Bike sharing: affordable convenience or unaffordable luxury?

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Outline

Bike sharing: the concept

What are the costs and benefits associated with bike sharing? What is the evidence?

International examples, including Bike in Bath (CIVITAS Renaissance)

Overlooked benefits & conclusion
Bike sharing

- Network of publicly available bicycles
- Unattended
- Short term hire
- Smart card operation
- Different types of memberships available
- Planned or spontaneous journeys
Bike in Bath

“it’s time to ride”

Launched 15th Sept 2011
70 bikes (40 in operation)
4 stations

http://www.bikeinbath.com
Bike sharing: evolution

“There are two types of mayors in the world: those who have bike sharing and those who want bike sharing”

Mayor of Lyon

Source: http://bike-sharing.blogspot.co.uk/
By Paul DeMaio
Source: http://bike-sharing.blogspot.co.uk/
By Paul DeMaio
## Bike sharing systems: examples

<table>
<thead>
<tr>
<th></th>
<th>Bikes</th>
<th>Stations</th>
<th>Trips generated</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>London</strong></td>
<td>8,300</td>
<td>570</td>
<td>Over 21M (since Dec 2010)</td>
</tr>
<tr>
<td>(Barclays Cycle Hire)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Paris</strong></td>
<td>20,000</td>
<td>1,800</td>
<td>1M in first 18 days, 50M in first 2 years</td>
</tr>
<tr>
<td>(Velib)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Barcelona</strong></td>
<td>6,000</td>
<td>400</td>
<td>n/a</td>
</tr>
<tr>
<td>(Bicing)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Montreal</strong></td>
<td>5,050</td>
<td>405</td>
<td>n/a</td>
</tr>
<tr>
<td>(Bixi)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Bath</strong></td>
<td>40 operating (70 in total)</td>
<td>4</td>
<td>764 (in 12 month trial period)</td>
</tr>
</tbody>
</table>
Financing bike sharing

**Subsidy:**
Direct funding, advertising contracts, sponsorships, parking & congestion charges

**Revenues**
- Members fees
- Usage charges
- Advertising

**Costs**
- Capital costs
- Operating costs
Stakeholders

Examples:

**Bath:** Local authority (B&NES) + bike sharing provider (Comunicare), EU funding

**Paris/Barcelona:** Local authority + advertising company (JCDecaux/Clear Channel), subsidy masked as lost gains from ad space

**London:** Local transport agency (TfL) + service company (SERCO), Barclays Bank sponsorship, local funding
Bike sharing costs

**Capital costs:**
- bikes, stations, software system, smart cards, distribution vehicles, installation
  - $3,000-4,400 per bike ($1,868-2,740) DeMaio (2009)
  - € 2,500-3,000 per bike (£ 2,040-2,450) Obis (2011)

**Operating costs:**
- maintenance, distribution, staff, insurance, office space, storage facilities, website, insurance, electricity
  - $1,600 (£ 997) per bike per year DeMaio (2009)
  - € 1,500-2,500 per bike per year (£ 1,225-2,040) Obis (2011)
# Bike sharing members’ fees

<table>
<thead>
<tr>
<th>Location</th>
<th>Daily fee</th>
<th>Weekly fee</th>
<th>Annual fee</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>London</strong></td>
<td>£2 (was £1)</td>
<td>£10 (was £5)</td>
<td>£90 (was £45)</td>
</tr>
<tr>
<td>(Barclays Cycle Hire)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Paris</strong></td>
<td>€1.70</td>
<td>€8</td>
<td>€29</td>
</tr>
<tr>
<td>(Velib)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Barcelona</strong></td>
<td>n/a</td>
<td>n/a</td>
<td>€46.46</td>
</tr>
<tr>
<td>(Bicing)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Montreal</strong></td>
<td>$7</td>
<td>n/a</td>
<td>$80.50</td>
</tr>
<tr>
<td>(Bixi)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Bath</strong></td>
<td>£8/9</td>
<td>n/a</td>
<td>£35</td>
</tr>
<tr>
<td>(Bike in Bath)</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
A controversial example: Barclays Cycle Hire

• Serco contract (installation & operation): £140M over 6 years - **£23.3M per year**

• Barclays funding: £50M over 8 years - **£6.25M per year**

• Revenues:
  – £323,545 in first 96 days (published)
  – About **£3M per year** (my calculation from members’ fees only)

Budget deficit: **£14.05M per year**

Forecasted revenues in 2009:
£110M in three years i.e. **£36.7M per year**
### Benefits of bike sharing

<table>
<thead>
<tr>
<th>Direct benefits</th>
<th>Indirect benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increasing cycling modal share</td>
<td>Making cycling more visible</td>
</tr>
<tr>
<td>Additional mobility option/Improving accessibility</td>
<td>Encouraging cycling infrastructure development</td>
</tr>
<tr>
<td>Reducing congestion</td>
<td>Liveable streets</td>
</tr>
<tr>
<td>Managing public transport demand</td>
<td>Savings due to reduction of car infrastructure</td>
</tr>
<tr>
<td>Increasing attractiveness for tourists</td>
<td>Positive city image</td>
</tr>
<tr>
<td>Advertising opportunities</td>
<td>Improving cycling safety</td>
</tr>
<tr>
<td>Health benefits</td>
<td>Reducing CO2 emissions</td>
</tr>
<tr>
<td>Employment opportunities</td>
<td>Wider health benefits</td>
</tr>
</tbody>
</table>

**Source:** Obis, Optimising bike sharing in EU cities (2011)
Increasing cycling mode share

- DeMaio (2009), in J Pub Transp:
  - **Paris**: from 1% in 2001 to 2.7% in 2007 (before Velib)
  - **Barcelona**: from 0.75% in 2005 to 1.76% in 2007 (before Bicing)

- Shaheen et al (2010), in TRR:
  - **Paris**: bicycle riding increased by 70% (as result of Velib)
  - **Lyon**: bicycle riding increased by 44% (as result of VeloV)

- Rojas-Rueda et al (2011), in BMJ:
  - Average increase in cycling is 3% as result of bike sharing
  - **Barcelona**: 30% increase in No of cycling trips

Contradicting evidence
Problem of attribution
No robust evaluation conducted
Health benefits

Rojas-Rueda et al (2011) The health risks and benefits of cycling in urban environments compared with car use: health impact assessment study, *BMJ*

- Focused on Bicing (Barcelona)
- Benefit to risk ratio: 77 to 1
- Total No of annual deaths avoided: 12.28

Fishman (2011), reply to BMJ

“Evaluating the benefits of PBS needs to be undertaken carefully”

- Data on travel mode shifts as a result of Bicing could not be found
- Flawed assumption that 90% Bicing trips replaced car trips (9.6%)
- Does not consider effects from replaced walking trips (26.1%)
Decreasing CO2 emissions

- DeMaio (2009), in J Pub Transp:
  - **Montreal**: 3M pounds CO2 saved in a year
  - **Lyon**: 18.6M pounds CO2 saved since inception

- Rojas-Rueda et al (2011), in BMJ:
  - **Barcelona**: 9M Kg CO2 saved per year

Tendency to overestimate car trip substitution rate
Misleading figures
## Car trip substitution: evidence?

<table>
<thead>
<tr>
<th>Trip replaced</th>
<th>Bicing Barcelona</th>
<th>VeloV Lyon</th>
<th>Call a bike Berlin</th>
<th>Capital Bikeshare VA, USA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Car</td>
<td>9.6%</td>
<td>7%</td>
<td>3.6%</td>
<td>7% (+6% taxi)</td>
</tr>
<tr>
<td>Public transport</td>
<td>55.1%</td>
<td>50%</td>
<td>25.8%</td>
<td>45%</td>
</tr>
<tr>
<td>Walking</td>
<td>26.1%</td>
<td>37%</td>
<td>21.4%</td>
<td>31%</td>
</tr>
<tr>
<td>Other bike</td>
<td>6.3%</td>
<td>4%</td>
<td>7.6%</td>
<td>6%</td>
</tr>
<tr>
<td>New trip</td>
<td>2.8%</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>
Evidence from Bike in Bath

Please think about the LAST TRIP you made using a Bike in Bath bicycle. Had Bike in Bath NOT existed, how would you have made that trip?

- 28% Would not have made the trip
- 7% Cycled with own bicycle
- 3% Walked
- 59% By bus
- Other (please specify)

As a result of using Bike in Bath, have you changed how often you use the following types of transport?

- Car: significantly reduced use (3), slightly reduced use (2), no change (22), slightly increased use (9), significantly increased use (5)
- Bus: significantly reduced use (2), slightly reduced use (2), no change (22), slightly increased use (9), significantly increased use (5)
- Cycling: significantly reduced use (2), slightly reduced use (2), no change (22), slightly increased use (9), significantly increased use (5)
- Walking: significantly reduced use (2), slightly reduced use (2), no change (22), slightly increased use (9), significantly increased use (5)
Bike sharing: summary

- Considerable capital and operating costs
- Comparably lower revenues
- Subsidy needed
- General lack of evidence on impacts
- Available evidence on benefits not robust

Are we looking for benefits in the wrong places? Have we missed something?
Overlooked benefits? (1)

**Improving accessibility:**
- 89% Velib users agreed that BS made it easier to travel through Paris
- 79% users in Washington DC agreed that BS was faster or more convenient than other options
- 85% Capital Bikeshare users joined to get around more easily and faster

**Increased spending in businesses/shops around the stations**

Shoner et al. on Minnesona Nice Ride bike sharing
Overlooked benefits? (2)

Increasing cycling visibility and improving its image
Sherwin & Parkhurst (2009)

“Bike sharing is a way our cities communicate about themselves showing that they are vibrant and trendy”
Frédéric Héran, Lille University (quoted by DeMaio)

Thank you!