PUBLICATION TRANSPORT
ORGANIZATIONAL MODELS:
ROLES FOR THE
PUBLIC and PRIVATE SECTORS

Outline

- Organizational Models
- UK Bus Industry Experience
- US Transit Industry
- Prospects for the future
- Public/Private Roles in Rail Systems
Transit vs Other Modes

Key differences between urban public transport and examples of fairly recent US deregulation:

• US transit has been operated by public sector for past 30-40 years

• US transit has been operated at a deficit for past 30-40 years
US vs Europe

- US has been the leader in deregulation outside transit
- UK, and now Europe, the leader in restructuring transit organizations
Organizational Models

• Unregulated/Deregulated
• Regulated Competition
• Threatened Competition
• Private Monopoly
• Public Monopoly
• Contracting Out
### Six Organizational Models

<table>
<thead>
<tr>
<th>MODELS</th>
<th>Unregulated</th>
<th>Regulated Competition</th>
<th>Threatened Competition</th>
<th>Private Monopoly</th>
<th>Public Monopoly</th>
<th>Contracting Out</th>
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<tr>
<td><strong>Regulation</strong></td>
<td>Minimum</td>
<td>Yes</td>
<td>Yes*</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes*</td>
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<tr>
<td><strong>Financing</strong></td>
<td>PR</td>
<td>PR</td>
<td>PR</td>
<td>PR</td>
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<td>PR</td>
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<tr>
<td><strong>Planning</strong></td>
<td>PR</td>
<td>PU &amp; PR</td>
<td>PU &amp; PR</td>
<td>PR &amp; PU</td>
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<td><strong>Ownership</strong></td>
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<td>PR</td>
<td>PR</td>
<td>PR</td>
<td>PU</td>
<td>PR (or PU)</td>
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<td><strong>Operation</strong></td>
<td>PR</td>
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<td>PR</td>
<td>PR</td>
<td>PU</td>
<td>PR</td>
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<td><strong>Maintenance</strong></td>
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<td>PR</td>
<td>PR</td>
<td>PR</td>
<td>PU</td>
<td>PR</td>
</tr>
</tbody>
</table>

* The model is regulated in the form of contracts

PU: Public Sector; PR: Private Sector
UK Experience with Bus Industry Restructuring

• Background
• Bus Deregulation outside London
• London strategy
• Results to date
Prior to mid-1980s, UK local bus industry broadly comparable to US transit industry:

- public ownership at local level
- heavily subsidized
- slowly declining ridership
- little innovation in technology, service, or management
- little responsiveness to public needs or concerns

Buses played a larger role than in US because of lower car ownership levels and higher car operating costs
Basic premises behind bus deregulation:

- deregulation would produce a competitive market
- competition would substantially reduce costs
- a competitive market would improve resource allocation
- there would be no significant negative side effects
Basic Elements of UK Bus Deregulation

- Bus markets were divided between commercial and non-commercial, with the following definitions and rules for each:

**Commercial**
- Defined as any service that an operator is prepared to offer with the only government support being
  - concessionary fares reimbursement
  - fuel tax rebate
- Services are registered including the route and timetable, and changes become effective after 6 weeks notice
- Fares can be changed with no prior notice
- Unrestricted entry and exit from the market
- Known as "Competition In the Market"
Non-Commercial

• Services which are not registered as commercial, but needed for social reasons as identified by local authorities

• Awarded to a private sector operator after a competitive bidding process for a period of (typically) three years
As a transitional strategy, public transport authorities were to be "corporatized," i.e., held at arm's length from government.

Could receive subsidy only as a result of success in a competitive bidding process.

Eventually they were to be privatized.

These large operations were not broken up into smaller competitive units.
London Strategy

• Deregulation not introduced in London because of concerns about:
  • the effects of free entry on congestion in Central London
  • rail system interaction effects
• London Transport (now Transport for London) opted to retain control over all planning functions but to move to privatization through competition for incremental pieces of the London bus network
• TfL controls routes, frequencies, quality standards, and fares
• Known as "Competition For the Market"
London Buses Reorganization

- Decentralization of London Buses Limited (LBL) operations, giving progressively more independence to LBL depots
- Put out to competitive bid about 10% of the bus network annually
- Awarding approximately 50% of competitive tenders to LBL subsidiaries with the remainder to independent private bus operators
- Used competitive pressure to induce LBL subsidiaries to restructure labor contracts and management strategy
- In 1994 all LBL subsidiaries were privatized
Table 1: Key bus operating statistics, GB and London, 1985/86 to 2004/2005

<table>
<thead>
<tr>
<th></th>
<th>Bus km (mil)</th>
<th>Pax trips (mil)</th>
<th>Subsidy</th>
<th></th>
<th>Operating costs per bus-km (in 2000 dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total £m</td>
<td>Per bus km</td>
<td>Per pax trip</td>
</tr>
<tr>
<td>London</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1985/1986</td>
<td>273</td>
<td>1152</td>
<td>£335</td>
<td>£1.23</td>
<td>£0.29</td>
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<tr>
<td>1989/1990</td>
<td>292</td>
<td>1188</td>
<td>£238</td>
<td>£0.82</td>
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<tr>
<td>1994/1995</td>
<td>356</td>
<td>1167</td>
<td>£177</td>
<td>£0.50</td>
<td>£0.15</td>
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<tr>
<td>1999/2000</td>
<td>365</td>
<td>1307</td>
<td>£134</td>
<td>£0.37</td>
<td>£0.10</td>
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<tr>
<td>2004/2005</td>
<td>450</td>
<td>1793</td>
<td>£601</td>
<td>£1.34</td>
<td>£0.34</td>
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<tr>
<td>GB Outside London</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1985/1986</td>
<td>1804</td>
<td>4489</td>
<td>£904</td>
<td>£0.50</td>
<td>£0.20</td>
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<tr>
<td>1989/1990</td>
<td>2150</td>
<td>3886</td>
<td>£682</td>
<td>£0.32</td>
<td>£0.18</td>
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<tr>
<td>1994/1995</td>
<td>2293</td>
<td>3253</td>
<td>£620</td>
<td>£0.27</td>
<td>£0.19</td>
</tr>
<tr>
<td>1999/2000</td>
<td>2234</td>
<td>2972</td>
<td>£613</td>
<td>£0.27</td>
<td>£0.21</td>
</tr>
<tr>
<td>2004/2005</td>
<td>2146</td>
<td>2944</td>
<td>£730</td>
<td>£0.34</td>
<td>£0.25</td>
</tr>
</tbody>
</table>

Source: Transport Statistics GB 2007 and earlier editions
Note: Subsidy includes concessionary fares payments; Operating Costs and Subsidies are in constant 1999/2000 prices

1.201, Lecture 19
Fall 2009
Table 2: Percentage change in key bus operating statistics with 1985/86 as base

<table>
<thead>
<tr>
<th></th>
<th>Bus km</th>
<th>Pax trips</th>
<th>Subsidy</th>
<th>Operating costs per bus-km (in 2000 dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total £m</td>
<td>Per bus km</td>
</tr>
<tr>
<td>London</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1989/1990</td>
<td>+7%</td>
<td>-3%</td>
<td>-29%</td>
<td>-33%</td>
</tr>
<tr>
<td>1994/1995</td>
<td>+30%</td>
<td>-1%</td>
<td>-47%</td>
<td>-59%</td>
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<tr>
<td>1999/2000</td>
<td>+34%</td>
<td>+13%</td>
<td>-63%</td>
<td>-72%</td>
</tr>
<tr>
<td>2004/2005</td>
<td>+65%</td>
<td>+56%</td>
<td>+80%</td>
<td>+9%</td>
</tr>
<tr>
<td>GB Outside London</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1989/1990</td>
<td>+19%</td>
<td>-13%</td>
<td>-25%</td>
<td>-36%</td>
</tr>
<tr>
<td>1994/1995</td>
<td>+27%</td>
<td>-28%</td>
<td>-31%</td>
<td>-46%</td>
</tr>
<tr>
<td>1999/2000</td>
<td>+24%</td>
<td>-34%</td>
<td>-32%</td>
<td>-46%</td>
</tr>
<tr>
<td>2004/2005</td>
<td>+19%</td>
<td>-34%</td>
<td>-19%</td>
<td>-32%</td>
</tr>
</tbody>
</table>

Source: Transport Statistics GB 2007 and earlier editions
Results of Bus Deregulation (1)

- Operating costs dropped significantly -- by about 50%, most of impact immediately after deregulation
- Bus kilometers of service increased substantially immediately after deregulation, but now again is in modest decline
- Fares rose significantly, particularly in major metropolitan areas
- Relatively little sustained on-the-street competition
• Great majority of services (80-85%) are operated in commercial regime
• Subsidies have declined by about 30% since deregulation
• Ridership has declined significantly since deregulation
• Subsidy per passenger has remained approximately constant despite major decline in subsidy per vehicle kilometer
• Perceptions of service instability
Typical Trajectory Following Deregulation

- Incumbent operator registered most of pre-existing network as commercial
- Reduced costs and raised entry cost by converting to minibuses
- Establishing a foothold for a new entrant via competitive bidding proved difficult
- Price competition proved to be ineffective relative to frequency competition
- Large bus holding companies emerged through mergers and acquisitions
- The urban bus market as it developed in the UK proved not to be truly contestable
- Local bus planning staff were largely eliminated
London Results

• Similarities:
  • Unit cost reductions in London are close to those attained outside London
  • Service provided increased by a similar amount to outside London

• Differences:
  • Ridership in London has experienced modest growth
  • Subsidy initially declined much more substantially in London
    than elsewhere -- prior to Congestion Charging effects
European Strategy

• Several major European cities adopted London-like schemes, e.g., Copenhagen, Stockholm

• Separation of public sector from direct operation is an accepted principal

• Contractual agreements developed between the planning and oversight agency (in the public sector) and the operators (in the private sector)
Organizational Models in the US

A. Traditional regional transit authority
B. Expanded regional transit authority
C. Split policy/operations: Single service providers
D. Split policy/operations: Multiple service providers

Industry Structure
 Remarkably little change since the early 1970s:

- regional transit authorities regulating, planning and directly operating most services
- principal use of private sector is in providing purchased services to transit authorities

<table>
<thead>
<tr>
<th>Mode</th>
<th>Directly Operated</th>
<th>Purchased</th>
<th>Total</th>
<th>% Purchased</th>
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<tbody>
<tr>
<td>Bus</td>
<td>15,923.0</td>
<td>1,893.4</td>
<td>17,816.4</td>
<td>10.6%</td>
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<tr>
<td>Heavy Rail</td>
<td>5,245.9</td>
<td>41.6</td>
<td>5,287.5</td>
<td>0.8%</td>
</tr>
<tr>
<td>Commuter Rail</td>
<td>3,547.6</td>
<td>223.8</td>
<td>3,771.4</td>
<td>5.9%</td>
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<tr>
<td>Light Rail</td>
<td>1,011.7</td>
<td>58.4</td>
<td>1,070.1</td>
<td>5.5%</td>
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<tr>
<td>Demand Response</td>
<td>1,175.0</td>
<td>1,921.7</td>
<td>3,096.7</td>
<td>62.1%</td>
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<tr>
<td>Total</td>
<td>26,903.2</td>
<td>4,138.9</td>
<td>31,042.1</td>
<td>13.3%</td>
</tr>
</tbody>
</table>

Source: American Public Transit Administration Fact Book 2008 (for 2006)
Use of Purchased Transit Services

• Dominant for demand-responsive service
• Little or none for urban rail services
• Modest for fixed route bus services
Fixed Route Bus Services

- Represents more than 50% of all services in the US
- Could clearly be operated efficiently and effectively by the private sector under contract
- The real potential for significant expansion for the private sector in transit
# BUSES OPERATING EXPENSE (2007: $ million)
(All agencies with Operating Cost > $100 million)

<table>
<thead>
<tr>
<th>City</th>
<th>Total Op Ex (incl PT)</th>
<th>Total PT</th>
<th>% PT</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEW YORK CITY TRANSIT</td>
<td>1,914.1</td>
<td>0.0</td>
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<tr>
<td>CHICAGO (CTA)</td>
<td>828.1</td>
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<td>0.0%</td>
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<td>NEW JERSEY</td>
<td>682.1</td>
<td>45.5</td>
<td>6.7%</td>
</tr>
<tr>
<td>WASHINGTON DC</td>
<td>469.9</td>
<td>4.9</td>
<td>1.1%</td>
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<tr>
<td>PHILADELPHIA</td>
<td>447.3</td>
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<td>0.0%</td>
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<tr>
<td>SEATTLE</td>
<td>405.9</td>
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<td>8.1%</td>
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<tr>
<td>MTA BUS</td>
<td>339.1</td>
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<td>0.0%</td>
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<tr>
<td>MIAMI</td>
<td>309.3</td>
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<td>SAN FRANCISCO</td>
<td>307.5</td>
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<td>0.0%</td>
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<td>BOSTON</td>
<td>306.3</td>
<td>5.8</td>
<td>1.9%</td>
</tr>
<tr>
<td>HOUSTON</td>
<td>267.9</td>
<td>35.7</td>
<td>13.3%</td>
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<tr>
<td>PITTSBURGH</td>
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<td>OAKLAND</td>
<td>253.3</td>
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<tr>
<td>DENVER</td>
<td>251.2</td>
<td>77.0</td>
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<td>BALTIMORE</td>
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<td>13.7%</td>
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<tr>
<td>MINNEAPOLIS-ST PAUL</td>
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<td>DALLAS</td>
<td>206.8</td>
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<td>0.0%</td>
</tr>
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## BUSES OPERATING EXPENSE (2007: $ million)
(All agencies with Operating Cost > $100 million)

<table>
<thead>
<tr>
<th>City</th>
<th>Total Op Ex (incl PT)</th>
<th>Total PT</th>
<th>% PT</th>
</tr>
</thead>
<tbody>
<tr>
<td>PORTLAND</td>
<td>203.2</td>
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<td>SANTA CLARA</td>
<td>196.5</td>
<td>2.6</td>
<td>1.3%</td>
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<tr>
<td>ORANGE COUNTY</td>
<td>194.8</td>
<td>4.1</td>
<td>2.1%</td>
</tr>
<tr>
<td>DETROIT</td>
<td>174.6</td>
<td>0.0</td>
<td>0.0%</td>
</tr>
<tr>
<td>CLEVELAND</td>
<td>164.0</td>
<td>0.0</td>
<td>0.0%</td>
</tr>
<tr>
<td>ATLANTA</td>
<td>162.1</td>
<td>0.0</td>
<td>0.0%</td>
</tr>
<tr>
<td>HONOLULU</td>
<td>137.9</td>
<td>135.4</td>
<td>98.2%</td>
</tr>
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<td>CHICAGO (PACE)</td>
<td>130.3</td>
<td>12.3</td>
<td>9.5%</td>
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<td>MILWAUKEE</td>
<td>127.6</td>
<td>2.0</td>
<td>1.6%</td>
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<td>NYC DOT</td>
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<td>99.0%</td>
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<td>PHOENIX</td>
<td>115.7</td>
<td>89.6</td>
<td>77.5%</td>
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<td>ST LOUIS</td>
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<td>0.0%</td>
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<td>LONG ISLAND BUS</td>
<td>110.2</td>
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<td>0.0%</td>
</tr>
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<td>LAS VEGAS</td>
<td>105.7</td>
<td>76.1</td>
<td>72.0%</td>
</tr>
<tr>
<td>WESTCHESTER CO., NY</td>
<td>104.8</td>
<td>95.1</td>
<td>90.7%</td>
</tr>
<tr>
<td>AUSTIN</td>
<td>102.5</td>
<td>13.8</td>
<td>13.5%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>9954.0</strong></td>
<td><strong>779.2</strong></td>
<td><strong>7.8%</strong></td>
</tr>
</tbody>
</table>


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Largest 33 Bus Operators

- Less than 8% of bus service is currently provided under purchase of service arrangements
- 16 of 33 agencies do not provide any purchased bus service
- Only 9 agencies provide more than 10% of bus services under contract: New York City (Department of Transportation), Honolulu, Westchester Co, Phoenix, Las Vegas, Denver, Baltimore, Austin, and Houston
Agencies Using Purchased Services Extensively Fall Into Three Groups

- Agencies which took over financial responsibility for franchise operators: New York City Department of Transportation
- Agencies taking over franchised services and/or expanding services through purchase agreements: Baltimore (MTA), and Chicago (PACE)
- Agencies required to transfer core services to purchased service arrangements: Denver
Prospects for the Future

Key ingredients for private sector participation:

• service is new and different
• external intervention
• incomplete assimilation of private operators

Direct transit authority operation is highly stable in North America:

• small leverage for central government; 13(c) labor protection clause
• at state/local levels of government organized labor is a powerful force likely to resist change
• confrontational/ideological nature of the debate
Possible Strategies

- Development of non-confrontational, incremental change proposals
- Contingency plans
- Replacement of marginally performing routes by contracted van or minibus service
- Develop a database on results of initiatives by credible agency
- Split policy board from operating functions
- Corporatization and privatization of bus depots in large metropolitan areas
Public/Private Roles in Rail Systems

Inter-city Rail:
- Japan (late 1980s)
- Argentina (mid 1990s)
- British Rail (late 1990s)

Urban Rail:
Japan

- JNR was privatized in 5 geographical units with vertical integration - internal restructuring approach
- Surplus labor was not transferred
- Government takes the lead in new high-speed rail infrastructure
- JR (East, Central, etc.) have to operate at a profit
- Government controls fare levels
- Viewed as a successful model
Argentina

• National, regional rail and subway system serving Buenos Aires with
  – massive fare evasion
  – excess labor and many "no show" employees
  – inadequate maintenance
  – no investment
  – strong labor unions

• Restructured as 7 separate bid packages with vertical integration

• Public sector owns facilities and sets fares, schedules, investment requirements

• Contractor keeps fare revenue

• 20-year concessions agreements

• Subsidy to be continued with awards based on minimum subsidy bid
Argentina (cont'd)

- Required at least 2 operators so competition threat remained
- World Bank funded buyout of excess labor
- Broad outreach to solicit interested bidders
- Lengthy bidding and transition process harmed the system

Immediate (1-year) results:
- Improved quality, fare collection and ridership up by 30%

 Longer-term (10-year) results:
- All but one concessionaires had filed for protection from creditors
- Non-cooperation on unified fare system
- Lobbying to change contract terms and duration
- Quantity and quality of public monitoring function eroded
- Government late on payments
Premises Underlying British Rail Restructuring

- markets, contracts, and regulation would serve better than a central unit making top-down decisions
- the private sector would provide better service
- separation from Government would free the railways from Treasury restrictions
- vertical integration was not the required model
- the railways would be profitable
British Rail

- British Rail restructured into ~100 separate companies (vertical segmentation) including:
  - Train Operating Companies (TOCs) (28 total)
  - Rolling Stock Leasing Companies (3 total)
  - Infrastructure company

- Oversight from the Office of the Rail Regulator
- TOC concessions awarded for seven-year terms with subsidy built in
- Infrastructure company, originally Railtrack, was a shareholder-owned company with assets transferred from the government and income from TOC access charges
  - Railtrack did an inadequate job on maintenance and ended up going out of business
- Replaced by Network Rail as a public entity
The Privatized Structure (simplified)

<table>
<thead>
<tr>
<th>Government</th>
<th>Regulators</th>
<th>Operators</th>
<th>Suppliers</th>
<th>Suppliers</th>
</tr>
</thead>
<tbody>
<tr>
<td>HSE</td>
<td>ORR</td>
<td>Railtrack</td>
<td>Infrastructure</td>
<td>Sub-contractors</td>
</tr>
<tr>
<td>DTP</td>
<td>Opraf</td>
<td>TOCs</td>
<td>maintenance</td>
<td>Rolling stock</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Roscos</td>
<td>maintenance</td>
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<td></td>
<td></td>
<td></td>
<td>Passengers and</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>freight</td>
<td></td>
</tr>
</tbody>
</table>
British Rail Restructuring Results

• accident rates have continued long-term decline
• passenger km increased by 38% since privatization
• train services have increased by 20%
• more imaginative pricing and promotion
• declines in reliability due to deteriorating infrastructure
• substantial increases in operations cost
• increased subsidies - from £1 bill/yr to £3-4 bill/yr
• maybe vertical integration benefits outweigh the costs
## PPP Approaches in Urban Rail Systems

<table>
<thead>
<tr>
<th>OPERATIONS</th>
<th>Public</th>
<th>Private</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Public</strong></td>
<td>Public Provision (USA)</td>
<td>London Underground</td>
</tr>
<tr>
<td><strong>Private</strong></td>
<td>Operating Concessions (Buenos Aires, Rio, San Juan)</td>
<td>DBFO (Kuala Lumpur)</td>
</tr>
<tr>
<td></td>
<td>Share Issue Privatization (Singapore)</td>
<td>Share Issue Privatization (Hong Kong)</td>
</tr>
</tbody>
</table>
London Underground PPP Background

- Public provision and financing dominant until last few years
- Long-term inadequacy of investment and annual funding cycle led to chronic operations and maintenance problems
- Poor project management track record in LUL
- Kings Cross fire in 1987 highlighted operational and cultural problems in LUL
London Underground PPP

• Operation of Underground remains responsibility of LUL - a public sector entity

• Three infrastructure companies awarded long-term (30-year) concessions to finance, improve, and maintain the rolling stock and infrastructure
  – produce £8 bill of infrastructure investment in 15 years
  – Tube Lines and Metronet consortium selected
  – NPV of £16 billion with set-up cost of £455 million

• Approach was highly controversial, with LUL transferred to TfL in 2003 after the contracts had been signed
London Underground PPP Performance Measures

1. Contractual Performance Measures: actual performance
   • Availability – measured by lost customer hours
   • Capability – long-term capacity and journey times
   • Ambience – quality of travelling environment measured by MSS

2. Maintenance and Asset Performance Measures
   • Rolling stock – MMBF
   • Average duration of delays > 2 mins
   • Lift and escalators – time between failures, avg time to repair

3. Renewals and Upgrades
   • Track renewal
   • Lift and escalator replacement
   • Station enhancements
   • Line upgrades

• New heavy rail/metro system for San Juan metropolitan area
• Design-Build-Operate-Maintain approach taken
• Public sector controls schedules and fares and retains fare revenue, but with operator revenue incentive
• Aggressive outreach for consortia to bid on RFP
Tren Urbano Master Plan

Figure by MIT OpenCourseWare.
Alignment by Segments – Phase I

Total Cost = $1.67 Billion
Total Length = 17.2 Km
Phase I = 16 Stations
Elevated = 52%
At or near grade = 40%
Underground = 8%

Figure by MIT OpenCourseWare.
## Tren Urbano Phase I - Summary

<table>
<thead>
<tr>
<th>Segment</th>
<th>Length</th>
<th>Stations</th>
<th>Investment ($ MM)</th>
<th>Finish</th>
<th>Consortium</th>
</tr>
</thead>
</table>
| 1 Bayamón | 2.9 KM | 1 Bayamón  
2 Deportivo | 78 | 4/2001 | Grupo Metro San Juan |
| 2 Río Bayamón | 1.7 KM | 3 Jardínes | 42 | 3/2001 | Redondo-Entrecanales |
| 3 Torrimar/ Las Lomas | 2.6 KM | 4 Torrimar  
5 Martínez Nadal | 656 | 5/2002 | Siemens Transit Team |
| 4 Centro Médico | 2.5 KM | 6 Las Lomas  
7 San Francisco  
8 Centro Médico | 81 | 6/2001 | Redondo-Entrecanales |
| 5 Villa Nevárez | 1.9 KM | 9 Cupey | 78 | 8/2001 | Redondo-Entrecanales |
| 6 Río Piedras | 1.8 KM | 10 Río Piedras  
11 Universidad | 279 | 5/2001 | Grupo Kiewit |
| 7 Hato Rey | 3.6 KM | 12 Piñero  
13 Domenech  
14 Roosevelt  
15 Hato Rey  
16 Sagrado Corazón | 134 | 10/2001 | Necso-Redondo |
Tren Urbano: Short-term Results

- Successful in getting construction underway quickly compared with traditional approach
- Operator's perspective influenced the design
- Many interfaces created major problems
- Inadequate public sector oversight of construction process
- Major contractor problems resulted in significant delays and cost overruns
- Ridership far below prediction (40K vs 115K pass/day) because of lack of system integration