Bus vs. Rail vs. ?
How Do We Get the Most Bang for Our Transit Investment Buck?

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An Evaluation Framework: *Some Thinking Points*

- What are the problems that investments in buses or rail transit seek to address?
  - Traffic congestion?
  - Mobility for those without? (because of age, income, or disability)
  - Air pollution, energy consumption?
  - Deserve our share of federal $$$?
  - All great cities have rail transit?

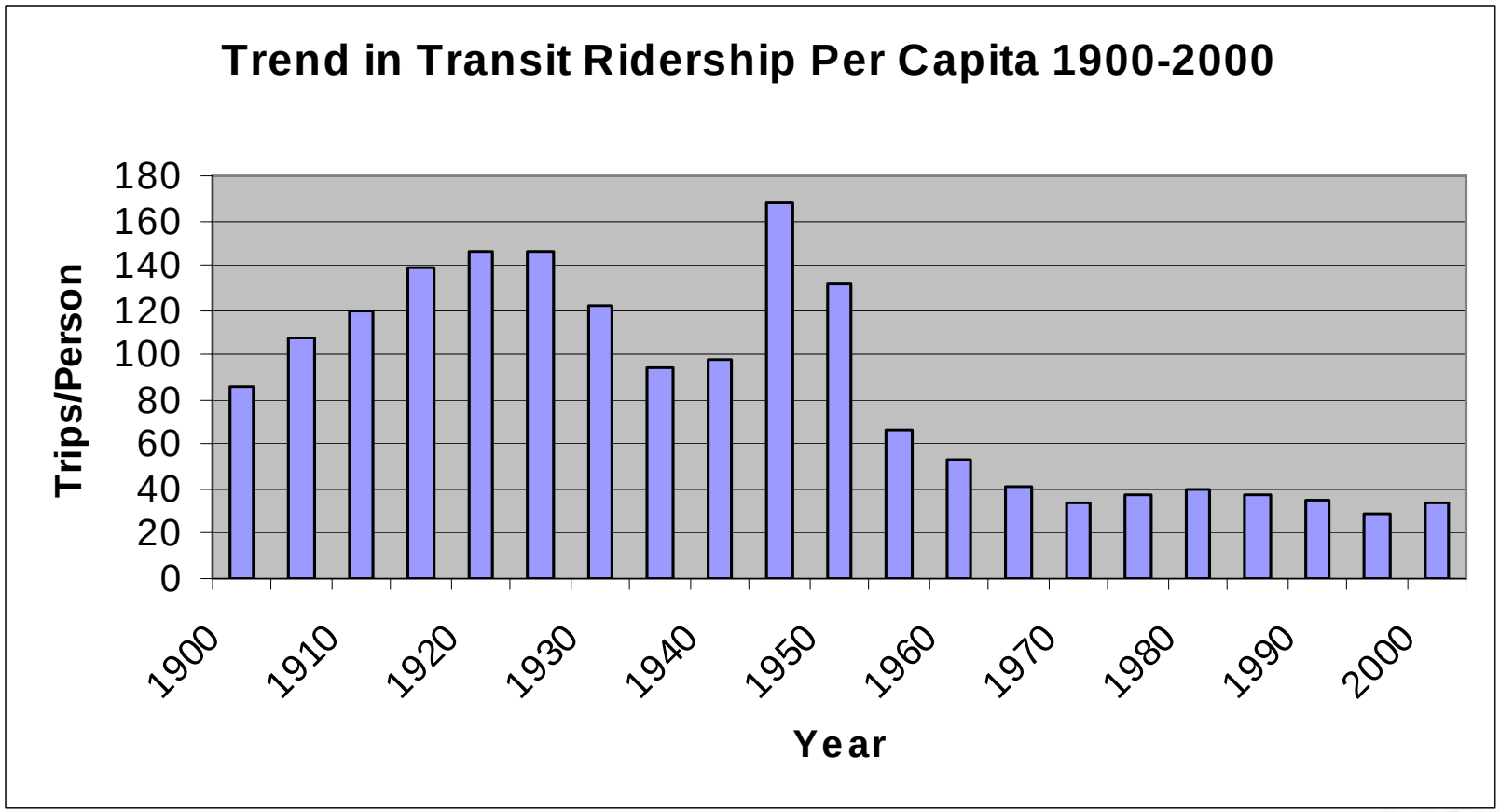
An Evaluation Framework: *Some Thinking Points*

- Do the problem definition and proposed solutions match in scope and scale?
  - Congestion levels are increasing across the road network…
  - Regulating auto use is unpopular…
  - Let's try to lure more drivers onto public transit...
  - Rail lines and busways are dramatic and sexy
    - they are more likely to interest drivers than boring old buses
    - Even if they cover just a tiny fraction of possible origins and destinations

An Evaluation Framework: *Some Thinking Points*

- Do advocates tend to define the problems in terms of their preferred solutions?
  - The *problem* is that Honolulu doesn't have rail transit (major league sports franchise, new airport, stadium with luxury boxes, etc.)
- Or…
  - Traffic congestion is a serious problem; what are the most cost-effective ways (transit or otherwise) to address this problem?

Transit use nationwide is relatively flat, despite substantial increases in investment



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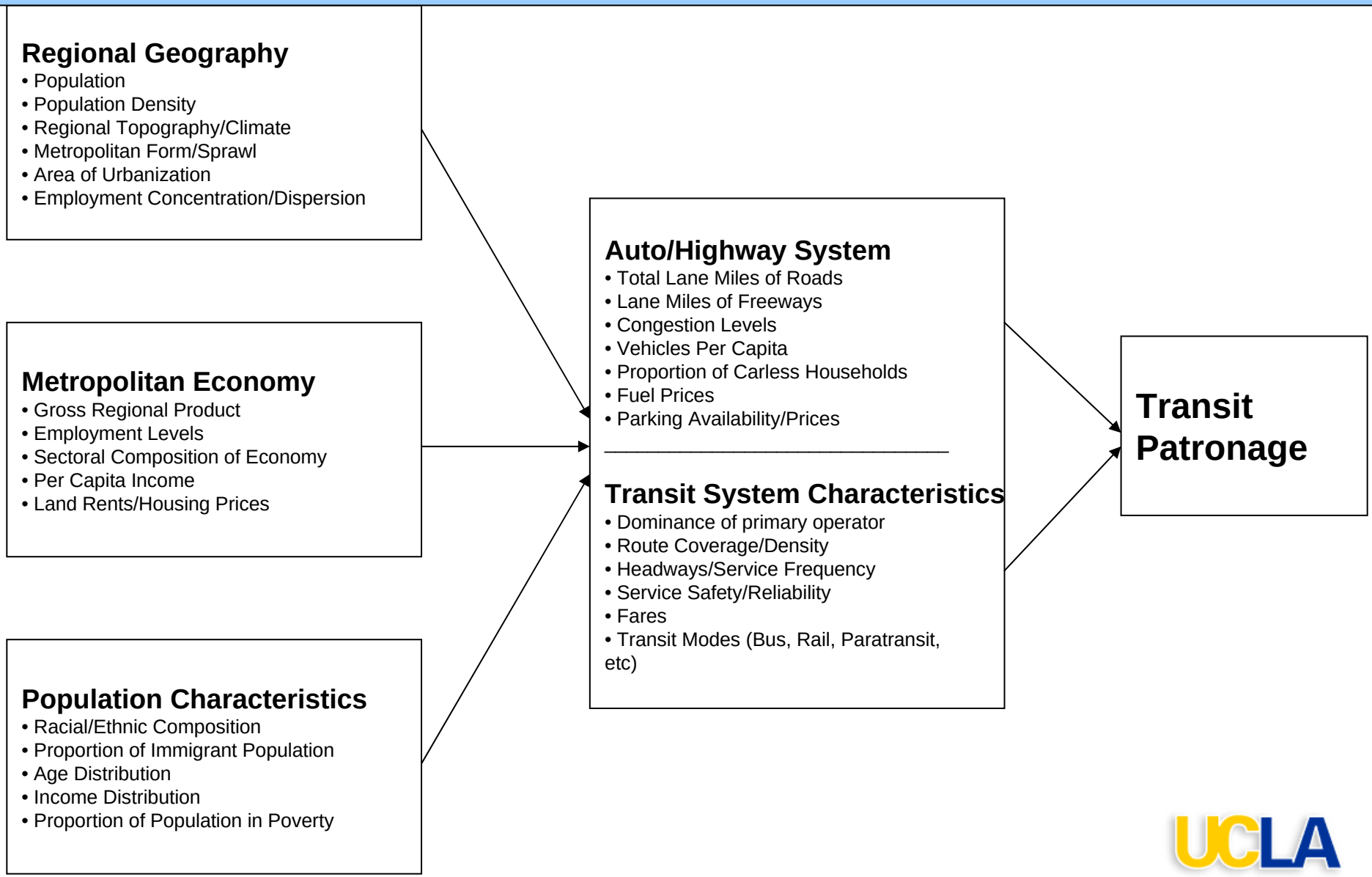
So What Explains Transit Ridership?

What Explains Transit Ridership?



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Driving and Transit Use Nationwide

- Between 1993 and 2003…
  - Travel on freeways increased almost 10 times faster (35.4% to 3.6%) than new freeway mileage
  - Rail transit patronage increased more slowly (23.1% to 26.7%) than new rail transit service
  - Inflation-adjusted government subsidies of transit (57.1%) increased much, much faster than total transit patronage (11.0%)

Investments today focus on transit

- Public transit
  - 20% of all government surface transportation expenditures today
  - 3% of all metropolitan person trips
- In Los Angeles
  - 55% of all government surface transportation expenditures through 2030
  - Transit's share of travel project to increase from 3% to 4%

Transit in Honolulu – 1998 to 2003

- Service hours (+13.4%), total inflation-adjusted expenditures (+8.0%), and inflation-adjusted expenditures per passenger (+12.1%) are up

- Total ridership (-3.7%) and passengers per service hour (-15.1%) are down

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- Public regulation discourages pricing (fare) innovation
- Work rules conflict with increasing demand peaking
- Pressure to expand service as cities grow
- Chronic overcapitalization
  - Focus on tracks and concrete, when rubber and asphalt will do
  - The “ribbon-cutting” problem

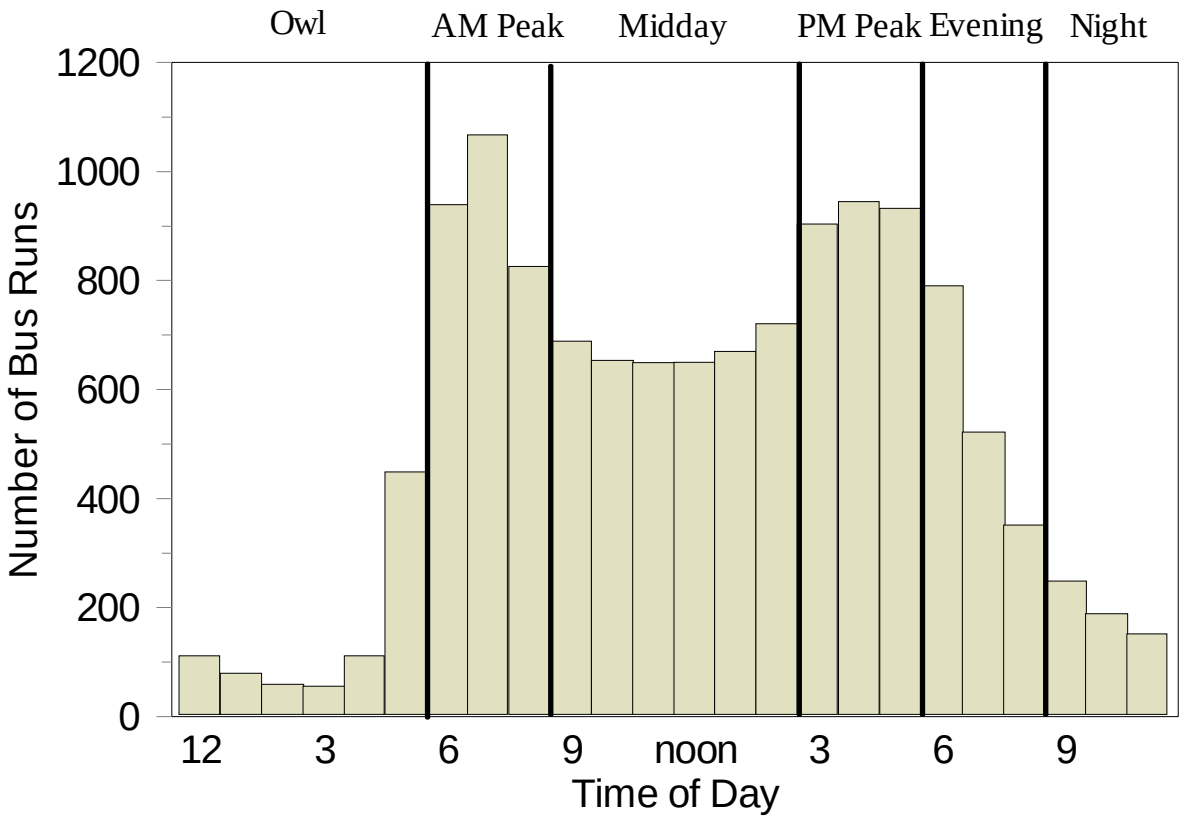
Subsidies and the Four Dimensions of Transit Costs

- Nationwide, taxpayers subsidize approximately 2/3 (65.3%) of transit costs.
- Close to 100 percent of transit capital costs are subsidized.
- Over half (58%) of transit operating costs are subsidized.
  - Fares cover 23% of operating costs on "TheBus," and none of the capital costs

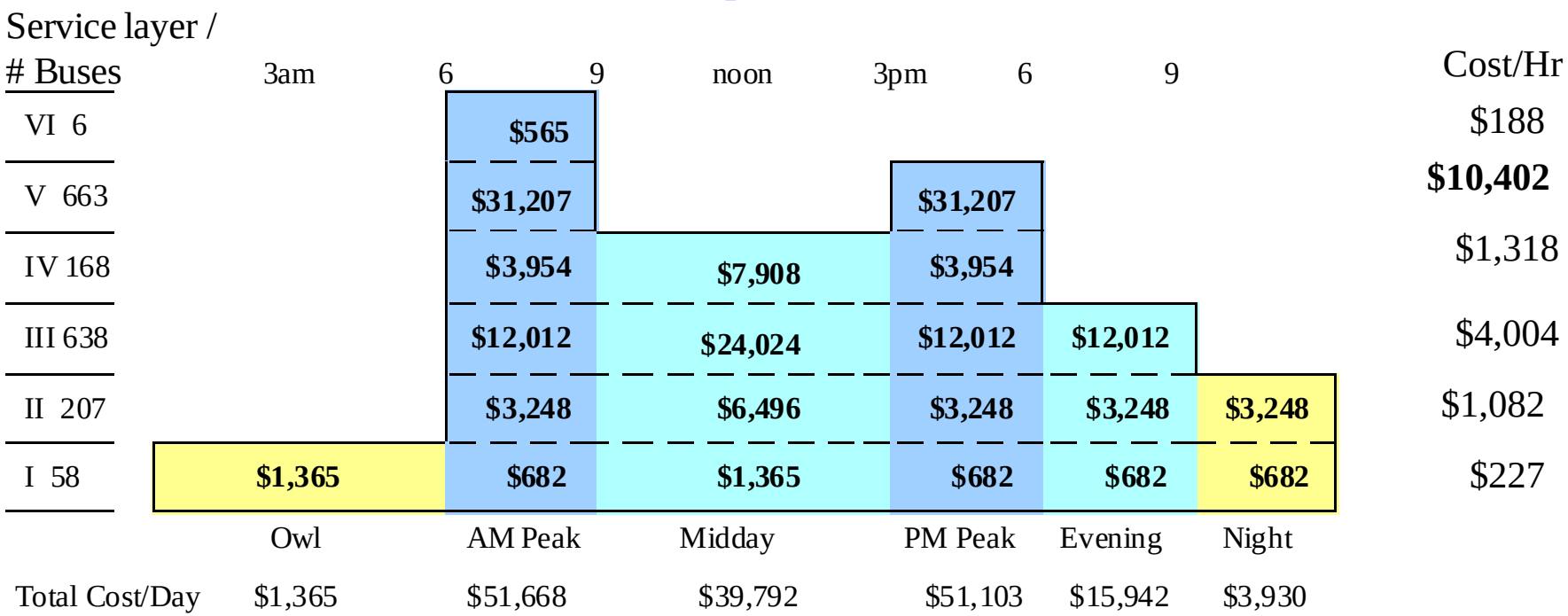
Subsidies and the Four Dimensions of Transit Costs

- Such aggregate data, however, mask the variable nature of transit costs, which vary by:
  - **Peak versus off-peak travel**
  - **Peak direction versus backhauls**
  - **Trip length**
  - **Transit mode**

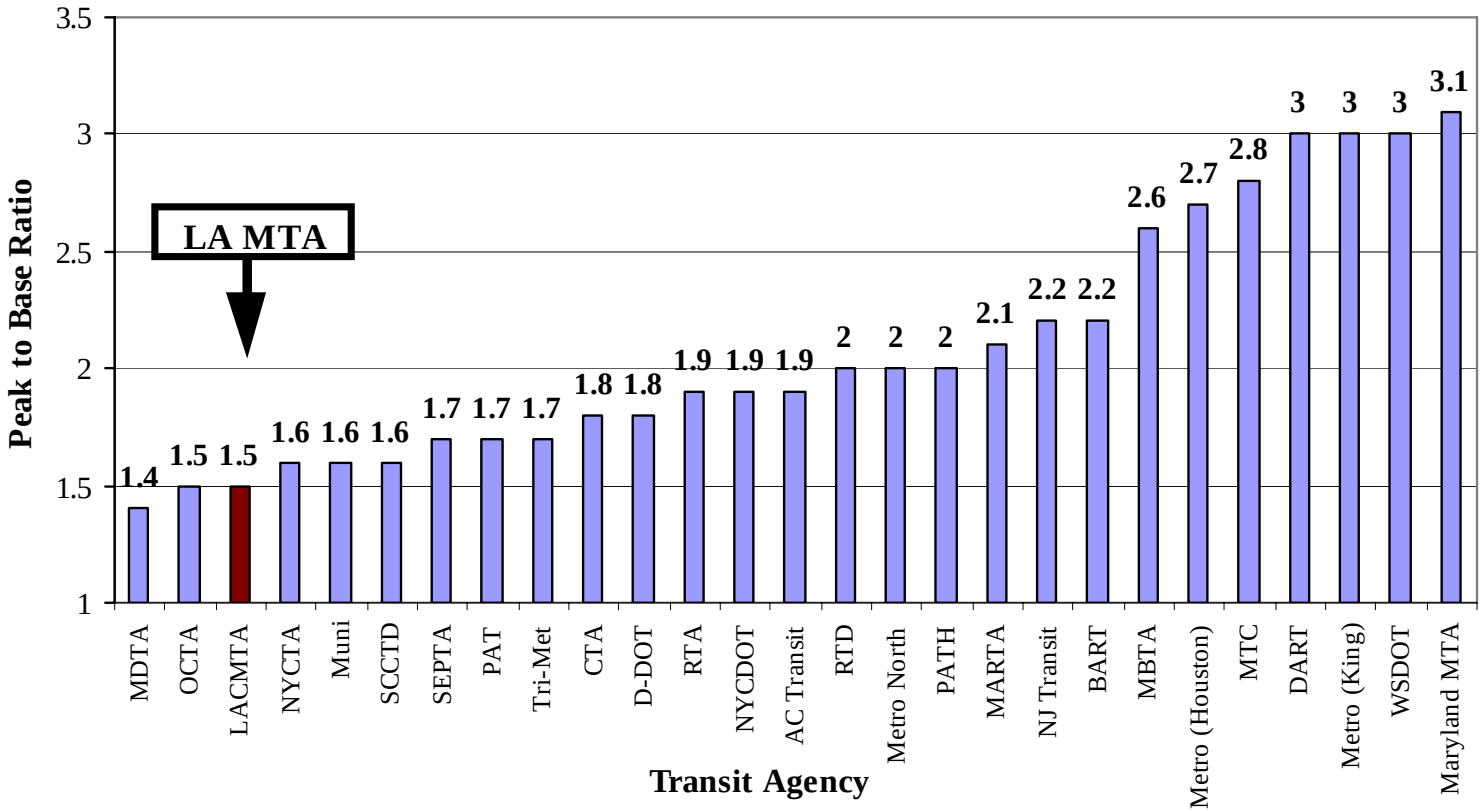
Time-of-Day Variation in Service Levels: Los Angeles MTA



Marginal Cost Approach to Allocating Vehicle Capital Costs



Peak/Base Ratios of the Twenty-Seven Largest Transit Operators (Honolulu = 2.74)



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Peak direction versus backhauls

- Transit demand varies by direction too
  - Demand tends to be highest:
    - Inbound in the morning, and outbound in the afternoon
  - Directional peaking is most pronounced on express bus and commuter rail lines
    - Thus, peak hour, peak direction commuter services tend to be most expensive transit trips

Trip length

- Longer trips are more expensive to serve than shorter trips.
  - Exacerbated by “flat fares” that do not vary whether a passenger rides two blocks or ten miles.

Transit Mode

- The very high capacities of rail transit works best in very densely developed, congested corridors where parking is limited and expensive
  - like those found in Manhattan, Mexico City, Hong Kong, and Tokyo

Transit Mode

- Elsewhere, buses are generally less expensive to purchase and operate than rail transit.
  - New RapidBus services realize some of the operating benefits of rail at much lower costs

>> Though the trend in BRT is toward capital-intensive “light rail lite” projects, rather than cost-effective incremental improvements to local bus service

Honolulu

- It’s not Tokyo or Hong Kong, but the physical boundaries and high densities make Honolulu a “transit-friendly” city

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The Most and Least Densely-Settled Large (500,000+) Urbanized Areas in 2001

RANK	URBANIZED AREA NAME	STATE	ESTIMATED POPULATION (1,000)	NET LAND AREA (SQ. MILES)	PERSONS PER SQUARE MILE
1	**Los Angeles**	**CA**	**12,770**	**2,231**	**5,724**
2	**Honolulu**	**HI**	**694**	**135**	**5,141**
3	San Juan	PR	1,306	274	4,766
4	Las Vegas	NV	1,256	270	4,652
5	San Jose	CA	1,655	365	4,534
6	New York-Northeastern NJ	NY	17,146	3,962	4,328
65	Kansas City	MO	1,427	1,036	1,377
66	Jacksonville	FL	886	727	1,219
67	Sarasota-Bradenton	FL	550	464	1,185
68	Nashville	TN	669	571	1,172
69	Birmingham	AL	663	609	1,089

Source: Highway Statistics, 2002

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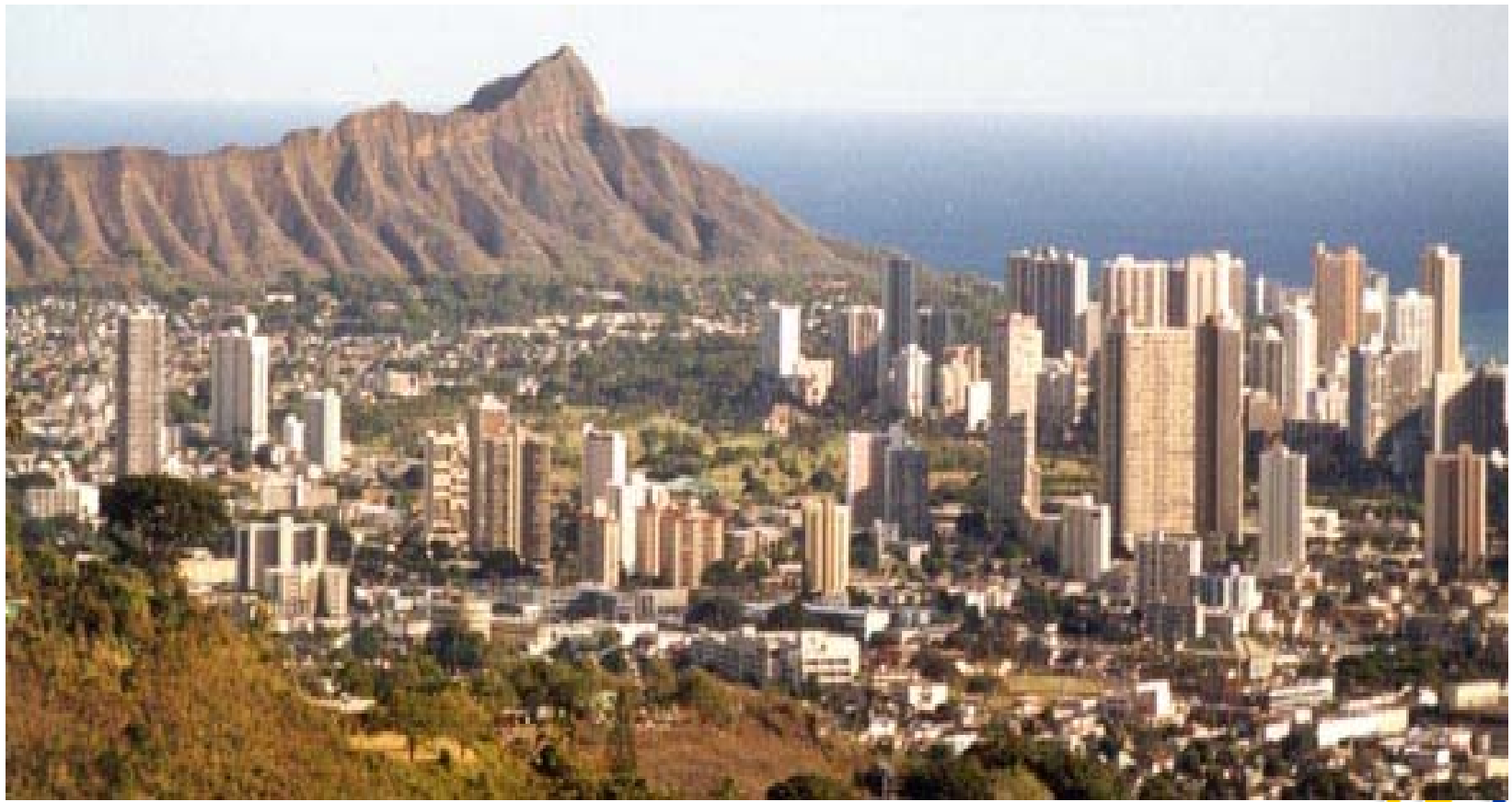
Many cities have downtown high-rises, but Honolulu is blessed (from a transit perspective) with high residential and visitor densities as well



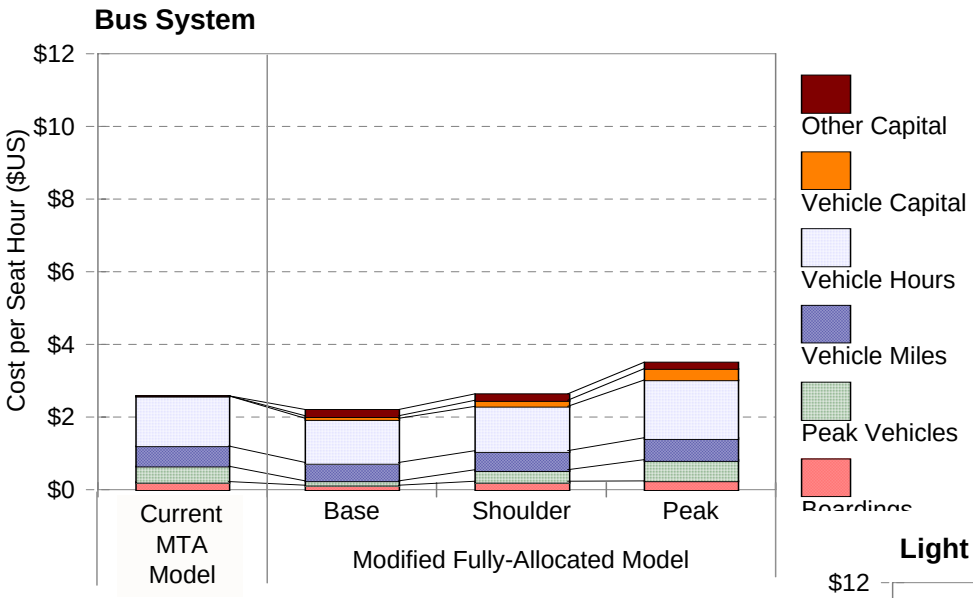
Large Urbanized Areas with the Most/Least 2001 per Capita Vehicle Travel

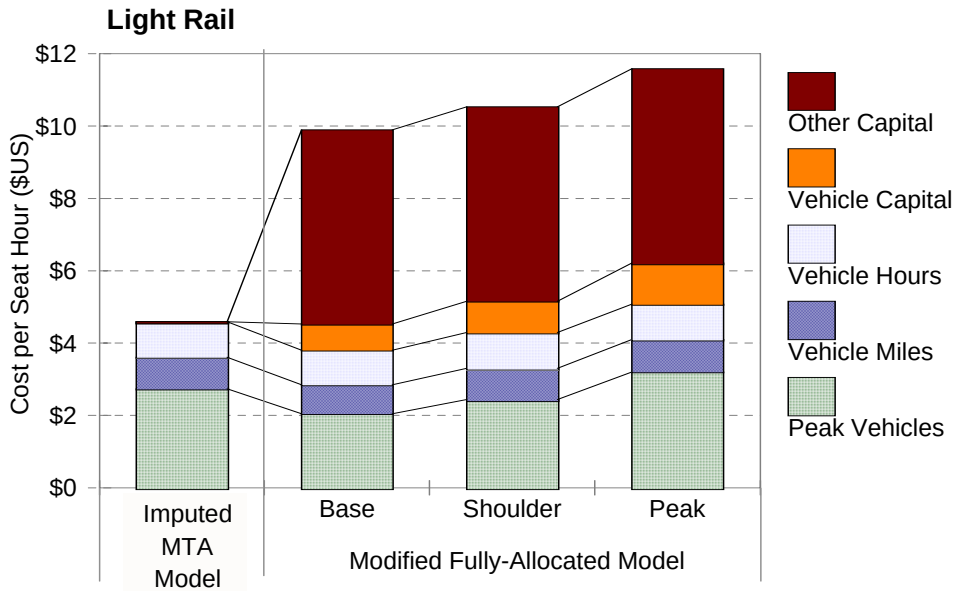
RANK	URBANIZED AREA NAME	STATE LOCATION	MILES OF ROADWAY PER 1,000 PERSONS	TOTAL DVMT PER CAPITA	AVERAGE DAILY TRAFFIC/ FREEWAY LANE
1	Houston	TX	6.1	37.6	18,174
2	Atlanta	GA	4.7	35.6	19,031
3	Birmingham	AL	6.9	34.8	12,847
4	Nashville	TN	4.4	34.3	13,763
5	Indianapolis	IN	4.7	33.6	16,911
6	Austin	TX	5.2	32.9	16,424
46	**Los Angeles**	**CA**	**2.1**	**22.2**	**23,123**
65	Philadelphia	PA	3.1	18.4	14,656
66	**Honolulu**	**HI**	**1.5**	**16.8**	**14,014**
67	New York-Northeastern NJ	NY	2.2	15.7	15,329
68	New Orleans	LA	3.1	14.4	13,478
69	San Juan	PR	2.2	13.4	15,557

Transit Mode

- LA in the mid-1990s…
  - For $128.1 million in operating costs, ***11.3 million*** passengers were carried on the Los Angeles-Long Beach Blue Line (not counting the nearly $1 billion in construction costs)
  - For $128.1 million in operating costs, ***183.6 million*** passengers were carried on 17 of the MTA's 22 busiest lines

Comparison of Estimated Bus System and Light Rail Costs





Using MTA Model and *Fully-Allocated Model*

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OK, so it's complicated. But what's most important?

- #1: Travel time reliability
  - Travelers like speed, but they like reliability even more
  - Wait and transfer times are especially burdensome (1.5 to 3 times more than in-vehicle time)
    - Frequent service with few transfers will beat fast service with transfers every time
  - Lesson: Increasing service frequency and schedule adherence attracts lots of riders

OK, so it's complicated. But what's most important?

- #1: Travel time reliability
  - Lesson: Increasing service frequency and schedule adherence attracts lots of riders
  - Cost-effective ways to improve reliability
    - Better tracking and management of vehicle spacing
    - Realistic schedule setting
    - Real-time "Next Bus" information at major stops
    - Transit signal prioritization
    - Queue jumper and, in limited cases, bus-only lanes

OK, so it's complicated. But what's most important?

- #2: Price
  - The cost of providing transit varies a lot
    - Peak hour, peak direction, and rail service costs a lot more than off-peak, contra-flow, and bus service
  - But transit fares tend to be "flat," per trip or even per month
    - Long-distance, peak hour, peak direction rail passengers get the biggest government subsidies, while short bus trips in the off-peak tend to require little subsidy
    - This encourages inefficiency

OK, so it's complicated. But what's most important?

- #2: Price
  - Conventional wisdom holds that lowering fares is a costly way to add riders
  - Fare elasticity research:
    - Fare increases chase away higher-income riders (who can switch to cars)
    - Fare reductions attract lower-income riders (who have fewer choices)

OK, so it's complicated. But what's most important?

- #2: Price
  - Lesson: Use smartcards to vary fares to reflect costs
    - Lower fares for inexpensive-to-provide trips (short, off-peak, backhaul trips)
    - Higher fares for expensive-to-provide trips (long, peak-period, peak direction, express and rail trips)
    - Would encourage better utilization of existing capacity, such as by adding rapid turnover short trips
      - Would add riders without adding much to costs

The Truth About U.S. Transit:

Most (58%) Transit Users are Bus Riders, and Most Bus Riders are Poor

MODE	MEDIAN HOUSEHOLD INCOME CATEGORY	MODAL HOUSEHOLD INCOME CATEGORY
Transit Bus	$15,000 - $19,999	$ 5,000 - $ 9,999
Urban Rail	$30,000 - $34,999	$15,000 - $19,999
Commuter Rail	$40,000 - $44,999	$55,000 - $59,999
Private Vehicle	$45,000 - $49,999	$35,000 - $39,999

Source: 1995 Nationwide Personal Transportation Survey.

Overall, 1/3 of all transit users come from households with 1995 incomes below $15,000, and 3/5 from households with 1995 incomes below $30,000

OK, so it's complicated. But what's most important?

- #2: Price
  - Lesson: Use smartcards to vary fares to reflect costs
    - Would increase both system performance and social equity
    - since higher-income riders disproportionately consume expensive-to-provide trips and lower-income riders disproportionately consume inexpensive-to-provide trips

But shouldn't we improve bus service and build rail?

- Should we perform coronary artery bypass surgery before we try improved diet, exercise, and medication?

- No.
  - We start with the most proven, cost-effective ways to solve problems before moving to riskier, more expensive options
  - No matter how politically attractive they might be

So when should we build rail?

- That's easy
  - When buses can no longer handle the demand
    - The MTA 204 Vermont operates on 6 min headways in the peak; crush loads require that stops with waiting passengers are sometimes passed
    - The 38 Geary in San Francisco operates articulated (accordion) buses on 7 minute headways in the peak; the service is standing-room-only much of the time
  - The Second Avenue subway in New York City is a great project and long overdue

Rail may one day be a good idea for Honolulu..

- But unpopular complementary policies to limit auto access and market price parking would be required at a minimum..
  - And not before improved and upgraded bus service can no longer handle the loads

- And there are so many, many cost-effective ways to improve the bus network that would, without a doubt, increase transit use far more than any single rail line ever could

Rail may one day be a good idea for Honolulu..

- There are so many more cost-effective ways to improve the bus network that would, without a doubt, increase transit use far more than any single rail line every could

- and at a fraction of the cost

First, We Must Solve the Ribbon Cutting Problem

- So how can we get public officials excited about ribbon-cutting media events for things like…
  - More frequent bus service
  - Better schedule adherence
  - Variable fares to reflect variable costs
  - Real time information at busy stops
  - Faster speeds with signal pre-emption, wider stop spacings, and occasional queue-jumper and bus-only lanes?

First, We Must Solve the Ribbon Cutting Problem

- How can we make ribbon-cutting media events out of things like…
  - More frequent bus service
  - Better schedule adherence
  - Variable fares to reflect variable costs
  - Real time information at busy stops
  - Faster speeds with signal pre-emption, wider stop spacings, and occasional queue-jumper and bus-only lanes

- Now that's a challenge

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How Do We Get the Most Bang for Our Transit Investment Buck?

- Questions? Comments?

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