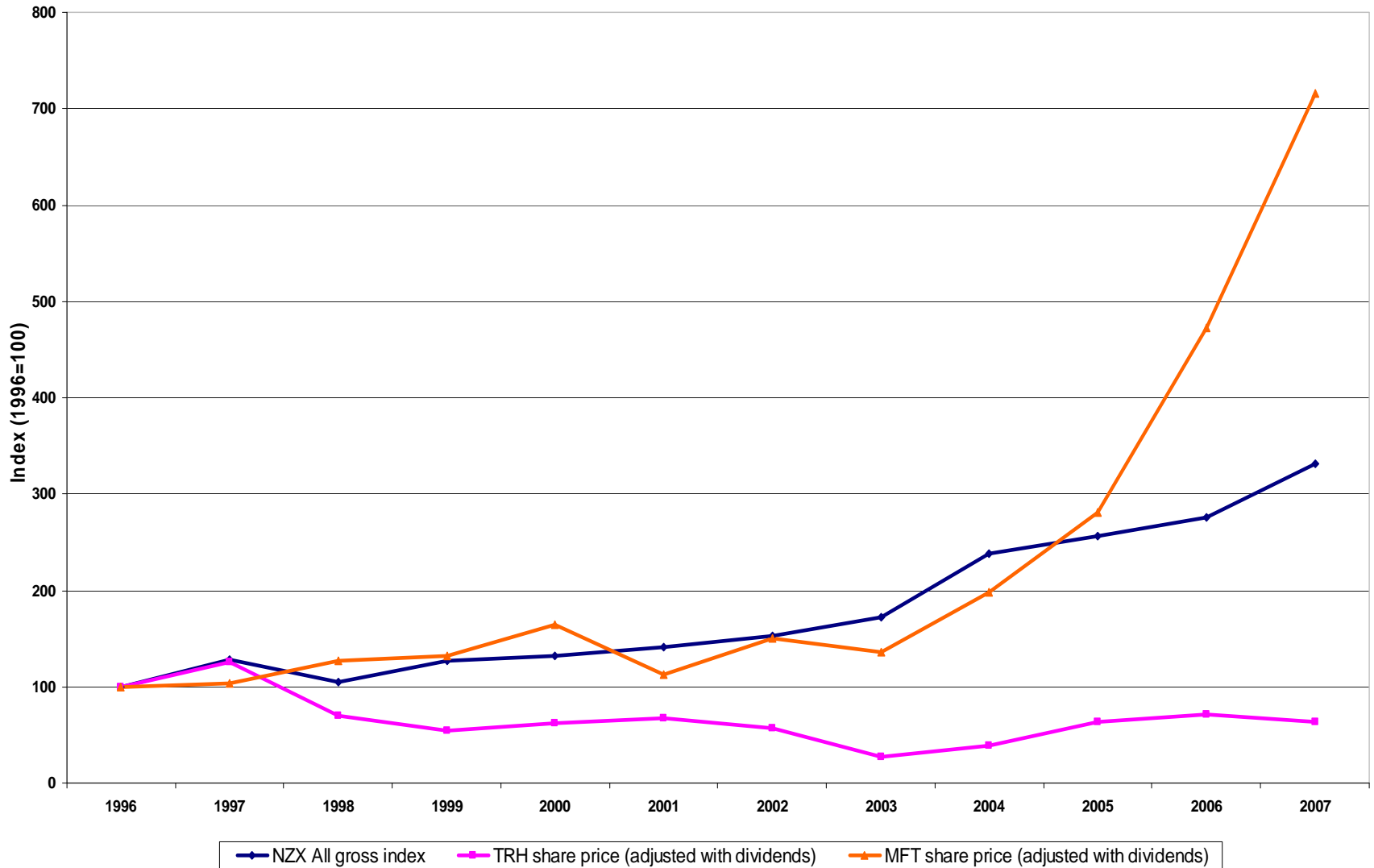
# Running down the assets: 1991-2008



Public      Private ownership      Public



# TranzRail, Mainfreight and NZX



# Comparison with other SOEs

---

- As at 1 July 2008, government equity in KiwiRail & ONTRACK valued at \$12bn – same as Meridian, Genesis, NZ Post, Mighty River Power, Transpower, Solid Energy and all other SOEs combined (CCMAU, 2008)
- In 2007/08, the other SOEs had an after-tax profit of \$637m on revenues of \$9.4bn (after-tax ROE 5.3%)
- Rail (+ferries) had negligible profit on revenues of \$741m. Would need to triple rail revenue without increasing costs to get similar ROE
- But rail ‘needs’ \$1bn programme to rebuild rundown network
- The \$12bn valuation is indefensible
- \$6bn land value is opportunity cost (but only available if network is shut down)

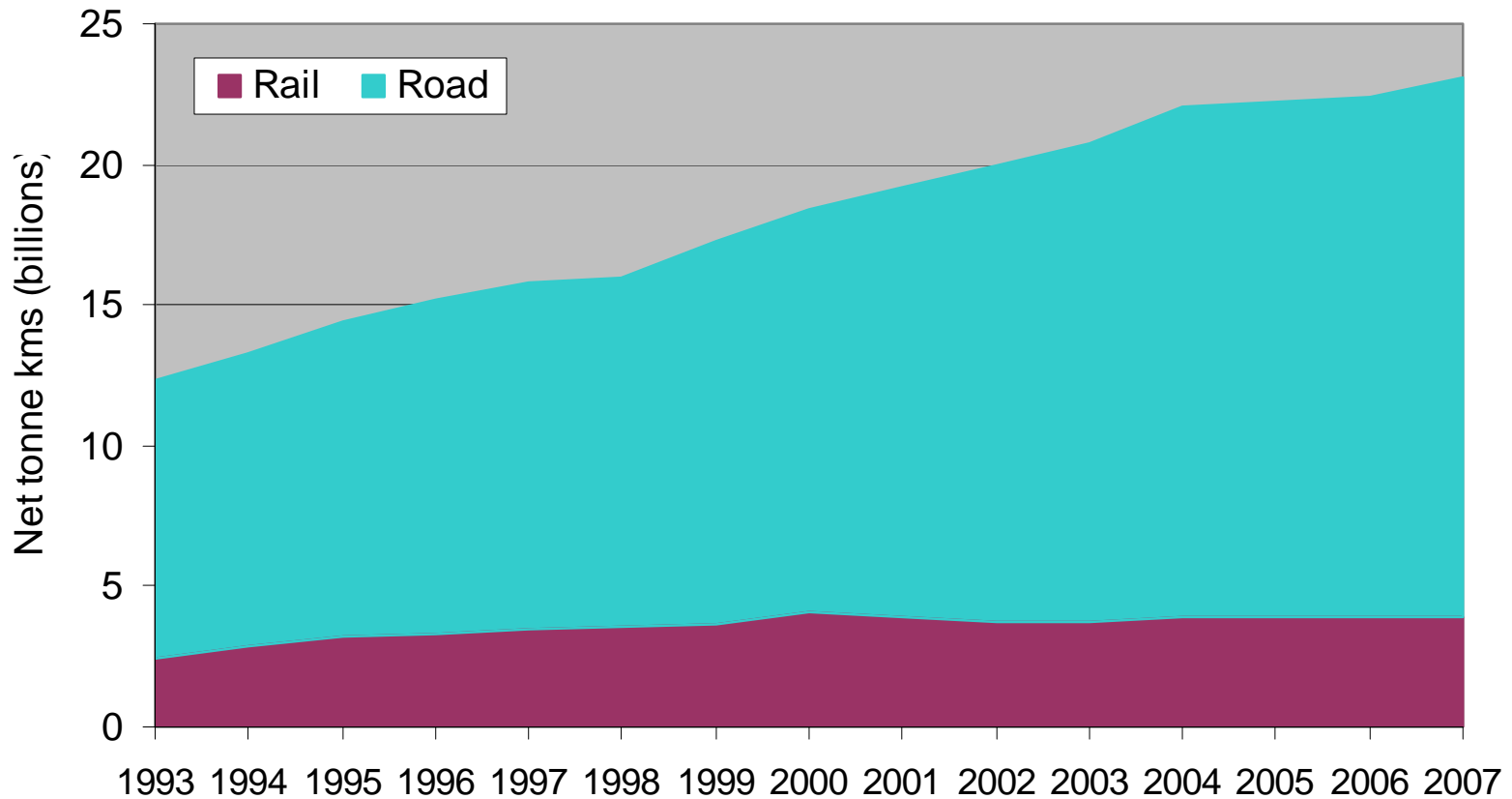
## Other evaluations

---

- Booz Allen Hamilton (2005) calculated economic deficit of rail freight was \$424m in 2000/01.
- “in the foreseeable future it is unrealistic to expect that [ONTRACK] will earn a commercial rate of return on its approximately \$12 billion of land and rail assets (CCMAU, 2008)
- “...our rail system cannot survive without substantial government subsidies into the future” (Clark, 2008)
- “...a business that has no value, in fact negative value” (English, 2009)

# Performance: freight carried

**Growth in surface freight 1993-2007**



## Performance: summary

---

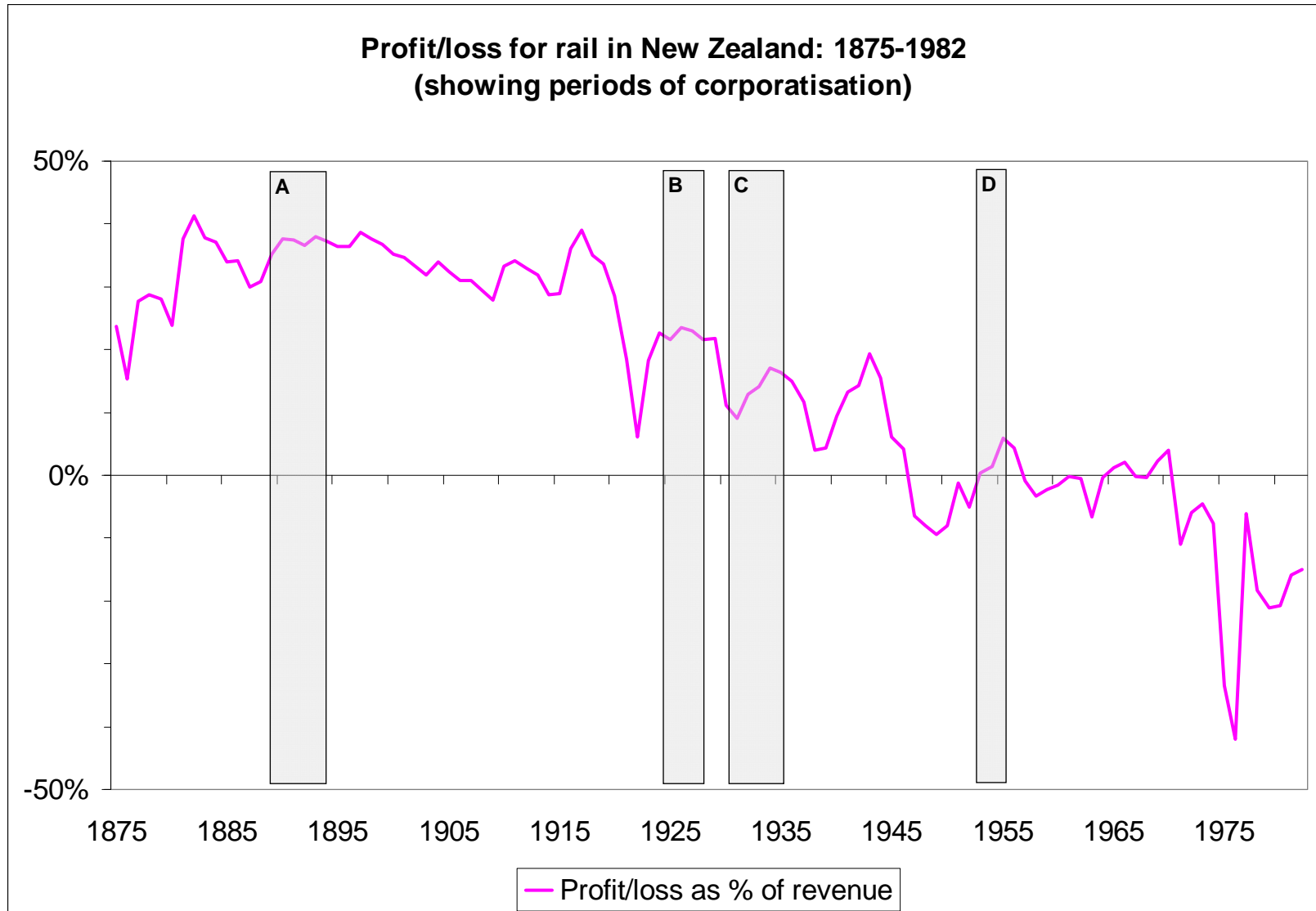
- Rail has performed poorly since at least the 1920s
- The rational response is a gradual rundown of long-lived infrastructure – and this has been happening
- Rail is unfixable in its present form without “heroic assumptions” about its future economics
- The network should be closed unless:
  - A change in ownership or governance can fix this problem
  - It has significant positive externalities that exceed the costs involved *and* these cannot be achieved at lower cost by other means; or
  - A viable subset of the network can be found

# Changing governance and ownership

---

- Ongoing experiment to find a model that works
- Orr (1981) observed a cycle which repeated on four occasions (1880s-1950s):
  - A perception of poor financial performance lead to a review finding political interference as a primary cause and recommending corporatisation as a remedy
  - Corporatisation implemented with the goal of making rail a viable business. It generally succeeded in improving the financial position
  - Within five years each corporatisation had been reversed, inevitably due to demand for increased political control
  - The financial performance gains were typically short-lived

# Governance changes 1875-1982



## Corporatisation #5 and privatisation

---

- The fifth corporatisation was NZRC in 1982. Continuing line closures and waves of restructuring over next decade
- Privatisation 1993 (NZ Rail) and public float (Tranz Rail) in 1996
- Tranz Rail initially bullish about investment but that slowed after 1997
- Financial performance dived from 2000
- Crown ownership of railway corridor land meant that Tranz Rail was unable to gain full benefits of line closures
- Over 2002-2004 government bought the below-rail infrastructure (ONTRACK) – creating structural separation

## Rail buyback completed in 2008

---

- ONTRACK and Toll unable to agree on a rail access charge
- Government wanted increased investment – but Toll could not justify it based on expected returns
- Government preferred to subsidise a SOE rather than a “foreign-owned” private company – but why? Government should be indifferent if its desired outcomes are achieved
- Government wanted to prevent rail-line closures (“rail essential for regional development”) – but at what cost?

# Governance and ownership: summary

---

- Ownership models tried
  - Local ownership (1860-1876)
  - Independent private railways (various to 1908)
  - Government department (5 times)
  - Government corporation (5 times)
  - Privately held (1993-1996 & 2007-2008)
  - Public company (1996-2007)
  - State-owned enterprise (2008+)
- Vertical integration
  - Integrated with ferries (1962+)
  - Integrated with trucking (1980s to 2008)
  - Structural separation (2004-2008)
- Typically economics improved around time of changes but reverted within a few years
- Underlying economic problems persist

# Externalities

---

- Recent justifications for rail are based on reducing externalities: especially accidents, congestion and greenhouse emissions
- But the optimal level of externalities is not zero – at some point it becomes more expensive to lower them than the welfare created by their further abatement
- The aim is to lower externalities towards this point at the least cost.
- As rail investments are very expensive, they need to be evaluated according to this least cost principle

# Rail safety and congestion

---

- “Rail is safer” – or is it?
  - Truck-related road deaths: 5.4/year
  - Rail-related deaths: 5.3/year  
(Average fatalities per billion NTK, 1998-2007)
  - Rail injury rates appear lower but the figures are not directly comparable
- “Shifting freight to rail reduces congestion”
  - Ignores congestion issues at transfer points
  - Ignores congestion issues at level crossings
  - Ignores congestion within the rail network
  - Ignores off-peak scheduling of the larger trucks that actually compete with rail
- Congestion costs \$1bn/year (BAH, 2005)
  - 70% in Auckland, 20% Wellington & Christchurch
  - Little reduction likely from increasing rail freight share. Rail carries non-urgent freight so off-peak trucking is a viable substitute
  - Commuter rail can help. Subsidies already internalise these costs

# Rail and greenhouse emissions

---

- Conventional wisdom: “rail is 4x better than trucking” (e.g. MOT, 2008b)
  - Considers averages, not the marginal values applicable to mode shifts
  - When used to justify projects, constant technology into the future is often assumed
  - Based on operating emissions only – ignores full life cycle
  - Same sources suggest that sea freight is 2x better than rail
  - Rail needs road for door-to-door delivery

# Rail CO<sub>2</sub>: marginal comparison

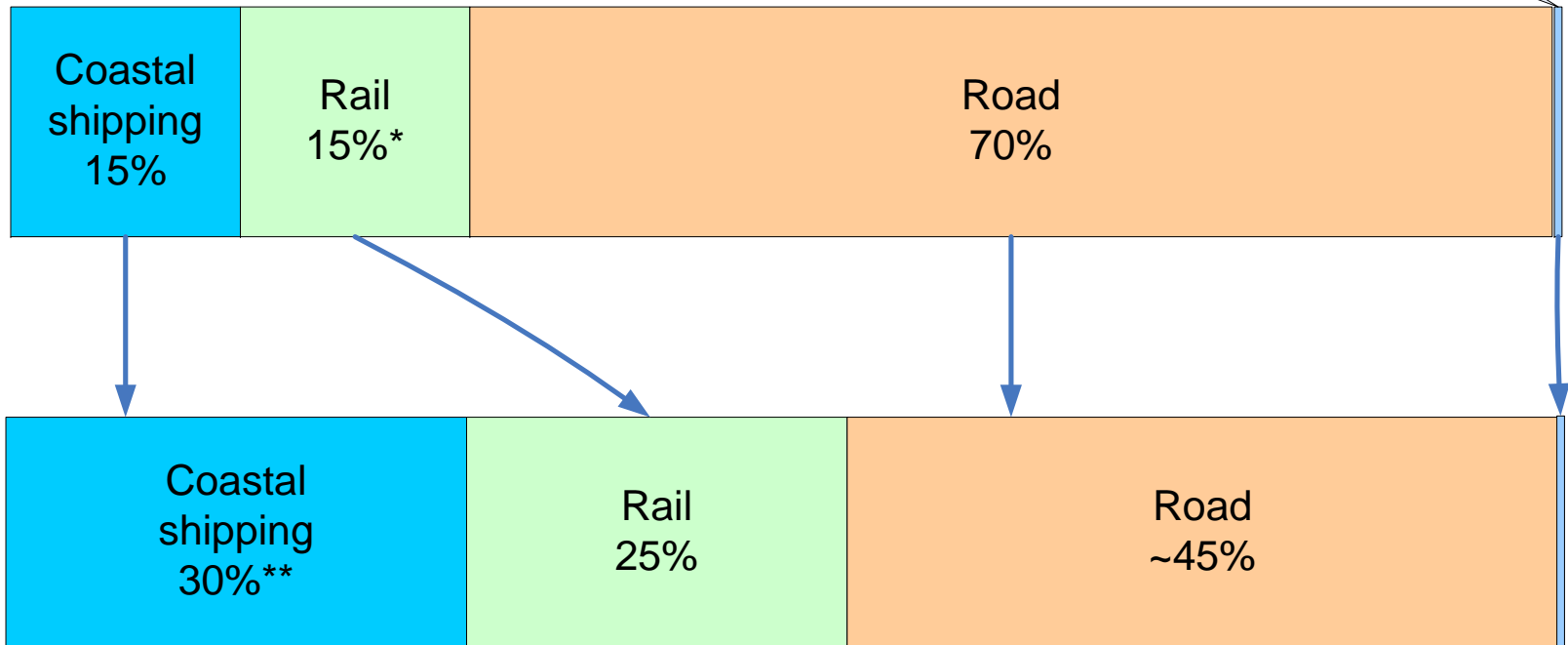
---

- Averages are dominated by non-contestable freight. For rail, this includes the point-to-point transfer of non-urgent bulk goods that it is preferentially suited for
- Contestable portion is small part of overall freight task: 3-7% of road freight task contestable by rail (Mackie et al., 2006)
- Affleck (2002) studied actual emissions for 7 specific Australian long-distance corridors
  - Intermodal (rail+road) distances generally longer
  - Intermodal produced 41-69% (average 55%) of the road-only emissions
- Gaballa & Cranley (2008) studied shipping consumer food products to Melbourne
  - Intermodal distances were 30% longer
  - Intermodal produced 61% of road-only emissions
- These figures are less than 2x – nowhere near 4x generally quoted in NZ

# Modal shift forces inefficient behaviour

Freight task (NTK) 2006/07 (NFDS 2008)

Air 0.3%



Freight task (NTK) 2040 (NZTS 2008)

Air ?

\* NZTS 2008 uses 18%. \*\*Target specified as a percentage of *inter-regional* freight. The proportion of *total* freight may be lower.

Implementation of the NZ Transport Strategy (MOT, 2008a) requires shipping to steal all of rail's modal share – so rail must steal that plus more from road

# Rail and indirect energy costs

---

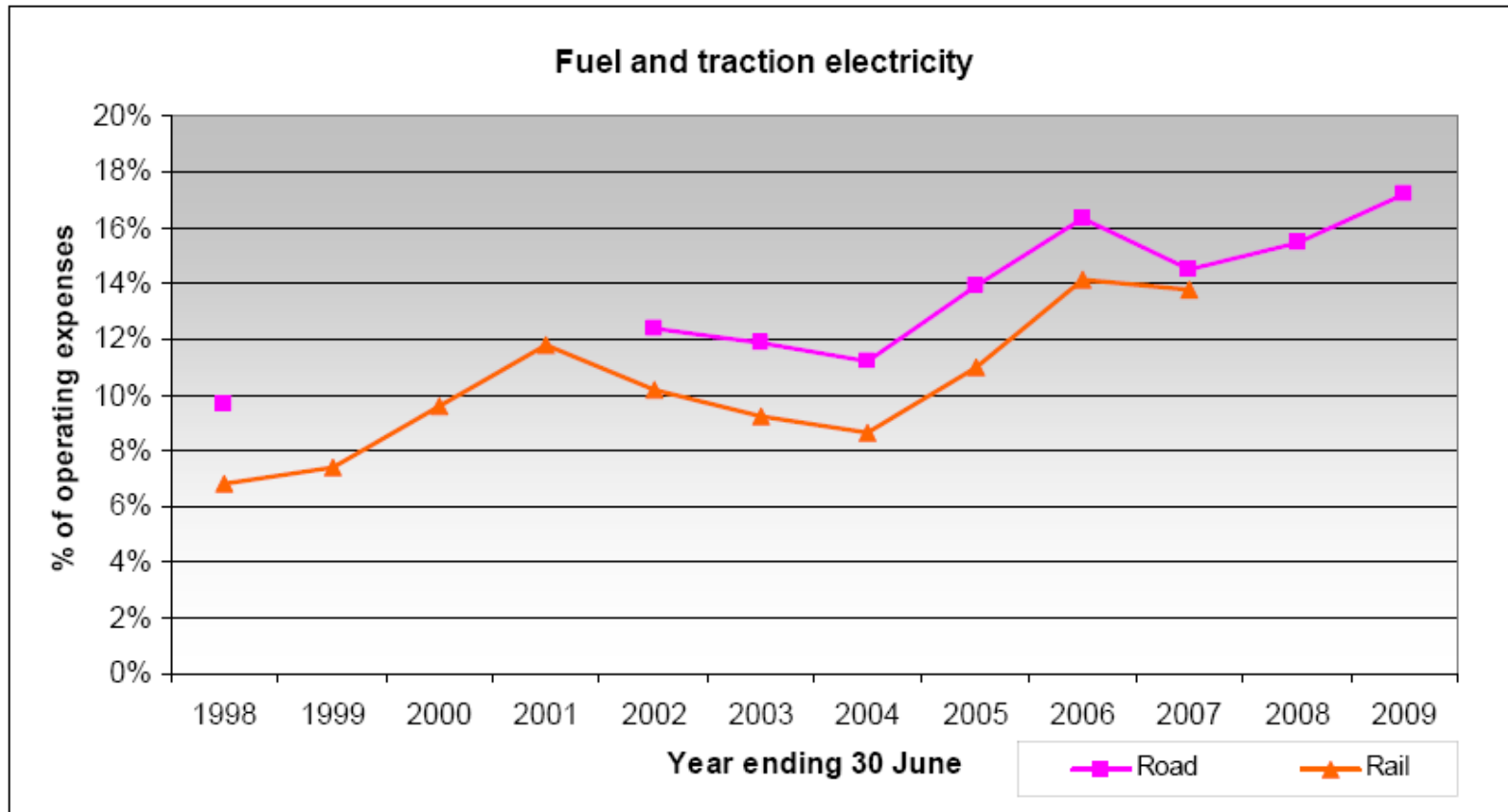
- Main inputs into rail infrastructure are steel, concrete and diesel
  - All are significant sources of CO<sub>2</sub> emissions
- For the Netherlands, Bos (1998) estimated that 45% of total rail energy use is in providing the rail infrastructure.
  - This proportion would be much higher on lightly-used tracks in NZ.
- Modal comparisons are misleading without full lifecycle accounting of environmental costs

## Greenhouse: summary

---

- Operational emission benefits will be negated by infrastructure emissions unless infrastructure well-chosen and heavily used
- Forced modal shift will move rail into tasks where it is not naturally efficient, potentially increasing overall emissions
- Greenhouse externalities best dealt with via carbon tax or equivalent emission-trading system which should drive an optimal modal allocation

# Will rising fuel prices assist rail?



- Energy efficiency cost advantage of rail is at most 3% of operating costs
- Cost gap appears to have narrowed as fuel prices increased
- Possible reason is that road transport is faster to adopt new technology

## Externalities: summary

---

- Results are mixed
- Main externalities are already internalised, or best internalised via other mechanisms
- Remaining externalities relatively small relative to the economic problem
- Transport infrastructure should be decided on primary benefits not externalities (Glaeser & Gottlieb, 2008)

# Is there a future for rail?

---

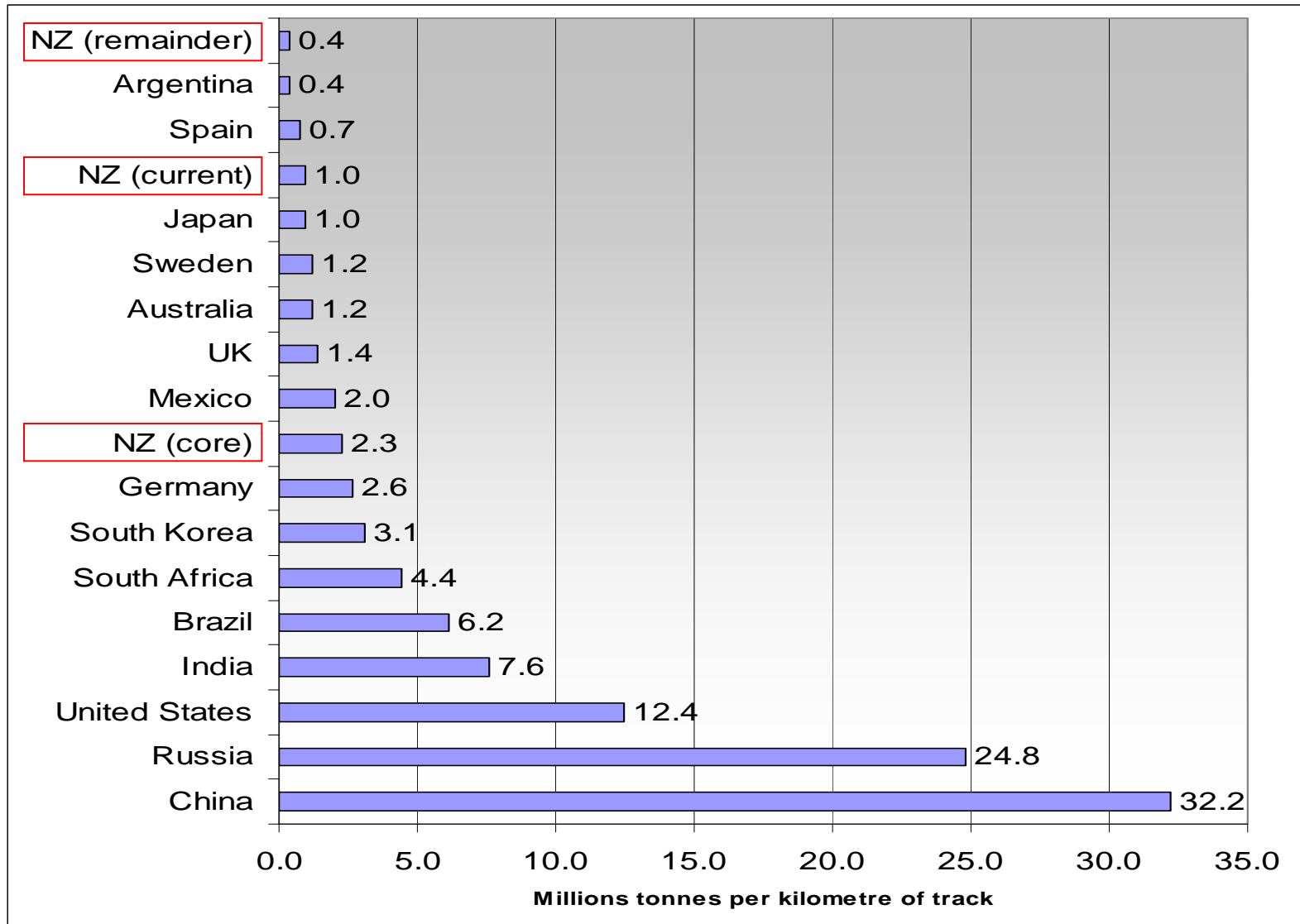
- **Commuter rail**
  - Wellington and Auckland rail should be evaluated independently – but require full environmental and economic analysis
- **Long-distance tourist rail**
  - Only viable on lines paid for by other rail users
- **Rail freight**
  - Extensive pruning in the 1950s-1980s was not enough to achieve economic viability
  - Recommended approach is to find a viable subset, then apply marginal analysis to see if any additions worthwhile

# A viable subset?

---

- Concentrate on rail's strengths
  - Primary role: point-to-point transport of large quantities of bulk goods
  - Integrate with - rather than duplicate - coastal shipping routes and state highways
- Rail's potential environmental and economic advantages can be realised if only heavily-used lines are retained
  - 30% of the network (Auckland, Waikato, Bay of Plenty, Canterbury and West Coast) carries 70% of freight
  - These are also the regions with the majority of future predicted increases in demand (Richard Paling Consulting, 2008)
  - Closing 70% of the network would free up land (possibly worth billions) which could fund the upgrading of the core network to 21<sup>st</sup> century standards

# Rail freight density comparison



# Summary

---

- Poor economic performance for almost a century
- Changing governance or ownership is unlikely to help
- Externalities are not sufficient to justify having the current rail system
- A future for rail freight requires finding a configuration that is economically viable
  - Smaller and denser than current network

# Questions

---

Research report and slides available from [www.iscr.org.nz](http://www.iscr.org.nz)

# References 1

---

- Affleck Consulting. (2002). *Comparison of Greenhouse Gas Emissions by Australian Intermodal Rail and Road Transport*. Brisbane: QR Network Access.
- Booz Allen Hamilton. (2005). *Surface Transport Costs and Charges Study: Main Report*. Ministry of Transport, New Zealand.
- Bos, A. J. M. (1998). *Direction indirect : the indirect energy requirements and emissions from freight transport*. Groningen.
- Clark, H. (2008, July 1). Full text: Helen Clark's speech on the launch of KiwiRail. *The New Zealand Herald*.
- Crown Company Monitoring Advisory Unit. (2008). *Briefing to Incoming Ministers on entities monitored under Vote State-Owned Enterprises*.
- English, B. (2009, March 4). Billion dollar KiwiRail now worthless, says English. *The New Zealand Herald*.
- Gaballa, S., & Cranley, L. (2008). *Food Miles in Australia: A comparison of emissions from road and rail transport*. Melbourne: CERES Community Environment Park.
- Glaeser, E. L., & Gottlieb, J. D. (2008). *The Economics of Place-Making Policies*. Discussion Paper. Harvard Institute of Economic Research.

## References 2

---

- ISCR. (1999). *The Privatization of New Zealand Rail Part 2: Quantitative Cost Benefit Analysis*. New Zealand Institute for the Study of Competition and Regulation.
- Mackie, H., Baas, P., & Manz, H. (2006). *The contestability of New Zealand's road freight task by rail*. Transport Engineering Research New Zealand Limited.
- Ministry of Transport. (2005). *National Rail Strategy to 2015*.
- Ministry of Transport. (2008a). *The New Zealand Transport Strategy 2008*.
- Ministry of Transport. (2008b). *Sea Change: transforming coastal shipping in New Zealand*.
- Richard Paling Consulting. (2008). *National Freight Demands Study*. Ministry Of Transport, New Zealand.
- Orr, S. (1981). *New Zealand Railways Corporations. A Short History of Previous Experiences With New Zealand Railways as a Corporation*. Economic Division, Ministry of Transport.
- Waters II, W. G. (2007). Evolution of Railroad Economics. *Research in Transportation Economics*, 20, 11-67.