Policy Analysis
No. 663 March 24, 2010

Defining Success
The Case against Rail Transit

by Randal O'Toole

Executive Summary

Over the past four decades, American cities have spent close to $100 billion constructing rail transit systems, and many billions more operating those systems. The agencies that spend taxpayer dollars building these lines almost invariably call them successful even when they go an average of 40 percent over budget and, in many cases, carry an insignificant number of riders. The people who rarely or never ride these lines but still have to pay for them should ask, "How do you define success?"

This Policy Analysis uses the latest government data on scores of rail transit systems to evaluate the systems' value and usefulness to the public using six different tests:

- Profitability: Do rail fares cover operating costs?
- Ridership: Do new rail lines significantly increase transit ridership?
- Cost-Effectiveness: Are new rail lines less expensive to operate than buses providing service at similar frequencies and speeds?
- The "Cable Car" Test: Do rail lines perform as well as or better than cable cars, the oldest and most expensive form of mechanized land-based transportation?
- The Economic Development Test: Do new rail lines truly stimulate economic development?
- The Transportation Network Test: Do rail lines add to or place stresses upon existing transportation networks?

No system passes all of these tests, and in fact few of them pass any of the tests at all.

Randal O'Toole is a senior fellow with the Cato Institute and author of Gridlock: Why We're Stuck in Traffic and What to Do about It.

CATO INSTITUTE

Transit agencies that receive federal funds invariably claim success no matter how much the rail line costs and how few people ride it.

Introduction

In 2002, the Vermont legislature funded a commuter train from Burlington to Charlotte, 13 miles away (see Appendix A for definitions of terms such as *commuter rail*, *light rail*, and *streetcars*). To ensure funds were effectively spent, the legislature set targets for the service and asked for an audit after one year.[1]

The audit found the rail line's capital costs were more than twice the projected amounts; the operating costs were nearly three times projections; the trains carried less than half of the projected riders; and fare revenues were less than a third of projections.[2] The audit also found that the environmental benefits of the project were nil: the diesel locomotives powering the trains used more energy and emitted more pollution than the cars the transit service took off the road.[3] The legislature cancelled the train.

Vermont taxpayers were fortunate that the state had not accepted any federal funds to support this project, as those funds come with a string attached: if a federally funded transit project is cancelled before the end of its expected lifespan, the local transit agency must repay the prorated value of all grants to the federal government. While there is a limited market for buses and railcars, it would be very difficult for an agency to recover any investments it makes in stations, tracks, and other fixed infrastructure. This means it can be less expensive to keep running the trains than to admit they are a failure.

The vast majority of rail transit projects in the nation today receive federal funds. Transit officials are unlikely to tell taxpayers, "Our rail transit project is a failure, but we need your tax dollars to keep it running because we can't afford to repay the federal grants." Instead, transit agencies that receive federal funds invariably claim success no matter how much the rail line costs and how few people ride it.

For example, in 2006 Tennessee spent $41 million to start the *Music City Star*, a commuter train from Lebanon to Nashville.[4] In 2008, the second full year of operation, the train carried a weekday average of just 264 rush-hour commuters to and from work, and fares of $616,000 barely covered 15 percent of the line's $4.1 million operating costs.[5] This represents an annualized cost of more than $25,000 per commuter, enough to buy each commuter using the train a new Toyota Prius every year for the next 30 years.[6] Yet Nashville's Regional Transportation Authority hopes to parlay the "success" of this line into getting funding for six more commuter-rail routes, while transit officials in Louisville, Indianapolis, and other cities cite the Star as an example of a "successful" train they wish to emulate.[7]

Before funding a project, voters and appropriators should ask rail supporters, "How do you define success?" It is not enough that people ride the trains, as many and often most of those riders were formerly on buses whose costs are far lower than rail transit. Nor is it enough if the trains attract some people out of their automobiles. Transit agencies typically operate trains at far greater frequencies and with fewer stops (resulting in higher average speeds) than buses. Since buses can easily operate at higher frequencies and with fewer stops—a type of service called *bus rapid transit*—taxpayers can legitimately question whether rail riders are attracted by the glitzy, expensive trains or simply appreciate the frequencies and speeds that could have been provided by much less expensive buses.

Advocates often claim rail transit will reduce traffic congestion, save energy, and reduce emissions of pollution and greenhouse gases. But the truth is that, outside of New York City, rail transit carries far too few people for it to have any significant effect on congestion or environmental quality. While rail transit carries about 10 percent of motorized travel in the New York urban area, it carries less than 3.5 percent in the San Francisco and Washington urban areas, less than 3.0 percent in the Boston and Chicago urban areas, less than 2.0 percent in the Philadelphia urban area, and less than 1 percent in Atlanta; Portland, Oregon; and all other urban areas with rail transit in the United States.[8]

Realizing this, rail advocates often carefully word their proposals so as not to claim that rail transit actually relieves congestion, but

simply that it will give frustrated motorists a choice. But there are lots of potential travel choices, including pedicabs, limousines, helicopters, and aerial tramways. Simply because an alternative is available does not mean taxpayers should subsidize it.

A more recent argument is that rail transit stimulates economic development. Developers are more likely to invest near rail lines than bus routes, the argument goes, because rail transit represents a large investment in immobile infrastructure while bus services can more easily be cancelled or eliminated. In fact, a close look reveals that almost all so-called transit-oriented developments along subsidized rail transit lines are themselves heavily subsidized and would not have been built without those subsidies.

To determine when and if rail transit is worthwhile, this paper will assess America's rail transit lines against several objective criteria:

- *The Profitability Test:* How close do rail transit lines come to covering their capital and operating costs?
- *The Ridership Test:* What effect does construction of new rail transit lines have on overall transit ridership?
- *The Cost-Efficiency Test:* How do rail transit investments compare with investments in improved bus service?
- *The Cable Car Test:* Are rail transit systems more productive than the most costly land transit system in the nation, the San Francisco cable car?
- *The Economic Development Test:* Does rail transit contribute to economic development or does it merely provide an excuse for more subsidies to such development?
- *The Transportation Network Test:* What effects do new rail transit lines have on a region's overall transportation network?

The Profitability Test

The most obvious candidate for testing the success of rail transit is profitability: does rail transit cover its costs? There are many valid reasons why profitability should be used as a test of the value of rail transit. Profits are a proxy for net social benefits, and while the proxy is imperfect, it provides an important discipline to public spending. Once the idea of earning a profit disappears, transit agencies might just as well invest $1 billion as $1 million in transit improvements, because there is no particular reason to consider the former any worse than the latter. In fact, politically it is likely to be much better.

As it turns out, no rail transit line in the country comes close to covering its operating costs, much less its total cost (see Appendix B for information on data sources). In 2008 New York City subways had the best financial performance of any rail transit system in the nation, yet subway fares covered just two-thirds of operating costs (Table 1). Average light-rail fares cover less than 30 percent of operating costs.[9] Transit fares have not contributed a single penny to rail capital costs for at least 60 years (see Appendix C for calculations of capital costs).

One reason for transit's lack of profits is that most transit systems in the United States are publicly owned and tax subsidized, and thus have no profit motive. While privatization of transit could improve the efficiency of transit service, it is unlikely that even private operators would ever choose to build rail transit lines in the United States. Once existing lines were worn out, they would probably replace most of them with buses.

Transit advocates argue that rail transit loses money everywhere in the world, and the United States should not expect to do any better. In fact, rail transit earns a profit in Hong Kong and Tokyo, two cities that are far denser than anywhere in the United States outside of Manhattan. Beyond that, the idea that taxpayers in France, Germany, and other countries are foolish enough to subsidize what may be an obsolete form of travel does not justify America doing the same.

The Ridership Test

A second criterion that could be used is the effect of rail transit on overall transit ridership.

No rail transit line in the country comes close to covering its operating costs, much less its total cost.

Table 1
Profitability and Ridership of Rail Transit Lines

Urban Area (Agency)	Mode	Fare/ Operating Cost	Fare/ Total Cost	Loss per Trip	Occupancy per Car	Total Weekday Riders
Albuquerque	CR	10.00%	3.80%	34.78	Unknown	4,700
Atlanta	HR	31.10%	10.00%	5.34	25.6	266,869
Baltimore	HR	22.20%	4.50%	18.63	12.9	46,362
Baltimore	LR	18.70%	7.10%	11.52	19.3	25,560
Boston	HR	57.60%	39.30%	1.63	**25.1**	**515,175**
Boston	**LR**	**58.80%**	**36.50%**	**1.75**	**32.6**	**256,128**
Boston (Downeaster)	CR	47.20%	45.70%	16.36	19.1	1,281
Boston (MBTA)	**CR**	**53.90%**	**29.60%**	**8.26**	**33.9**	**143,498**
Buffalo	LR	18.10%	3.50%	20.81	18.1	19,743
Charlotte	LR	17.10%	3.40%	20.14	27.3	11,678
Chicago (CTA)	HR	46.30%	26.40%	2.86	17.6	641,783
Chicago (Metra)	CR	44.20%	28.50%	7.74	41.1	278,855
Chicago (N. Indiana)	CR	49.50%	29.50%	10.88	33.5	13,897
Cleveland	HR	24.60%	15.40%	4.53	26.5	25,360
Cleveland	LR	19.60%	10.50%	7.05	24.1	10,703
Dallas	LR	15.50%	3.70%	18.5	28.9	65,757
Dallas-Ft. Worth	CR	9.20%	2.20%	46.14	24	9,730
Denver	LR	52.70%	13.40%	6.85	14.3	67,196
Detroit	AG	8.40%	2.60%	$17.50	6.1	5,898
Houston	LR	33.20%	15.80%	3.67	33.7	40,567
Jacksonville	AG	5.60%	1.40%	49.4	0.9	1,736
Kenosha	SC	5.90%	3.40%	7.05	3.7	162
Little Rock	SC	8.10%	1.80%	26.47	3.9	317
Los Angeles	**CR**	**50.40%**	**26.40%**	**15.33**	**41.9**	**47,210**
Los Angeles	HR	33.20%	4.40%	15.76	36.3	134,665
Los Angeles	LR	19.40%	5.80%	11.14	34.8	134,327
Memphis	SC	21.80%	6.00%	13.17	1.8	2,829
Miami	AG	0.00%	0.00%	8.07	7.7	27,333
Miami	CR	16.50%	7.20%	29.16	42.8	13,228
Miami	HR	16.10%	5.50%	12.38	19.9	62,307
Minneapolis	LR	37.90%	11.30%	6.92	31	30,518
Nashville	CR	15.20%	8.30%	41.03	15.1	667
New Orleans	SC	31.40%	18.40%	4.28	10.9	12,298
New York (CT)	CR	12.10%	4.80%	63.03	14.9	1,986
New York (Hudson-Bergen)	LR	16.80%	8.20%	12.62	24.2	48,291
New York (LIRR)	**CR**	**48.00%**	**33.80%**	**9.96**	**29.1**	**342,754**
New York (Metro North)	**CR**	**58.60%**	**42.50%**	**8.19**	**36.9**	**285,613**
New York (MTA)	**HR**	**67.00%**	**42.50%**	**1.21**	**28.8**	**7,822,158**
New York (NJ Transit)	**CR**	**55.50%**	**35.90%**	**8.97**	**38.1**	**300,900**
New York (PATH)	HR	45.20%	24.60%	3.88	29.4	279,937
New York (Staten Island)	HR	19.80%	17.90%	3.47	19	27,739
NY/Philadelphia (NJ Transit)	LR	25.90%	25.90%	31.11	21	20,440
Philadelphia (PATCO)	**HR**	**49.80%**	**40.00%**	**3.07**	**22.1**	**36,184**

Urban Area (Agency)	Mode	Fare/ Operating Cost	Fare/ Total Cost	Loss per Trip	Occupancy per Car	Total Weekday Riders
Philadelphia (PennDOT)	CR	49.60%	40.00%	22.98	16.7	1,509
Philadelphia (SEPTA)	**CR**	**57.00%**	**39.20%**	**5.56**	**29.5**	**117,056**
Philadelphia (SEPTA)	**HR**	**52.80%**	**24.40%**	**2.7**	**25.6**	**305,353**
Philadelphia (SEPTA)	LR	43.60%	33.00%	1.79	18.9	95,946
Pittsburgh	LR	15.90%	7.00%	13.07	18	6,784
Portland	LR	37.40%	9.80%	7.44	28.2	118,970
Sacramento	LR	27.10%	10.10%	8.03	20.1	52,686
Salt Lake City	CR	14.80%	3.20%	52.19	23.5	7,228
Salt Lake City	LR	35.80%	8.40%	7.21	24.5	48,664
San Diego	**LR**	**55.60%**	**15.30%**	**4.58**	**25.9**	**113,635**
San Diego (North County)	CR	39.30%	13.30%	26.94	37.6	6,180
San Diego (North County)	LR	9.30%	2.10%	44.36	48.9	31,252
San Francisco	CC	47.20%	45.80%	3.87	19.1	20,530
San Francisco	CR	45.80%	22.00%	12.47	40.6	36,421
San Francisco	LR	18.50%	10.30%	4.53	22.8	159,405
San Francisco (BART)	**HR**	**64.50%**	**20.10%**	**10.68**	**21.6**	**384,231**
San Jose	LR	15.50%	4.50%	17.46	16.2	33,043
San Jose (Altamont)	CR	37.80%	22.50%	18.57	48.4	3,191
San Juan	HR	18.20%	4.80%	23.65	13.6	29,974
Seattle	CR	26.40%	6.30%	45.37	61.2	9,914
Seattle	SC	11.20%	4.50%	14.24	6.7	1,295
Seattle (Tacoma)	SC	0.00%	0.00%	11.6	9.8	3,018
St. Louis	LR	30.30%	8.10%	9.85	21.4	57,384
Tampa	SC	30.20%	21.80%	4.64	8.9	1,025
Washington	**HR**	**60.60%**	**20.70%**	**6.09**	**23.5**	**971,490**
Washington (MARC)	CR	34.90%	21.70%	14.86	47.4	31,216
Washington (VRT)	CR	45.50%	28.60%	15.14	59.1	14,508
National average/total	AG	3.40%	1.00%	11.73	6.4	34,967
National average/total	CR	50.10%	31.80%	9.8	35.7	1,670,542
National average/total	HR	59.40%	28.30%	2.6	25.7	11,549,587
National average/total	LR	29.40%	10.60%	6.91	24.4	1,448,677
National average/total	SC	23.10%	9.80%	7.48	7.5	20,944
National average/total	All	52.50%	26.50%	3.82	28.5	14,746,247

Source: *2008 National Transit Database* (Washington: Federal Transit Administration, 2009), "operating expense," "capital expense," "fare," and "service" spreadsheets; 1992 through 2007 capital expenses from *National Transit Database Historical Data Files*, TS3.1–Capital Expenditures Time Series. Albuquerque data are not in the National Transit Database, but are based on Jim Scarantino, "Rail Runner 2008–2009 Losses Top $19 Million," New Mexico Watchdog, December 13, 2009, tinyurl.com/yb9ctb9.

Note: Automated guideways (AG), cable car (CC), commuter rail (CR), heavy rail (HR), light rail (LR), and streetcar (SC) lines operating in the United States in 2008. "Fare/Operating Cost" shows the share of 2008 operating costs covered by 2008 fare collections. "Fare/Total Cost" shows the share of 2008 operating costs plus either the annualized capital costs shown in Table 1 or, for older systems, the annual average of 1992–2008 capital costs covered by 2008 fare collections. "Loss per Trip" shows the operating and capital subsidy required for every passenger (and passengers who change trains midway count as two trips). "Occupancy per Car" is the average number of people on board the railcars while they were in revenue service (calculated by dividing 2008 passenger miles by 2008 vehicle revenue miles). "Total Weekday Riders" is the typical number of people carried each weekday in 2008. Systems that appear in bold typeface pass the "cable car test" (see text).

Table 2
Transit Trips per Capita

	1985	2008	Change
Albuquerque	10	15	46.9%
Atlanta	83	39	-53.2%
Baltimore	59	51	-13.0%
Boston	106	90	-14.5%
Buffalo	36	28	-22.8%
Charlotte	22	23	3.8%
Chicago	110	72	-34.6%
Cleveland	53	34	-36.0%
Dallas	18	16	-12.5%
Denver	40	47	17.3%
Houston	25	22	-11.8%
Los Angeles	56	51	-8.3%
Miami	22	30	41.5%
Minneapolis	38	38	-1.0%
Nashville	17	12	-29.8%
New Orleans	70	18	-74.2%
New York	201	215	6.7%
Philadelphia	92	67	-26.4%
Phoenix	11	21	93.6%
Pittsburgh	50	39	-21.3%
Portland	53	61	15.8%
Sacramento	17	24	37.5%
Salt Lake City	23	41	75.7%
San Diego	22	37	70.4%
San Francisco	121	107	-11.7%
San Jose	26	28	8.3%
Seattle	56	52	-6.9%
St. Louis	27	25	-6.4%
Washington	102	116	14.0%

Source: 1985 and 2008 National Transit Databases, Federal Transit Administration, Washington; Census Bureau population estimates for urbanized areas.
Note: 17 out of 28 rail regions have seen a decline in per capita transit usage despite—or because of—the existence or construction of rail transit lines.

Per capita transit ridership has declined in most regions that have rail transit.

Rail advocates claim that many people won't ride buses, but they will ride trains. If true, construction of a new rail transit line could increase ridership in the transit corridor. But, as Department of Transportation researcher Don Pickrell pointed out in 1989, the real question is: what is the effect of rail transit on regional transit ridership?[10] If the high cost of rails leads a transit agency to raise fares or reduce other transit services, transit ridership outside the rail corridors may suffer, offsetting any gains in the rail corridor.

Table 2 shows that, for one reason or another, per capita transit ridership has declined in a majority of urban regions that have rail transit. Moreover, increases in some of the cities, such as Albuquerque, Charlotte, and Phoenix, took place before the opening of rail transit lines. In Miami's case, the increase took place only after the transit agency began to emphasize buses when its rail lines failed to perform.

Fewer than one out of four rail regions can honestly argue that new rail transit lines gen-

Table 3
Transit's Share of Commuting

	Year Rail System Opened*	Commute Share of Population Prior to Rail†	2008 Commute Share
Albuquerque	2006	1.4	2.2
Atlanta	1979	9.1	4.6
Baltimore	1984	12.3	8.4
Boston	1900	13.5	13.3
Buffalo	1986	16.4	4.2
Charlotte	2007	5.5	3.6
Chicago	1900	18.7	14
Cleveland	1900	11.5	4.8
Dallas-Ft. Worth	1996	2.7	2.2
Denver	1994	4.7	5.8
Houston	2004	3.8	3.2
Los Angeles	1988	5.9	6.7
Miami	1984	4.3	3.9
Minneapolis	2004	5.5	6.2
Nashville	2006	1.3	1.8
New Orleans	1900	11.5	3.7
New York	1900	30.7	32.5
Philadelphia	1900	15.1	10.6
Phoenix	2008	2.2	3.3
Pittsburgh	1900	13.8	8
Portland	1986	9.8	8
Sacramento	1987	4.1	3.3
Salt Lake City	1999	3.5	3.6
San Diego	1981	3.5	3.8
San Francisco	1972**	16.8	15.5
San Jose	1988	3.1	4
San Juan	2004	5.8	4.1
Seattle	1999	7.1	9.1
St. Louis	1994	3.5	3.6
Washington	1976	16.7	16.8

Source: Census Bureau, 1980, 1990, 2000 censuses, 2008 American Community Survey.
Notes: Transit's share of commuting has fallen in most rail regions since 1980 or the decennial census prior to the opening of new rail transit, whichever is later. Urban areas with only streetcars or automated guideways are excluded as these modes are not intended for commuting.
* 1900 if pre-1970
** BART system
† No earlier than 1980

erated significant new riders. These include Denver; Portland; Sacramento; Salt Lake City; San Diego; Washington; and possibly (though not apparent from Table 1) Minneapolis. Of course, even increases in transit ridership do not necessarily translate into net social benefits. They may merely signal people switching from a relatively unsubsidized form of trans-

Increased ridership may simply indicate a switch from relatively unsubsidized to heavily subsidized transportation.

In January 2010, Transportation Secretary Ray LaHood abolished cost-effectiveness rules for federal transit grants, saying, in effect, that he was willing to fund rail projects no matter how much money they waste.

portation to another that is heavily subsidized.

Table 3 shows that, when compared with passenger travel by auto, transit's share of travel has declined in most rail regions since 1980 (or the year of the decennial census before post-1990 rail lines opened). Increases in Albuquerque, Nashville, Phoenix, and Seattle took place before rail lines opened; Los Angeles's increase took place after the transit agency was ordered by a federal judge to restore bus service that had been cut to help pay for the rail system. Only Denver, Minneapolis, Salt Lake City, San Diego, San Jose, and Washington can honestly say that new rail transit lines contributed to increases in transit's market share, and these increases tend to be very small.

The Cost-Efficiency Test

A major reason offered for giving subsidies to rail transit is that rail transit produces nonmarket benefits, such as mobility for low-income people who lack access to an automobile, congestion relief, and reduced air pollution, that might not be captured in transit fares. Taxpayers, the reasoning goes, should be willing to subsidize transit to obtain these benefits. Of course, in cities where transit ridership declined following rail construction, it is difficult for rail advocates to argue that rail lines produce any social benefits at all.

Even if a rail line has increased overall transit ridership, that does not necessarily mean it is good for the environment. Rail advocates point out that steel wheels have less friction than rubber tires. This makes a big difference for freight, but less for passengers.

A freight car that weighs 50 tons can carry 100 tons of freight. But a 50-ton passenger car can only hold a few hundred passengers, and, as Table 1 shows, the average for light- and heavy-rail cars (which weigh about 50 tons) is 25 passengers. That means the average weight per passenger is about 4,000 pounds. That is at least twice the weight per passenger of a typical passenger auto carrying the national average of 1.6 people. This high weight-to-passenger ratio partly or wholly offsets the savings from steel wheels.

Commuter rail can be even worse considering the added weight of the locomotive. For example, Dallas-Ft. Worth commuter trains typically use a locomotive weighing 260,000 pounds, pulling an average of 3.7 passenger cars weighing 110,000 pounds each for a total of 667,000 pounds. The cars have nearly 150 seats, but in 2008 they carried an average of just 24 people each, for a weight-per-person of more than 7,500 pounds. As a result, they consumed 50 percent more energy and emitted 40 percent more carbon dioxide per passenger mile than the average passenger auto.[11]

Where rail transit does increase ridership, the criterion to use is *cost-efficiency*: Is rail transit the least costly way of obtaining a fixed amount of nonmarket benefits? Or, alternatively, does rail transit provide the greatest amount of these benefits for a fixed amount of money?

Rail advocates object to using true cost-efficiency analyses. In January 2010, rail supporters cheered when Transportation Secretary Ray LaHood announced he was abolishing cost-effectiveness rules and would instead judge projects based on whether they promote "livability," a concept that is impossible to quantify.[12] The rules LaHood was eliminating had been written under the previous transportation secretary, Mary Peters.

In 2005, Peters required that, to be eligible for federal funding, new rail transit projects must cost less than $24 per hour of savings to transportation users.[13] This test failed to discriminate between projects that cost only $1 per hour and projects that cost $23 per hour, but at least projects that cost more than $24 were eliminated, including many rail proposals. Under Peters, the Federal Transit Administration also required that cities applying for funds for streetcar projects demonstrate that streetcars were more cost-efficient than buses. As a result, almost all of the cities that had been preparing to apply for federal grants for streetcars gave up those plans.[14]

In deciding to repeal these rules, LaHood was saying, in effect, that the FTA would be willing to fund rail transit projects no matter

how much money they waste relative to alternatives. This makes many more rail projects eligible for federal funding. Still, taxpayers have an interest in knowing whether rail transit is cost-effective compared with buses or other alternative forms of transportation.

Though rail's capital cost is much greater than for buses, rail advocates argue that rail's operational savings will more than make up for the added capital cost. Rail cars cost as much or more to operate per mile as buses, rail advocates concede, but rail cars have higher capacity and thus the cost per passenger mile may be much lower. Table 4 tests this idea for all post-1970 rail lines in operation in 2008. The table estimates the number of buses needed to provide equivalent service to the rail lines and compares the estimated capital and operating costs of those buses with actual rail costs.

Table 4
Rail vs. Bus Capital and Operating Costs (costs in $millions)

	Mode	Maximum Cars in Service	AM Peak Rider per Car	Replacement Buses Needed	Change in Annualized Capital Costs	Change in Operating Costs	Total Net Cost/Savings
Albuquerque	CR	22	25	22	-30.2	-9.9	-40.1
Atlanta	HR	33	42	56	-331.4	203.9	-127.6
Baltimore	HR	54	19	54	-213.3	-7	-220.3
Baltimore	LR	36	23	36	-58.9	-11.7	-70.6
Boston-Portland	CR	10	20	10	0.2	4	4.2
Buffalo	LR	23	29	26	-97.7	-14.9	-112.6
Charlotte	LR	14	40	22	-36.6	-2.4	-39
Dallas	LR	85	50	171	-275.8	8.1	-267.6
Dallas-Ft. Worth	CR	34	37	50	-40.4	-12.2	-52.6
Denver	LR	101	26	107	-116.3	50.3	-66
Detroit	AG	10	7	10	($28.60)	($7.60)	($36.20)
Houston	LR	17	50	34	-60.9	0.6	-60.3
Jacksonville	AG	7	1	7	-18.7	-4.2	-22.9
Kenosha	SC	1	4	1	-0.2	-0.1	-0.3
Little Rock	SC	21	10	21	-2.5	-0.3	-2.9
Los Angeles	CR	141	80	451	-97.9	169.3	71.5
Los Angeles	HR	70	47	132	-616.3	8.8	-607.5
Los Angeles	LR	102	51	209	-24.4	13.4	-11
Memphis	SC	12	2	12	-10.2	0.2	-9.9
Miami	AG	19	8	19	-48.3	-12.5	-60.8
Miami	CR	27	92	100	-62.3	44.5	-17.7
Miami	HR	84	28	95	-155.6	-7.4	-163
Minneapolis	LR	24	53	51	-53.5	15.1	-38.4
Nashville	CR	4	15	4	-3.2	-2.3	-5.5
NY (Hudson-Bergen)	LR	59	43	102	-173.9	-40.8	-214.6
Phil. (River Line)	LR	17	51	35	-109.6	-6.1	-115.7
Portland	LR	85	35	118	-231.3	4.2	-227.1

Continued next page

Table 4 *Continued*

	Mode	Maximum Cars in Service	AM Peak Rider per Car	Replacement Buses Needed	Change in Annualized Capital Costs	Change in Operating Costs	Total Net Cost/Savings
Sacramento	LR	56	33	73	-82.9	-0.4	-83.3
Salt Lake City	CR	18	115	83	-55.4	47.5	-7.9
Salt Lake City	LR	46	35	64	-85.7	9.8	-75.9
San Diego	LR	93	42	155	-139.8	66.9	-72.8
San Diego (North)	CR	20	56	45	-31.8	9	-22.8
San Diego (North)	LR	4	50	8	-24.9	-4.4	-29.3
San Francisco	HR	540	39	836	-1,018.90	479	-540
San Jose	LR	53	16	53	-132.9	-24.5	-157.4
San Jose (Altamont)	CR	15	79	48	-4.9	11.4	6.5
San Juan	HR	40	20	40	-156.7	-27.1	-183.9
Seattle	CR	38	61	93	-92.5	-7.6	-100
Seattle	SC	2	7	2	-7.7	-1.9	-9.6
Seattle	SC	2	12	2	-3.7	-2.2	-5.9
St. Louis	LR	56	32	72	-151.4	23.4	-127.9
Tampa	SC	4	11	4	-0.8	-1.3	-2.1
Washington	HR	810	43	1,385	-1,387.30	346.7	-1,040.60
Washington (MARC)	CR	109	94	410	-3	84.5	81.5
Washington (VRE)	CR	67	101	272	-39.6	20.2	-19.5

Source: Maximum cars in service and peak-hour riders per car from *2008 National Transit Database* (Washington, Federal Transit Administration, 2009), "service" spreadsheet. Other columns calculated; see text for a detailed explanation. Data for Albuquerque estimated on the basis of information in Jim Scarantino, "Rail Runner 2008–2009 Losses Top $19 Million," New Mexico Watchdog, December 13, 2009, tinyurl.com/yb9ctb9.

Notes: Abbreviations stand for automated guideways (AG), cable car (CC), commuter rail (CR), heavy rail (HR), light rail (LR), and streetcar (SC). When compared with buses, few rail lines save enough money on operations to compensate for their high capital costs; some don't have any operational savings at all.

To offer equal frequencies, the table assumes that transit agencies would need at least as many buses as rail cars. Because buses are smaller than most rail cars, the table assumes agencies would need enough additional buses to ensure that average peak-hour loads are no more than 25 riders per bus. For example, Dallas light-rail cars carry an average of 50 riders during the morning peak period (which, in Dallas, is 6:00–9:00 a.m.). Although most transit buses can easily accommodate 50 riders, some trains will be even more crowded than the average peak-hour trains. So Table 4 assumes that Dallas would need twice as many buses as rail cars to provide equivalent service.

Table 4 assumes that transit agencies using automated guideways or streetcars could have instead used trolley-style buses that cost about $100,000 each. Agencies using light or heavy rail could have used transit buses costing about $400,000. Because commuter-rail trips tend to be longer than other transit trips, commuter-rail agencies would otherwise use long-distance coaches costing about $500,000. To convert to an annualized cost, these capital costs are amortized over 12 years at 7 percent interest as specified by FTA guidelines.

Table 4 also assumes that each bus would operate as many miles per year as each rail car and that the buses would cost the 2008 national average of $9.34 per vehicle mile to

operate. The last three columns in the table show the differences in annualized capital costs, operating costs, and the total of the two. Negative numbers indicate that buses save money over rail; positive numbers indicate that rail is less costly. For example, the table indicates that Portland's light-rail lines costs $4.2 million per year less to operate than buses, but this savings hardly makes up for light rail's greater annualized capital costs of $231 million.

Table 4 finds that no automated guideway, heavy-rail, light-rail, or streetcar line is more efficient than buses offering equivalent service. Many of these lines do not even offer any operational savings to offset rail's greater capital costs.

The only systems that might be cost-efficient relative to buses are commuter-rail lines. Yet the savings are marginal. Many commuter-rail agencies save money by contracting out operations to private operators such as First Transit or Veolia. On the other hand, transit agencies that contract out their bus operations spend only about two-thirds as much per vehicle mile as agencies that operate their own buses. A sensitivity test reveals that, if commuter agencies contracted out their bus operations at the national average of $6.24 per vehicle revenue mile, those buses would cost less than rail in every case.

In a few cases, there may be logistical reasons why buses could not work as well as rail. Adding nearly 1,400 buses to the Washington Metro system would more than double the number of buses used on a typical weekday, and downtown streets might not be able to accommodate those buses at the speeds offered by Metro rail. The same might be true for the San Francisco Bay Area Rapid Transit (BART) system. In nearly all other cases, however, buses could easily provide equal service, especially if they can operate on high-occupancy vehicle or high-occupancy/toll lanes.

Rail advocates may respond that the number of buses indicated in Table 4 might provide the same frequency of service as the trains, but not at the same speeds, because buses, unlike trains, are subject to being caught in traffic. In fact, rail lines are no speed demons: the average speed of a streetcar is less than 10 mph; the average speed of light rail is a little more than 20 mph; the average speed of heavy rail is about 30 mph; and the average speed of commuter trains is 30 to 40 mph.[15] Buses traveling on high-occupancy vehicle lanes can easily exceed those speeds.

Another argument made by rail advocates is that some people will ride trains but not buses. In fact, at least some researchers have concluded that transit ridership is more sensitive to frequencies and speed than to whether the vehicles run on rubber tires or steel wheels. "When quantifiable service characteristics such as travel time and cost are equal," says a paper in *Transport Policy Journal*, "there is no evident preference for rail travel over bus."[16]

This has been verified by transit agencies that have increased the frequencies and speeds of their bus services using bus–rapid transit, or buses running at the same frequencies and speeds as (or faster than) light rail. Kansas City bus–rapid transit achieved a 29 percent increase in weekday ridership over the slower, less-frequent bus service that preceded it, which is comparable to gains reported for new rail lines.[17] If it is true that a few people refuse to ride buses, it remains difficult to justify taxpayer subsidies to snobs.

While some people may prefer to ride trains instead of buses, it remains difficult to justify taxpayer subsidies to snobs.

The Cable Car Test

Cable cars have several disadvantages compared with more modern technologies. Table 5 makes it clear why cable cars were so quickly replaced by electric streetcars (and, in turn, why streetcars were later replaced by buses): cable cars have by far the highest operating cost, per vehicle mile, of any land-based transit system in the United States.

In addition to high operating costs, San Francisco cable cars suffer from other significant disadvantages. For one, the top speed is just 9 mph, compared with top speeds (not average speeds) of 50 to 80 miles per hour for commuter-, heavy-, and light-rail lines. In addition, the cars have just 30 to 34 seats and room

Table 5
2008 Average Operating Costs Per Vehicle-Revenue Mile

Automated Guideway	$21.86
Bus (diesel or gas)	9.24
Bus (trolley)	19.07
Cable Car	107.31
Commuter Rail	13.91
Heavy Rail	9.35
Light Rail	14.53
Streetcar	16.94

Source: *2008 National Transit Database* (Washington: Federal Transit Administration, 2009), "service" and "operating expense" spreadsheets.

for about another 20 standees compared with around 70 seats for light- and heavy-rail cars and more than 100 for many commuter-rail cars. Finally, all three cable car routes total just 4.4 miles long, far shorter than most other rail lines.

Given these inherent disadvantages, it seems reasonable that other rail transit lines should outperform cable cars. In particular, any rail transit line should be considered an outright failure unless

- fare revenues cover at least as high a share of operating costs as cable car fares;
- the average railcar carries at least as many patrons as the average cable car; and
- the rail line attracts at least as many weekday trips as cable cars.

In 2008, cable car fares covered 47.2 percent of operating costs. The average cable car carried 19.1 riders and on a typical weekday cable cars carried 20,530 trips. Given the cable cars' high operating costs, small capacities, and other disadvantages, any rail lines that cannot meet this three-part cable car test should be considered a clear waste of money, as it is likely that transit demand could easily have been satisfied with low-cost improvements in bus services.

Despite the high cost of operating cable cars, 80 percent of the nation's other rail transit lines do not perform as well as cable cars.

Table 1 shows that only 14 out of 70 rail transit systems in the United States pass the cable car test. Ten of these are older systems in Boston, New York, and Philadelphia. The remaining four are post-1970 rail systems: Los Angeles commuter trains, San Diego light rail, San Francisco BART, and Washington Metrorail. All but three of the remaining 56 failed the fare ratio test. Of the remainder, Denver light rail failed the occupancy test; commuter trains between Indiana and Chicago failed the weekday ridership test; and Philadelphia commuter trains failed both.

For the 14 systems that passed the cable car test, this finding does not mean that those systems should be considered successful, but only that the other 56 lines are clearly not successful. The value of the 14 lines that pass the cable car test would depend on their capital costs and on whether the social benefits justify the capital and operating subsidies. A 2006 analysis by economists Clifford Winston and Vikram Maheshri found that the costs of all rail systems in the country except BART outweighed the social benefits.[18]

Some might say that the cable car test is unfair because San Francisco cable cars are mainly a tourist attraction. But many cities have built vintage streetcar lines as tourist attractions, and none of them pass the cable car test, suggesting that merely being a tourist attraction is not enough to succeed. Rail advocates might also argue that cable cars do well because they serve one of the most densely populated areas in the United

States. But that is exactly the point: transportation systems work when they go where people want to go, not where planners would like people to go.

The Economic Development Test

"New rail lines spur urban revival," proclaimed a recent headline in the *New York Times*.[19] Yet the three examples in the article belied the headline. One, in Columbus, Ohio, is in an area where no one expects a rail line will ever be built. The second, in Denver, is in an area where a rail line might be built more than a decade after the development took place. Only the third example (though the first listed in the article), in the Dallas suburb of Carrollton, involves an actual rail line, and it is doubtful that the rail line has contributed much to the town's development.

What all three examples have in common is not a rail line but subsidies, mostly in the form of tax-increment financing. The Columbus development, the *Times* disclosed, received $800 million in subsidies.[20] The Denver development, the *Times* did not disclose, received nearly $300 million in subsidies.[21] Meanwhile, the $38 million Carrollton project, the *Times* similarly did not disclose, received $13 million in subsidies. Ironically, much of this subsidy went to the construction of a six-story parking garage so that people can shop and work in the new development without having to take the light rail to get there.[22]

To support claims that rail lines spur economic development, rail advocates often cite every new building built anywhere near a rail line, even though most would have been built without the rail line.[23] Oregon, California, and other states have required that all state offices locate near rail lines; such relocations are then credited by rail planners as having been stimulated by development.

To support transit ridership, planners particularly favor *transit-oriented developments*, meaning relatively high-density projects that mix housing, retail shops, and office space. While there is no central clearinghouse for transit-oriented development data, anecdotal evidence indicates that such developments are almost always subsidized using tax-increment financing or other support. For example, a Texas developer rejected the idea of building high-density, mixed-use developments in Houston after "we discovered the ones that were economically successful were the ones that had government help."[24] Developers in Portland, Oregon, built no new transit-oriented developments along the city's light-rail line until the city began subsidizing such developments 10 years after that line opened.[25] This suggests it is the subsidies, not the rail lines, that stimulate the development.

Even to the extent that rail transit increases property values along its route, for an urban region as a whole, this is a zero-sum game: increases along the route are offset by lower property values elsewhere. It may even be a negative-sum game if higher taxes and land-use regulation needed to support the rail lines discourage economic growth. A literature review commissioned by the FTA found that "urban rail transit investments rarely 'create' new growth." At most, they "redistribute growth that would have taken place without the investment." The main beneficiaries of this redistribution were downtown property owners, which explains why they tend to strongly support rail transit projects.[26]

The Transportation Network Test

Rather than benefit the regions that build rail lines, rail transit places significant stress on those regions' transportation systems. There are four prominent forms of this stress:

Transit Apartheid: The massive investments required for rail transit usually serve a small share of the people in an urban area. Given limits on total transportation funding, spending a huge amount of money on a narrow segment of travel often leads to significant declines in the region's transportation network.

Subsidies to developers, not rail construction, have stimulated many of the developments along rail transit lines.

The general managers of six transit agencies all recently resigned in the face of controversies over their handling of rail systems.

Financial stresses created by the high cost of rail transit often lead transit agencies to raise fares and cut bus services, thus harming low-income families and other transit-dependent people. Rail transit is primarily aimed at getting middle- and high-income people out of their cars, not at providing better transport for people who cannot drive. As a result, many transit systems suffer from what Clark Atlanta University professor Robert Bullard—who is sometimes called the "father of environmental justice"—calls "transportation apartheid": heavy subsidies to a few suburban transit users combined with deteriorating service to the inner-city neighborhoods where transit needs are greater.[27]

The Peter Principle: Planning, building, and managing rail transit requires a completely different set of skills than those needed for a bus system. As a result, many transit agencies that build new rail lines quickly display a level of incompetence they did not exhibit when running only buses, exhibited by large cost overruns, overestimated ridership projections, and other unforeseen problems related to building and managing rail lines.

Transit agencies can purchase buses more-or-less off the shelf and instantly reroute them in response to changing travel demands. Train cars are generally custom-made and rail lines require years to plan and build. While buses operate on a pay-as-you-go basis, most rail projects require agencies to go heavily into debt. While bus planners need do little more than look out the window to see where people want to go, rail planners must accurately project costs, ridership, fares, and tax revenues for decades in advance.

Brookings Institution scholar Clifford Winston tells the story of the Capital Centre, an entertainment and sports venue outside of Washington, D.C., that was so popular that Metro decided to build a rail line to serve it. "After decades of planning and delay," says Winston, "Metro did open a rail station in 2005 at the site of the Capital Centre—which unfortunately had been demolished three years earlier."[28]

The inability of rail planners to successfully predict the future is illustrated by the fact that studies from 1989 through 2007 have consistently found that rail construction costs average 40 percent over the original projections.[29] Although accuracy in cost projections would seem to be a requirement for projects that cost hundreds of millions or even billions of dollars, the accuracy of rail cost projections has not improved in at least two decades. Such inaccuracies have proven disastrous for transit systems all across the country.

The general managers of transit agencies that operate rail tend to be paid far more than those of bus-only agencies. Yet higher pay does not guarantee the skills needed to manage rail. The general managers of transit agencies in Austin, Denver, Norfolk, San Jose, St. Louis, and Washington all recently resigned in the face of controversies over their handling of the rail systems.[30]

Land-Use Czars: Given that planners cannot predict where people will want to travel 10 or more years from now, rail transit agencies try to become land-use czars, demanding that cities use prescriptive zoning and various subsidies to force and/or entice people to live and work near rail stations. Such transit-oriented land-use plans intrude into private property rights and impose high costs on taxpayers and homebuyers. Yet some researchers have found that this policy is "not very effective in increasing primary reliance on mass transit for commuting."[31]

The fundamental problem with rail transit, other than its high cost, is that it makes no sense in today's decentralized world. With the possible exception of Manhattan, Americans do not live or work in environments dense enough to need any higher capacity transit than buses. Not only are most people spread out in single-family homes, jobs are so spread out that less than 10 percent are in central city downtowns and only another 20 to 30 percent are in suburban downtowns or other major job centers.[32]

To make rail transit work, many transit agencies work with metropolitan planning

organizations to fundamentally transform how Americans live and work. They want people to live in higher-density, mixed-use developments, often called transit-oriented developments (TODs). Yet most Americans don't want to live that way: surveys consistently show (and people's behavior confirms) that the vast majority of people aspire to live in a single-family homes with large yards.[33]

Transit planners use a combination of coercion and incentives to alter people's behavior. The coercion includes urban-growth boundaries that drive up the cost of land to persuade more people to live in multi-family housing or, at least, single-family homes on small lots. This is combined with minimum-density zoning that prevents people from building single-family homes or other low-density structures near rail stations.

Incentives include tax breaks, below-market land sales, and direct subsidies to developers who build high-density housing near transit stops. One recent study found that at least two-thirds of rail transit–oriented developments have received subsidies of some sort and well over half the developers benefited from capital funding or below-market land sales by local governments.[34]

Comparing Tables 2 and 3 with Table 6 reveals that nearly all of the regions where rail transit has contributed to increased transit ridership have supplemented that transit with strict land-use rules. This suggests that so-called smart growth—transit improvements combined with land-use rules aimed at promoting transit—actually works—but only to a limited degree and at high costs, including forcing people to live in homes they do not prefer, reduced housing affordability, increased congestion; lost property rights, and higher taxes and/or reductions in other essential urban services such as fire, police, and schools to support rail lines and transit-oriented developments.

Crumbling Rail Infrastructure: Since the onset of the recession in late 2008, most transit agencies have been facing serious financial problems due to declining tax revenues. But many agencies with older rail transit systems were suffering continuing financial crises throughout the booming 1990s and early 2000s. The high cost of maintaining rail transit is the major reason for these perpetual crises.

A recent FTA assessment of transit systems in Boston, Chicago, New York, Philadelphia, San Francisco, and Washington found that more than a third of the rail lines "are in either marginal or poor condition, implying that these assets are near or have already exceeded their expected useful life." By comparison, less than 20 percent of the assets owned by other transit agencies were in such poor condition.[35]

The FTA estimated that bringing these lines to a "state of good repair" would cost nearly $50 billion. Yet the regions studied were not even spending enough to maintain the existing state of repair, much less address the backlog.[36] Unfortunately, the report did not break down its findings by transit agency or urban area. But it did indicate that nearly 75 percent of the backlog was for heavy rail (subways and elevateds), 18 percent for commuter rail, and just over 1 percent for light rail. Although the agencies reviewed collectively operate about a fifth of all transit buses in the nation, less than 6 percent of the backlog was for buses.[37]

How much should transit agencies expect to spend maintaining existing transit lines once the patina of newness rubs off? An approximate answer to this question can be gained by examining how much the agencies are actually spending and keeping in mind that the FTA estimates that they need to spend about 10 percent more just to maintain their existing condition.[38] The FTA's National Transit Database counts maintenance and rehabilitation as capital costs. The capital costs of agencies that have built little or no new track are presumably all for rehabilitation.

- Between 1992 and 2008, Chicago annually spent around $250,000 per mile (adjusted for inflation to 2008 dollars); Boston spent more than $300,000 per mile; and New York spent $500,000 per mile on their commuter-rail lines.

Despite historic subsidies, more than a third of the rail lines in six major cites are in marginal or poor condition due to inadequate maintenance.

Table 6
Stresses Placed on Transportation Systems by Rail Transit

	Modes	Transit Apartheid	Peter Principle	Land-Use Czars	Crumbling Infrastructure
Albuquerque	CR				
Atlanta	HR	X	X		
Austin	CR		X		
Baltimore	HR, LR		X		
Boston	CR, HR, LR			X	X
Buffalo	LR		X		
Charlotte	LR		X		
Chicago	CR, HR	X			X
Cleveland	HR, LR				
Dallas-Ft. Worth	CR, LR		X		
Denver	LR		X	X	
Detroit	AG		X		
Houston	LR	X	X		
Jacksonville	AG		X		
Kenosha	SC				
Little Rock	SC				
Los Angeles	CR, HR, LR	X	X		
Memphis	SC				
Miami	AG, HR		X		
Minneapolis	LR		X	X	
Nashville	CR		X		
New Orleans	SC	X			
New York	CR, HR, LR		X		X
Norfolk	LR		X		
Philadelphia	CR, HR, LR				X
Phoenix	LR		X		
Pittsburgh	LR		X		
Portland	CR, LR		X	X	
Sacramento	LR		X	X	
Salt Lake City	CR, LR				
San Diego	CR, LR			X	
San Francisco	CR, HR, LR	X	X	X	
San Jose	CR, LR		X	X	
San Juan	HR		X		
Seattle	CR, LR		X	X	
St. Louis	LR		X		
Tampa	SC				
Washington	CR, HR	X			X

Notes: Abbreviations stand for automated guideways (AG), cable car (CC), commuter rail (CR), heavy rail (HR), light rail (LR), and streetcar (SC). "Transit apartheid" refers to regions where investments in rail transit led to reduced transit service to low-income neighborhoods; "Peter Principle" refers to transit systems that have suffered large cost overruns or ridership shortfalls; "Land-Use Czars" refers to regions that have tried to boost rail ridership by imposing draconian land-use rules; and "Crumbling Infrastructure" refers to rail systems that have fallen into a state of poor repair due to deferred maintenance.

- Philadelphia spent close to $250,000 per mile, Boston spent nearly $1 million per mile, and Pittsburgh more than $1 million per mile on light-rail lines.
- Boston and Chicago spent $1.2 million per mile, Philadelphia $1.7 million, and New York $2.2 million per mile on their subway and elevated rail lines.

This suggests that spending anything less than an average of $0.5 million per mile per year on commuter rail, $1 million per mile each year on light rail, and $2 million per mile per year on subways and elevateds will be inadequate to maintain systems after they reach 30 years old.

Table 6 shows the regions where each of these stresses is most serious. See Appendix D for a region-by-region discussion of rail systems and the stresses they have placed on regional transportation networks.

Federal Incentives for Rail Transit

If rail transit is so unsuccessful, then why do so many cities want to build it? One reason is standard public-choice theory: a few powerful groups, notably rail contractors and downtown property owners, get enormous profits while everyone else pays a relatively small amount in their taxes. But this can be true for just about any public works project. What has made rail transit special is a number of incentives in federal transportation programs that reward transit agencies for selecting high-cost transit systems rather than more affordable buses.

When the federal government began funding urban transit in 1964, only about 10 American urban areas still had some form of rail transit. That number has nearly quadrupled today, and one major reason for this is incentives for rail construction built into federal funding formulas.

- First, a majority of federal transit funds are dedicated to regions with rail transit, while the remainder is divided among cities with bus transit, whether or not they have rail transit. To be eligible for the larger pot of money, transit agencies need to build their own rail lines.
- Second, in 1973 Congress allowed cities to cancel planned urban interstate freeways and apply the federal funds to transit capital improvements. Since few cities had enough money to operate all of the buses that they could purchase with the funds released by not building an interstate freeway, Portland, Oregon; Sacramento, Californa; and other cities chose rail transit as a high-cost solution that could absorb lots of federal capital dollars without imposing high operating costs. While this law was repealed in 1982, it kick-started the light-rail construction boom that has now reached at least two dozen urban areas.
- Third, other federal transit funds are also mostly dedicated to capital improvements, with only about 20 percent going for operating costs. Since the ratio of capital costs to operating costs for buses is about 1 to 4, while for rail it is closer to 4 to 1, the 4-to-1 division of federal capital and operating funds fits rail better than buses.[39]
- Fourth, since 1991 federal funds for new rail construction have been in an "open bucket," which means the cities that propose the most expensive transit projects get the most money. Most other transportation funds are distributed using formulas based on population or similar state and local attributes. The open bucket promotes wasteful rail projects where buses would work as well or better at a far lower cost.
- Fifth, as previously noted, federal law requires regions to return any federal grants spent on cancelled transit projects. This makes it less expensive to claim a project is a success than to admit it is a failure.
- Finally, federal law requires transit agencies to obtain the approval of transit

Federal funds for rail construction are an "open bucket," which means the cities that ask for the most wasteful projects are likely to get the biggest grants.

unions for any grant applications submitted to the federal government. While the unions are not necessarily biased in favor of rail, they tend to prefer high-cost solutions over transit options that could move more people at a lower cost.

Until these incentives are changed, American cities and urban areas will continue to promote rail transit despite its high costs and negligible benefits.

Conclusions

Congress should stop funding rail rehabilitation, giving transit agencies a choice between locally funding rail maintenance or shutting down rail lines as they wear out.

Since around 1970, the modern rail transit boom has led American cities to spend close to $100 billion building, and billions more operating, new rail transit lines. This analysis indicates that these new lines almost always waste taxpayer dollars. Instead of providing cost-effective transportation, rail transit mainly transfers wealth from taxpayers to rail contractors, downtown property owners, and a few transit riders who prefer trains to buses.

Most of the few rail regions that enjoyed increases in per-capita ridership or transit's share of commuting supplemented rail construction with strict land-use rules that reduce housing affordability; transportation plans that deliberately increase congestion to discourage driving; and subsidies to high-density transit-oriented developments along the rail lines. The costs of these policies are high and benefits negligible.

By almost any objective criteria—profitability, ridership, cost-efficiency, the Cable-Car Test, economic development, and the effect of rail transit on a region's transportation system as a whole—few American rail transit systems make sense. Congress should correct the perverse incentives that encourage transit agencies to choose high-cost solutions to transit problems. Transit agencies should stop building rail transit. With the possible exception of a few subway and commuter-rail lines in New York and one or two other major cities, agencies should make plans to shut down existing systems when they are worn out and would otherwise require expensive rehabilitation. Those exceptions should be maintained only if they can be locally funded, preferably out of user fees and not general taxes.

Appendix A: Nomenclature and History

Federal Transit Administration data distinguish six kinds of rail transit:

- *Automated guideways*, sometimes called "people movers," run, as the name implies, without a human operator. They are popular in large airports where they often provide the only public conveyance between terminals. Several cities, including Detroit; Irving, Texas; Jacksonville, Florida; and Miami, have elevated automated guideways in their downtowns. The FTA also classifies the privately financed Las Vegas monorail as an automated guideway.
- *Cable cars* are mechanically powered by a cable in the ground. Though once found in 30 American cities, the only remaining cable cars are in San Francisco.
- *Commuter rail* usually operates on tracks shared with freight trains and consists of unpowered passenger cars hauled by a diesel or electric locomotive.
- *Heavy rail* includes subways and elevateds and is distinguished from light rail and commuter rail in having its own exclusive right-of-way, never intersecting with auto or pedestrian traffic.
- *Light rail* sometimes operates in streets and sometimes on its own right of way.
- *Monorail* is a form of elevated transportation. As the FTA defines it, the only monorail in the United States is the Seattle monorail built as a tourist attraction for the 1962 World's Fair.

The terms "heavy" and "light" refer to capacities, not weight: Heavy-capacity rail operates exclusively in its own right of way, so

train length is limited only by station platform size—usually eight or ten cars long—and trains can carry up to 2,000 people. Since light-capacity rail sometimes runs in city streets, trains cannot be longer than a city block, which in most cases means a typical light-rail train cannot carry much more than about 500 people.

The FTA counts all electric streetcars as a form of light rail, but this paper distinguishes between the two. As used in this paper, "light rail" refers to vehicles that are around 100 feet long and can be operated in trains of two to four cars, while "streetcar" means shorter routes using smaller vehicles operated one at a time. *Vintage streetcars* are older or "old-fashioned style" cars designed mainly for tourists, while *modern streetcars* have been built mainly for residents of trendy districts (or districts that planners hope will become trendy).

In 1910, close to 800 American cities had streetcars. Many of these lines were built as real estate promotions: developers paid for the cost of construction in order to attract homebuyers who would have otherwise considered the developments to be too far from job centers. While transit fares covered the costs of operating the lines, the fares were often not enough to pay the capital costs—which meant the lines failed to build reserves to cover the cost of reconstructing the lines when rails and equipment wore out.

Subways and elevateds were found in only the largest cities, including New York, Boston, Philadelphia, and Chicago. What is now called light-rail technology—cars around 100 feet long that could be operated in trains of several cars—were first used in 1937 to connect Berkeley and Oakland with San Francisco across the then-new Bay Bridge.

In the 1920s, competition from the automobile reduced transit profitability and nearly halted the growth of rail systems. When faced with the cost of building new rail lines or replacing aging rail infrastructure, most transit managers realized that buses that shared the costs of roads with autos were far more economical, and they steadily replaced streetcar lines with buses from the 1920s through the 1960s. After 1930, the only new rail transit construction was undertaken by government agencies.

By 1966, only eight American cities still had some form of rail transit. Yet San Francisco had begun building the Bay Area Rapid Transit system. Opened in 1972, BART has been a failure by any objective measure. It cost 50 percent more than anticipated and attracted only half the projected riders. Planners initially projected that fares would cover all of BART's operating costs and some of its capital costs. Instead, fares covered well under half of operating costs. Yet, "as a public relations enterprise," observes University of California transportation analyst Melvin Webber, it was an "unquestionable success." As a result, Webber warned, BART could "become the first of a series of multi-billion-dollar mistakes scattered from one end of the continent to the other."[40]

Webber's fears proved correct. In the 1970s, the federal government subsidized BART-like heavy-rail lines in Atlanta and Washington. In the 1980s, Baltimore and Miami also built heavy-rail lines; San Diego, Portland, San Jose, Buffalo, and Sacramento built light-rail lines; and Detroit, Jacksonville, Miami, and Tampa built automated guideways.

Downtown automated guideways were so unsuccessful that Tampa dismantled its people mover in 2000, and the one in Irving operates only during lunch hours.[41] Heavy rail also proved to be far too expensive for cities that did not have extremely dense job centers. So most new rail construction in the 1990s and 2000s was light rail, which costs about half as much per mile as elevateds and as little as one-tenth as much as subways. The 1990s also saw new commuter-rail lines open in Dallas-Ft. Worth, Los Angeles, the San Francisco Bay Area, Seattle, and the Maryland and Virginia suburbs of Washington, followed by lines in Nashville; Portland, Maine; Portland, Oregon; and Salt Lake City in the 2000s. At the end of 2009, rail transit lines were operating or under construction in about three dozen American urban areas, and dozens more were considering rail transit proposals.

BART was a disaster for Bay Area transit, but it was a public-relations success, leading other cities to want their own "multi-billion-dollar mistakes."

About every 30 years, rail cars, track, and other rail infrastructure must be completely replaced.

Appendix B: Data Sources

Most of the data in this report come from the Department of Transportation and the Census Bureau. Since 1960, the Census Bureau has gathered information about how commuters get to work in each decennial census and, since 2000, in the annual American Community Survey. Data for 1990, 2000, and the years since 2000 are downloadable from the Census Bureau's website.[42] Unless otherwise noted, census data in this report are for urbanized areas, not cities or metropolitan statistical areas. These census data are used to estimate the share of a region's commuters who use transit to get to work.

The Federal Transit Administration publishes the National Transit Database each year. This database includes information on ridership, passenger miles, operating and capital costs, fares, vehicle miles, vehicle rosters, energy consumption, and other pertinent transit data for every transit agency and mode of transit. Downloadable data are available back to 1991 (1992 for capital cost data) at the National Transit Database website.[43] Except for capital cost data, most of the data are available in published form dating back to 1982.

To compare transit's share of total travel, as opposed to just commuter travel, passenger miles in the National Transit Database can be compared with vehicle miles traveled in each urban area published in *Highway Statistics* by the Federal Highway Administration. Table HM-72 lists daily vehicle miles traveled in each urban area.[44] This is multiplied by 365 to convert to annual vehicle miles and—based on Department of Transportation surveys—by 1.6 to convert to passenger miles.[45]

Appendix C: Calculating Capital and Maintenance Costs

Comparing a system's revenue from transit fares to operating costs for a given year is relatively straightforward. However, comparing revenue to total system cost—both operating and capital—is much more difficult. Rail transit projects have huge up-front capital costs, but after new rail lines begin operating, annual capital costs are low. About every 30 years, rail cars, track, and other rail infrastructure must be completely replaced. From a strict accounting point of view, this is a maintenance cost, but the Federal Transit Administration includes such costs with capital costs.

For transit systems that are largely more than 40 years old, such capital and maintenance costs can fluctuate tremendously from year to year. The FTA has published capital cost data by transit agency and mode for each year from 1992 through 2008. The average of these costs, after adjusting for inflation using gross domestic product price deflators, is used here as an estimate of annual capital/maintenance costs that can be counted against 2008 transit fares and other benefits in Table 1.[46] (In many cases, this is an underestimate as many lines suffer from deferred maintenance.)

For rail transit lines that opened since 1970, actual capital costs are available from a variety of published sources (Table C-1). These numbers are adjusted for inflation to 2009 dollars using GDP deflators.

To compare with annual data, FTA guidelines specify that capital expenses be amortized at a 7 percent discount rate over the useful life of the improvements. The FTA further specifies that rail structures, track, and signals have a useful life of 30 years, parking lots and grade crossings have a useful life of 20 years, rail cars and locomotives have a useful life of 25 years, and right of way has a useful life of 100 years.[47] Because none of the available sources have broken down costs into these categories, this paper amortizes all capital costs over 30 years.

As Table C-1 shows, construction of new rail transit lines—those opened for service after 1970—collectively cost American cities more than $90 billion (in 2009 dollars). All of those lines combined carried less than 40 percent as many passenger trips in 2008 as the

New York City subway, yet their operating losses were 75 percent greater: $1.68 billion for new lines vs. $944 million for the New York subway.[48]

Table C-1
New Rail Transit Capital Costs in Millions of 2009 Dollars

Urban Area	Mode	Capital Cost ($millions)	Annualized	Miles	Cost per Mile ($millions)	Source
Albuquerque	CR	400	31.6	97.0	4	MRCOG [v]
Atlanta	HR	4,187	334.2	51.9	81	Baum-Snow [ix], *New Starts*
Baltimore	HR	2,706	216.0	17.0	159	Baum-Snow, Kozel [x]
Baltimore	LR	760	60.7	28.8	26	Baum-Snow
Boston-Portland ME	CR	5	0.4	57.0	0	NTD [vi]
Buffalo	LR	1,240	99.0	7.1	176	Baum-Snow
Charlotte	LR	472	37.7	4.7	100	NTD
Dallas	LR	3,560	284.2	49.2	72	NTD
Dallas-Ft. Worth (Irving)	AG	74	5.9	5.5	13	Panayotova [i]
Dallas-Ft. Worth	CR	544	43.4	23.8	23	NTD
Denver	LR	1,523	121.6	36.2	42	Baum-Snow, RTD
Detroit	AG	360	28.7	2.9	124	*Washington Post* [ii]
Houston	LR	434	34.7	9.1	48	NTD
Jacksonville	AG	236	18.8	5.4	44	*Florida Times-Union* [iii]
Kenosha	SC	2	0.2	1.9	1	NTD
Little Rock	SC	35	2.8	3.5	10	NTD
Los Angeles	CR	1,574	125.7	327.9	5	NTD
Los Angeles	HR	7,801	622.8	17.1	458	Baum-Snow
Los Angeles	LR	4,472	357.0	58.2	77	Baum-Snow, *New Starts* [xiv]
Memphis	SC	129	10.3	10.5	12	NTD
Miami	AG	608	48.5	9.4	65	Miami-Dade Transit [iv]
Miami	CR	857	68.4	76.1	11	NTD
Miami	HR	2,008	160.3	28.0	72	Miami-Dade Transit
Minneapolis	LR	701	56.0	13.3	53	NTD
Nashville	CR	43	3.4	16.5	3	Metro Jacksonville [vii]
New York (Hudson-Bergen)	LR	1,394	111.3	7.0	201	Dantata [xv]
Philadelphia (River Line)	LR	1,288	102.8	34.0	38	*New York Times* [xvi]
Phoenix	LR	1,476	117.8	19.6	75	NTD
Portland	CR	172	13.8	14.7	12	*Tigard Times* [viii]
Portland	LR	2,970	237.1	48.0	62	Pickrell [xvii], NTD
Portland	SC	122	9.7	3.9	31	City of Portland[xx]
Sacramento	LR	1,084	86.5	36.6	30	Pickrell, NTD
Salt Lake City	CR	758	60.5	26.1	29	NTD
Salt Lake City	LR	1,112	88.8	20.1	55	NTD

Continued next page

Table C-1 *Continued*

Urban Area	Mode	Capital Cost ($millions)	Annualized	Miles	Cost per Mile ($millions)	Source
San Diego	CR	433	34.6	48.9	9	NTD
San Diego	LR	1,846	147.4	51.3	36	Baum-Snow, *New Starts* [xviii]
San Diego (North County)	LR	315	25.1	16.3	19	NTD
San Francisco	HR	13,279	1,060.2	133.8	99	Webber [xi], NTD
San Jose	CR	98	7.8	45.0	2	NTD
San Jose	LR	1,698	135.5	39.8	43	Baum-Snow
San Juan	HR	1,988	158.7	12.8	156	New Starts [xii]
Seattle	CR	1,230	98.2	70.4	17	NTD
Seattle	LR	2,866	228.8	13.9	206	NTD
Seattle	SC	46	3.7	2.6	18	NTD
St. Louis	LR	1,940	154.9	48.2	40	Baum-Snow, *Post-Dispatch* [xix]
Tacoma	SC	97	7.7	2.7	36	*Tacoma News-Tribune* [xxi]
Tampa	SC	10	0.8	3.2	3	NTD
Washington	HR	18,232	1,455.6	106.3	172	NTD, FTA [xiii]
Washington MARC	CR	707	56.4	235.5	3	NTD
Washington VRE	CR	354	28.3	80.8	4	NTD
National total/average	AG	1,278	102.0	23.2	55	
National total/average	CR	7,174	572.5	1119.5	7	
National total/average	HR	50,201	4,007.8	366.7	137	
National total/average	LR	31,151	2,487.0	541.0	58	
National total/average	SC	441	35.2	28.3	16	
National total/average	All	90,246	7,205.5	2078.7	45	

Sources: [i] Tzveta Panayotova, "People Movers: Systems and Case Studies," University of Florida, 2003, p. 9, tinyurl.com/yaudd5e; [ii] "Detroit Transit System Finally Moving People," *Washington Post*, August 1, 1987, tinyurl.com/ycczqyx; [iii] David Bauerlein, "Final Part of Skyway to Open Wednesday," *Florida Times-Union*, October 27, 2000, tinyurl.com/ydunj3t; [iv] "Facts at a Glance," Miami-Dade Transit, 2009, tinyurl.com/y9jb554; [v] "Project Plans—Funding," Mid-Region Council of Governments, Albuquerque, 2009, tinyurl.com/ycwmap8; [vi] *National Transit Database Historical Datafiles* (Washington: Federal Transit Administration, 2009), "Capital Expenditures Time-Series" spreadsheet, tinyurl.com/yhubppv; *2008 National Transit Database* (Washington: Federal Transit Administration, 2009), "capital expense" spreadsheet, tinyurl.com/yeuucn8; [vii] "Rail on a Budget: Nashville's Music City Star," Metro Jacksonville, September 18, 2007, tinyurl.com/nwk296; [viii] "TriMet Adds 'New' Rail Cars to Backup WES," *Tigard Times*, October 29, 2009, tinyurl.com/ykslrbo; [ix] Nathaniel Baum-Snow and Matthew E. Kahn, "Effects of Urban Rail Transit Expansions: Evidence from Sixteen Cities, 1970-2000," *Brookings-Wharton Papers on Urban Affairs*, 2005, no. 6, pp. 147–206, tinyurl.com/ykxbw3j; [x] Scott Kozel, "Baltimore Metro Subway," Roads to the Future, 1997, tinyurl.com/yaw2m4f; [xi] Melvin M. Webber, "The BART Experience—What Have We Learned?" Institute of Transportation Studies Monograph No. 26, 1976, Berkeley, CA, p. 35, tinyurl.com/ydtwvjp; [xii] *Annual Report on New Starts 2005* (Washington: Federal Transit Administration, 2003), Appendix A, "Tren Urbano," p. 2, tinyurl.com/yb2xjrq; [xiii] "FY 2000 Statistical Summary," Federal Transit Administration, 2001, tinyurl.com/ya5y55b; [xiv] *Annual Report on New Starts 2008* (Washington: Federal Transit Administration, 2006), Appendix A, "Metro Gold Line Eastside Extension," p. 2; [xv] Nasiru A. Dantata, Ali Touran, and Donald C. Schneck, "Trends in U.S. Rail Transit Project Cost Overrun," paper presented to the Transportation Research Board, 2006, table 2, tinyurl.com/34g9rd; [xvi] Robert Strauss, "The Twenty-First Century Unlimited," *New York Times*, November 21, 2004, tinyurl.com/ya364xe; [xvii] Don Pickrell, "Urban Rail Transit Projects: Forecast Versus Actual Ridership and Costs," Department of Transportation, Cambridge, MA, 1989, p. xv; [xviii] *Annual Report on New Starts 2005* (Washington: Federal Transit Administration, 2003), Appendix A, "Mission Valley East Extension," p. 2, tinyurl.com/y8rhkgt; [xix] Elisa Crouch, "MetroLink Expansion: Can We Afford the Ride?" *St. Louis Post-Dispatch*, August 24, 2006, tinyurl.com/y9mtqpm; [xx] "Portland Streetcar Development Oriented Transit," City of Portland, 2008, p. 7, tinyurl.com/ye38dkr; [xxi] Aaron Corvin, "Streetcar Debut Stirs Memories of Early Rail Transit in Tacoma," *Tacoma News-Tribune*, August 22, 2003.
Note: Since 1960, American cities have spent $90 billion building 2,000 miles of new rail transit lines.

Appendix D: Rail Systems by Region

The following is a brief description of the rail systems in the 31 urban areas that have or are about to open commuter-, heavy-, and light-rail lines. Most people movers and streetcars are not discussed as they contribute little to personal mobility.

Albuquerque: The state of New Mexico and Albuquerque's metropolitan planning organization started a commuter-rail line in 2006 and extended it to Santa Fe in 2008. Start-up costs were $400 million and annual operating deficits are close to $20 million per year. This line received no Federal Transit Administration capital grants, so it does not appear in the National Transit Database. The trains carry less than 2,500 round trips per day, meaning a fleet of no more than two dozen buses costing less than $12 million could carry all those riders.

Atlanta: Built at around the same time and using similar technology to the Washington Metro rail system, Atlanta's rail network has been a miserable failure. First opened in 1979, ridership peaked in 1985 and then stagnated despite a rapidly growing population. From 1985 to 2008 per capita ridership fell by more than 50 percent.

Transit apartheid is a major reason for this decline. The high cost of building rail to Atlanta's middle-class suburbs led the Metropolitan Atlanta Transit Authority to triple inflation-adjusted fares since 1980, while it cut bus service to low-income, inner-city neighborhoods that provide the core of transit patronage. Budget shortfalls in 2005 forced MARTA to reduce bus service by 15 percent—but it increased rail service by 4 percent. From 1985 through 2008, the population of the Atlanta urbanized area grew by 121 percent and MARTA increased rail service by 138 percent despite its low ridership. But it increased bus service by only 8 percent.[49]

Austin: Austin's Capital Metro promised to open a commuter-rail line in the spring of 2008. In a clear case of the Peter Principle, that opening has been delayed nearly two years due to poor planning, construction delays, safety problems, and disputes with its contractors. "We moved one station three times and we relocated another station twice," admitted the transit agency's CEO, Fred Gilliam.[50] Gilliam later resigned in disgrace and the rail line is still not operating.[51]

"By its own admission," writes reporter Ben Wear of the *American Statesman*, Capital Metro "didn't know when it asked voters in 2004 for permission to build the 32-mile line how complex an undertaking it faced, or the full scope of the project, or the work and time required to fix glitches and malfunctions that would arise along the way."[52] As of the end of 2008, the line was already more than 15 percent over budget, and the cost is likely to go much higher before it is completed.[53]

In 2002, Capital Metro had $200 million in the bank, as the sales taxes it collected were more than it needed to operate its bus system. To "protect" itself from politicians who might raid its cash horde or reduce its tax rate, the agency decided to build a rail line. Now, having gone over budget and not yet collected a single rail fare, it is "nearly tapped out financially and struggling to get a commuter-rail line out of the station."[54]

Baltimore: Baltimore's efforts to build rail are a clear case of the Peter Principle. In 1984, the city opened a subway/elevated line that went 60 percent over budget.[55] In 1992, it opened the first stage of a light-rail line, parts of which went at least 40 percent over budget.[56] These lines greatly added to the costs of operating Baltimore transit. In 1982, Baltimore spent $180 million (in 2008 dollars) operating its bus system.[57] By 2008, it spent nearly $290 million operating its buses plus another $92 million operating its rail lines.[58]

Yet rail transit did nothing for transit ridership. In 1982, as subway construction began, Baltimore buses carried more than 122 million passenger trips. By 1985, the first full year of subway operation, bus and rail ridership together had fallen below 108 million trips. In 1993, the first full year of light-rail operation, ridership was less than 101 million trips. Since

Austin's transit agency spent hundreds of millions of dollars on a rail line mainly to protect its now-exhausted reserve fund from being raided by other government entities.

then, despite construction of 46 more miles of light-rail and subway lines, ridership has hovered around 100 million trips per year.[59]

Boston: Of cities with older rail systems, Boston has had the largest growth in transit usage over the past 25 years, reporting a 40 percent increase in ridership. However, it also is one of the biggest examples of crumbling infrastructure. "The Massachusetts Bay Transportation Authority (MBTA) is in danger of collapsing under its own operating expenses and debt obligations, to the point that it can't even pay for repairs that are vital to basic safety," reported the *Boston Globe* in November, 2009.[60]

Until 2000, the state funded the MBTA's deficits each year. To give transit officials an incentive to control costs, the 1999 legislature dedicated a 1 percent sales tax to the MBTA. But, instead of controlling costs, a 2009 assessment found that costs grew by 5 percent per year, while sales taxes fell $20 to $40 million short of expectations each year after 2004.[61]

As a result, the MBTA allowed the system to fall into greater disrepair. Between 2004 and 2009, the backlog of projects needed to restore the system to a "state of good repair" grew from $2.7 to $3.2 billion and many projects critical to safety were left unfunded. Just to keep the system in its existing state of repair, D'Alessandro found, the agency would have to spend $224 million more per year on maintenance than it actually spends.[62]

MBTA also dealt with rising costs by restructuring its debt. However, its total debt grew from $5.6 billion in 2001 to $8.5 billion in 2009.[63] In 2009, the agency spent $245 million, or 17 percent of its total revenues, on interest alone.[64] The 2009 state review concluded that MBTA should "slow expansion until the safety and maintenance priorities can be addressed." As the report said, "It makes little sense to continue expanding the system when the MBTA cannot maintain the existing one."[65]

Buffalo: In another illustration of the Peter Principle, Buffalo's light rail cost 50 percent more than projected.[66] After it opened, transit ridership immediately dropped by about 15 percent, and continued to fall thereafter.[67] Far from revitalizing downtown, as planners hoped, light rail on Main Street has corresponded with a further decline in downtown businesses: vacancy rates increased 27 percent and property values declined 48 percent.[68]

Charlotte: The Charlotte Area Transit System opened a light-rail line in late 2007 that cost more than $470 million, about 60 percent more than initial projections.[69] The system's 2008 transit ridership grew by about 10 percent, but that may have been as much due to high gas prices as to the light-rail line. It is too soon to tell how well the line will work in the long run.

Chicago: The Windy City's transit infrastructure is in worse condition than Boston's. Rail lines operated by the Chicago Transit Authority are in such poor condition that the agency is forced to run some trains at just 6 miles per hour to maintain safety. The agency says it needs $8.7 billion to bring its tracks and trains into a state of good repair, but it doesn't even have the money to maintain the tracks in their existing poor condition.[70] According to the agency's most recent review, 42 percent of CTA's bridges and 70 percent of Chicago's commuter-rail bridges are "past their useful life," meaning repairs are no longer cost effective.[71] One factor making maintenance difficult is the agency's $2.6 billion worth of debt; interest payments alone cost $176 million a year.[72]

Despite the region's population growth, Chicago transit ridership has fallen since the 1980s. The entire decline has been in bus ridership as Chicago cannibalized its bus service to maintain rail. In 2008, the Chicago Transit Authority ran its buses 9 percent fewer miles than in 1983, contributing to a 35 percent decline in bus ridership. While rail ridership grew by 33 percent in that period, since there were more than twice as many bus as rail riders in 1983, the net result has been a 15 percent loss in overall transit ridership.

In an example of transit apartheid, as CTA's infrastructure crumbles, its sister agency Metra has doubled the region's com-

Though it continues to expand its rail system, Boston's transit agency can't even afford to pay for repairs of existing lines that are vital to public safety.

muter-rail service since 1983. But in attempting to serve suburban commuters, Chicago sacrificed its core market of inner-city bus riders, gaining 20 million commuter-rail trips but losing 180 million bus trips.

The effort to attract suburban commuters out of their cars was only minimally successful. The 2000 census revealed that the Chicago urban area gained more than 500,000 new commuters since 1990, but it had lost 31,000 transit commuters. This is because virtually all of the new jobs were in the suburbs, where transit is ineffective, while the number of inner-city jobs and inner-city commuters taking transit to work both declined.[73]

Cleveland: Cleveland still had a few streetcar lines when the city-owned Cleveland Transit System opened the nation's first postwar rail transit line in 1955. In the last two decades, the Greater Cleveland Regional Transit Authority has invested close to $500 million refurbishing and maintaining those lines. Yet transit ridership fell by almost 50 percent in the 1980s and has been stagnant since the early 1990s.

Dallas-Ft. Worth: Despite spending hundreds of millions on light rail and commuter rail, rail transit has had virtually no impact on the transportation habits of the region's residents. In 1990, before any rail was operating, 2.7 percent of the region's commuters took transit to work. By 2008, when the region had nearly 75 miles of rail transit, just 2.2 percent of commuters took transit to work.

Like other regions, Dallas-Ft. Worth has attempted to promote transit-oriented developments along its rail lines. Unlike regions in Oregon, California, and a few other states, Texas municipal governments can wield only carrots, not sticks, in promoting such developments, as Texas law does not allow counties to zone unincorporated areas. As a result, transit planners must rely solely on subsidies rather than urban-growth boundaries and their effects on land prices.

Denver: In 2004, Denver had one light-rail line and was building a second when it persuaded voters to approve a sales tax increase to build six new rail lines. During the campaign, Denver's Regional Transit District claimed that it built the previous lines within the planned budgets. In fact, the first light-rail line cost 28 percent more than the original projection.[74] The second line went 59 percent over its original projection.[75] They were "on budget" only because the agency increased the budget when cost overruns became apparent.

Prior to the election, rail critic Wendell Cox predicted that Denver's rail plans would go over budget. "RTD cannot deliver the whole system for anything like $4.7 billion," predicted Cox. RTD General Manager Cal Marsella immediately responded that it "absolutely can."[76]

Soon after the election, RTD's projected cost of the planned rail lines grew by 68 percent (later modified to 40 percent when the recession reduced construction costs). Moreover, the sales tax revenues that were supposed to pay for construction fell well short of projections. Marsella claimed that the events that caused his agency's predictions to be wrong "could not have been foreseen."[77] But that's exactly why transit agencies should avoid projects that require impossibly accurate predictions of the distant future.

Amid growing controversies, Marsella resigned in 2009.[78] RTD now says it only has the funds to complete two or three of the six lines and, even if it could build all six lines, it won't have enough money to operate them all.[79] The agency may ask voters for another tax increase to complete all six lines.[80]

Houston: Between 1995 and 2001, Houston bus ridership had experienced steady growth from 79.6 million to 99.2 million trips per year. That growth stopped when Houston began construction of its first modern light-rail line in March 2001. By 2004, when the $380 million light rail opened for business, bus ridership was down to 87.9 million trips.

Light-rail trips made up for part of the fall in bus ridership. But bus trips continued to decline, reaching 84.6 million in 2008. Total 2008 bus and rail trips were 96.4 million, less than 2001 bus trips. This actually underestimates the decline in trips, because Metro rerouted many bus routes that formerly had

Soon after persuading voters to approve a tax increase to build 119 miles of new rail lines, Denver admitted that rail costs were 68 percent higher than projected and, even if it could build the lines, it couldn't afford to operate them.

In 2002, when Miami-Dade Transit asked voters for funds to "complete the rail system," it failed to admit that it was desperately short of funds just to maintain the existing system.

downtown destinations so that they terminated at light-rail stations, forcing many riders to transfer. Transit agencies count every time someone boards a transit vehicle as a separate trip, but total personal trips (called "linked trips" in transit agency jargon) were far fewer.

A major reason for the decline in transit ridership is a reduction in bus service necessitated by the high cost of rail construction. Service had grown from 37.5 million vehicle revenue miles in 1995 to 45.0 million in 2003, but declined thereafter, falling to 39.6 million in 2008.

The opening of light-rail lines does not reduce the need for bus service as much as it changes the character of that service. Light rail replaces trunk line buses headed for major destinations such as downtowns, but most transit agencies convert those bus routes into feeder buses for the light rail. The result is that transit agencies in many cities increase bus mileage when they open light rail. When they do not, as in Houston's case, the result is a drop in ridership.

Los Angeles: Los Angeles opened its first modern light-rail line in 1990 and a subway in 1993, both of which had cost overruns of about 50 percent. To cover rail costs, the Rapid Transit District (later renamed the Metropolitan Transportation Authority) began increasing fares while it cut bus service from 92 million vehicle revenue miles in 1985 to 76 million in 1995. The result was a 21 percent drop in bus ridership. Rail ridership made up for only a fifth of this decline.

The NAACP sued MTA, arguing in effect that Los Angeles is another example of transit apartheid, with the city building rail lines to white neighborhoods but cutting bus service to black and Latino neighborhoods. An out-of-court settlement in 1996 forced MTA to improve bus service, freeze fares for a decade, and scale back its rail plans.

Total transit ridership returned to 1985 levels in 2000, and bus ridership alone returned to 1985 levels by 2006. However, fare increases at the end of the decade-long freeze contributed to a 15 percent drop in bus ridership and a 13 percent drop in total ridership in 2008. Ironically, MTA's CEO argued that the fare increase was needed so that the agency could use more of its sales tax revenues as matching funds to get federal grants to build more rail lines, suggesting a return to transit apartheid.[81]

Miami: In the mid-1980s, Miami built a two-mile downtown "people mover" that went more than 100 percent over budget and a 10-mile elevated rail line that went 33 percent over budget. Miami's transit ridership has doubled since it first opened the rail lines in the mid-1980s—but almost all of that growth has been among bus riders. In 2008, buses carried more than three-fourths of Miami-Dade's transit riders.

In 2002, voters agreed to increase the sales tax to "complete the rail system" by building 89 more miles of elevated rail lines.[82] What voters didn't know was that, by 2002, Miami-Dade Transit was desperately short of the cash it needed just to maintain the existing rail lines. The agency was scheduled to overhaul the rail cars on both the people mover and the elevated lines by 1999, but it lacked the money to do so. As a result, the cars were rapidly declining and the FTA was threatening to shut down the system. Soon after the election, the transit agency contracted to repair or replace the cars, which ended up costing far more than anticipated.[83]

As a result, instead of the 89 miles of new rail routes, it now appears likely that less than 10 miles of rail lines will be built. Moreover, the existing routes are now served by fewer daily trains than before the measure passed. Miami-Dade Transit had also promised to greatly expand bus service with the new tax revenues; initial expansions have since been cut back and are now only about a third of the promised levels.[84]

Meanwhile, the South Florida Regional Transportation Authority (Tri-Rail) began offering commuter-rail service between Miami, Ft. Lauderdale, and West Palm Beach in 1989. In 2008, the agency spent nearly $53 million operating this service and collected less than $9 million in fares.[85] Over the life of the service,

Tri-Rail has spent nearly $1 billion on capital improvements, most of it going to double-track the 71-mile rail line.[86] This was supposed to allow service improvements that would attract more than 30,000 new riders each weekday.[87] Although double-tracking was completed in 2007, Tri-Rail carried just over 13,000 weekday riders in 2008, less than a third more than in 1994 before the expensive project began.[88]

Minneapolis: The Hiawatha light-rail line opened in 2004 at a cost of more than $700 million, about 50 percent more than the initial projections.[89] The line increased the region's transit ridership. But, far from relieving congestion, it significantly added to it. Because transportation officials adjusted traffic signals to give preference to trains over highway vehicles, motorists on the highway parallel to the rail line found their journeys took 20 to 40 minutes longer than before the line opened.[90]

Nashville: As previously noted, the *Music City Star* cost less than most rail lines, but the tiny number of passengers it carries each day cannot justify even this low cost.

New Orleans: The St. Charles streetcar line is the oldest continuously operated streetcar route in the world and still uses vehicles built in the 1920s. In order to boost tourism, the city added two new lines in the early 2000s—one of them just in time to be destroyed by Hurricane Katrina. The lines did nothing for local transit ridership, which steadily declined in the years before Katrina.

New York: New York transit systems carry more trips each year than the transit systems of the next 15 largest urban areas, and almost twice as many rail trips as all other rail transit systems in the nation combined. Even some of the severest critics of rail transit call New York transit a success.[91] Yet a look at the transit system's finances once again raises the question, "How do you define success?"

New York City's Metropolitan Transportation Authority rail infrastructure was in dire straights in the early 1980s, when "a third of the fleet was typically out of service during the morning rush hours, cars broke down or caught fire, trains derailed on hazardous track, and graffiti covered virtually every car."[92] Despite improvements from those dark days, only about two-thirds of the system's multi-billion-dollar annual maintenance needs are funded.[93] Even if fully funded, some parts of the system would not reach a state of good repair until 2028.[94]

The agency gets much of its funds from toll bridges that cross into Manhattan and a real estate transfer tax. To provide more, the legislature approved five new taxes in 2009, including a payroll tax (which it called a "mobility tax" even though it was imposed on people who work at home).[95] Yet these taxes are only expected to raise $1.9 billion in 2010, which is barely enough to cover MTA's operating deficit, much less fill its maintenance gap.

As one MTA official recently admitted, "there will never be 'enough money.'"[96] Even as MTA struggles to bring its system into a state of good repair, it is spending billions of dollars expanding the system. This includes two of the world's most expensive transportation projects: first, the Second Avenue Subway, which is projected to cost more than $17 billion for 8.5 miles of subway located just two blocks from an existing parallel subway line.[97] Second is the Long Island Railroad East Side Access, which extends Long Island commuter trains two miles to Grand Central Station at a cost of $7.6 billion.[98]

The New York urban area is also served by many other transit agencies, the largest of which is New Jersey Transit, which is spending billions of dollars on new light-rail lines. While New Jersey Transit bus fares covered more than 100 percent of their operating costs in 2008, the agency's Hudson-Bergen light rail covers only 17 percent of its operating costs out of fares.

Norfolk: Hampton Roads Transit is the latest agency to discover the Peter Principle of rail transit. In 2003, the agency said it could build a 7.4-mile light-rail line for $232 million (2009 dollars) and open it for business by mid-2008.[99] It is currently not expected to open until 2011 at a cost as high as $340 million.[100] In January 2010, the agency's CEO agreed to retire after being told to "resign or

One New York transit official recently admitted that "there will never be enough money" to keep the system in good repair.

To date, Portland has spent nearly $3 billion building light-rail lines and nearly $2 billion subsidizing developments along the light rail and streetcar lines.

be fired" due to the delays and cost overruns.[101]

Philadelphia: The Southeastern Pennsylvania Transportation Authority (SEPTA) operates the nation's fourth-largest rail transit system. Perennially short of funds, these rail lines—like those in Boston and Chicago—are suffering from deferred maintenance. As recently as 2007, SEPTA was forced to transfer $27 million of funds from its capital budget to cover its operating deficit, and also spent all of the $79 million of state "flexible" (available for either capital or operating expenses) funds on operating costs.[102]

Like Boston's transit system before 2000, SEPTA—which depends on the state for nearly half its funding—was funded by the legislature on a year-to-year basis. But in 2007, the state dedicated a share of sales taxes to SEPTA in the hope that this would help SEPTA bring its system into a state of good repair.

Like Boston, SEPTA soon learned that having a dedicated tax base does not assure financial prosperity, as sales taxes are particularly likely to decline during a recession.[103] Not only were revenues down, but the Transport Workers Union went on a six-day strike, demanding that its members get "their share" of the dedicated sales tax.[104] As a result, SEPTA is likely to continue deferring maintenance at least through the end of the recession.[105]

Phoenix: In 1998, Valley Metro projected that it could build a 13-mile light-rail line for $509 million (in 2009 dollars). By the time the line opened the last days of 2008, the cost had ballooned to $1.5 billion for 20 miles—an 88 percent increase in per-mile costs. Considering that transit carries only 0.6 percent of travel in this auto-oriented region, this line is not likely to do much for the region's transportation system.

Pittsburgh: One of the few cities that did not dismantle all of its streetcar lines, Pittsburgh upgraded its surviving lines to light-rail standards in the 1980s and 1990s. Pittsburgh also built some exclusive bus lanes that were nearly as expensive as new light-rail lines. These improvements did little to stop the decline in transit ridership, which has fallen by nearly 30 percent since 1982. Now the city, which seems to think it can promote economic recovery by building rail infrastructure, is spending $550 million on a 1.2-mile extension of its light-rail system called the North Shore Connector.[106]

Portland, Oregon: Heavy investments in rail transit and draconian land-use policies have made Portland one of the few cities that can honestly say rail transit increased per capita transit ridership. To promote compact development and reduce per capita driving, most of Oregon is zoned so strictly that people are not allowed to build homes on their own land unless they own at least 80 acres and earn at least $40,000 to $80,000 (depending on soil productivity) per year farming it.[107] Inside the growth boundaries, Portland and other cities have rezoned dozens of neighborhoods for high-density development. In many cases, zoning was so strict that, if someone's single-family home burned down, they would be required to replace it with multifamily housing.[108]

Although this resulted in rapidly rising land prices, developers failed to build transit-oriented developments along Portland's rail lines. So Portland began offering a variety of subsidies, most of them paid for through tax-increment financing. To date, Portland has spent nearly $3 billion building light-rail lines and nearly $2 billion subsidizing developments along the light rail and Portland's streetcar.

The results have been mixed. While transit ridership has increased since 1990, rail transit still carries less than 1 percent of the region's passenger travel. Moreover, transit's share of commuting declined between 2000 and 2007. In fact, Census Bureau data indicate that the absolute number of transit commuters shrank from about 58,000 in 2000 to 57,000 in 2007 while the number of auto commuters grew by about 66,000.[109]

Surveys of one of the Portland area's largest transit-oriented developments reveal that residents use transit a little more than people in other neighborhoods—but not for commuting.[110] Many transit-oriented devel-

opments have struggled, and research by the Cascade Policy Institute's John Charles has shown that the key to success is plenty of parking; those with inadequate parking tend to have high vacancy rates.[111] In a very real sense, then, successful developments are not even transit oriented.

Sacramento: In the mid-1970s, Sacramento decided to build light rail instead of freeways. At the time, "traffic congestion was essentially non-existent," but transportation planners hoped that "lack of road building and the resulting congestion" would encourage many people to substitute transit for driving.[112]

One part of their plan succeeded: Since 1982, traffic congestion has octupled.[113] But in other respects, planners admit, the plan has "not worked out." "Despite a focus on luring drivers out of their autos," surveys show that most transit riders lack access to an auto, while drivers avoided congestion by finding alternative routes. Efforts to use light rail to shape the region's growth patterns also failed: both housing and jobs have continued to sprawl into areas not served by the rail lines.[114]

Yet the region's latest transportation plan still emphasizes transit and manipulating land-use patterns to make the region more transit oriented. Transit carries less than 0.8 percent of the region's motorized travel, yet the 2006 transportation plan "gives first priority to expanding the transit system, more than doubling light rail mileage."[115] The plan also dedicates $500 million to promote "mixed use and compact development" along the rail lines, attempting to enlarge the market for transit ridership.[116] Much of this is urban renewal funds originally dedicated to curing "urban blight" but now being used to socially engineer new development to promote transit and discourage auto driving.[117] To further support this goal, the California legislature passed a law requiring all new state offices to locate within a half mile of a rail stop.[118]

Some claim that Sacramento's transit-oriented development program is "a model for the nation."[119] But planners admit the land-use components of the region's transportation plan "cannot be evaluated for effectiveness yet."[120] Their models project that the addition of transit-oriented developments to their transportation plan could reduce driving by up to 9 percent.[121] But this has yet to be verified, and many transportation experts believe that transit-oriented development works mainly through "self-selection." That is, people who want to take transit will tend to locate in such developments, but the developments themselves have little effect on overall regional transportation habits.[122]

Salt Lake City: The Utah Transit Authority opened its first modern light-rail line in 1999 and began commuter-rail service in 2008. Ridership data suggest that light rail pirated many passengers away from buses; rail carried 6.1 million riders in its first full year of operation, while buses carried 6.3 million fewer riders that year than in the year before light rail opened. The Utah Transit Authority recently admitted that it has been overestimating light-rail ridership by 20 percent or more.[123] A Utah state auditor found that regional transportation planners "cooked the books" to bias cost-effectiveness analyses in favor of more rail operations.[124]

San Diego: If any new rail transit system in the nation deserves to be called a success, it is San Diego's. Per capita transit ridership and the share of the region's commuters using transit have both grown since the region opened its first light-rail line in 1981. And the transit system has achieved these gains at a remarkably low cost: San Diego's subsidies per passenger mile are second lowest among the nation's major transit systems.

Like Portland, San Diego paired its rail lines with strict land-use policies that encouraged denser development in the region's core and discouraged development at the periphery.[125] San Diego has also used tax-increment financing and other subsidies to promote dense, mixed-use transit-oriented developments along the region's growing rail network.

It is likely that these land-use policies have contributed to the growth of transit ridership, but at enormous hidden costs. One of the largest costs is housing. Median housing

A state auditor found that Salt Lake City transportation planners "cooked the books" to bias the analyses in favor of more rail construction.

prices were a little more than twice median family incomes in 1969.[126] By 2006 they were more than eight times median family incomes, making single-family homes unaffordable to all but the very wealthy.[127]

A second hidden cost is the reduced urban services due to the inability of the city and region to serve increased densities. After the 1979 plan promoted rapid infill development in the region's core, "sewer breakdowns became commonplace" and by 1990 the city estimated "it would cost over $1 billion to make up the infrastructure shortfall."[128] A third hidden cost is traffic congestion, which increased by nine times as the region pursued the policy of emphasizing transit over highways.[129]

Three decades of imposing these costs on the region have contributed to transit growth, yet transit remains an insignificant form of travel in the San Diego urban area. Transit carried just 3.8 percent of commuters to work in 2008 (up from 3.5 percent in 1980), and just 1.5 percent of overall motorized travel in 2007 (up from 1.4 percent in 1982).

San Francisco-Oakland: The San Francisco Bay Area Rapid Transit (BART) system has become a giant money sink for the region. Unlike regions whose rail and bus systems are run by the same agencies, BART is separate from Bay Area bus agencies and effectively competes with those agencies for funds. A member of the Alameda Contra Costa (AC) Transit Board has called BART a "vampire" because it "sucks the lifeblood out of every transit agency with which it comes in contact."[130]

Decisions about the distribution of federal and state transit funds to the various agencies are made by the Metropolitan Transportation Commission. The MTC has been sued by low-income advocates for transit apartheid, for funding BART to wealthy suburbs while denying funds to low-cost bus improvements in low-income neighborhoods.[131] Between 1982 and the present, the region's bus service, measured in vehicle revenue miles, declined by 20 percent, which contributed to a 37 percent decline in bus ridership. This decline is greater than the increase in BART ridership, so overall transit ridership fell by 14 percent.

BART, says one transit advocate, is a "vampire" that "sucks the lifeblood out of every [other] transit agency" in the Bay Area.

In 2003, BART opened a new line in San Mateo County, with the agreement that San Mateo Transit (SamTrans) would cover the operating losses of the new line. Those losses proved to be much higher than expected, forcing SamTrans to reduce bus service by more than 10 percent, leading to an 8 percent loss in ridership.

San Jose: Silicon Valley's first light-rail line opened in 1988, and a second in 2000.[132] Since then, the Santa Clara Valley Transportation Authority (VTA) has been planning more light rail and an extension of the San Francisco BART system to San Jose.

These plans were put on hold when the dot-com crash resulted in reduced sales tax revenues in 2001. VTA was unable to keep its existing system running while meeting its $400 million debt obligations, much less build any new lines. Even after diverting some of the sales tax that was supposed to be dedicated to capital improvements to fund its operations, VTA was forced to reduce both bus and rail service by 20 percent. This contributed to a 34 percent loss in transit ridership between 2001 and 2005, less than a third of which has been recovered since then.

Despite these financial problems, VTA still plans to fund the BART extension even though the environmental impact report for the line projected that it would not take enough cars off of any highway segment to increase rush-hour travel speeds by even 1 mile per hour.[133] In its 2001 regional transportation plan, the San Francisco Bay Area Metropolitan Transportation Commission found that the BART San Jose extension would be so expensive that it would cost more than $100 for every new transit ride it would produce. By comparison, the average cost per new transit ride of bus improvements was less than $7, and some were less than $1.[134]

VTA's insistence on building this rail line combined with its financial ineptitude in managing its bus and light-rail system has led transit expert Tom Rubin to call it "the worst transit operator in the U.S." "I have never found any agency that is so consistently either one of the worst or, commonly, the absolute worst, on every single metric as VTA," says Rubin.[135]

Seattle: In an example of the Peter Principle, transit officials admitted they had grossly underestimated costs soon after Seattle voters approved the region's first light-rail line in 1996. The Central Puget Sound Transit Authority (Sound Transit) decided to build an exclusive right of way for most of the length of the rail line, thus combining the low capacities of light rail with the high costs of heavy rail. The 14-mile line finally opened in 2009 at a cost of $2.1 billion, making it the highest cost-per-mile light-rail line ever built—a dubious achievement the agency expects to beat with its next rail line.

Sound Transit also spent an incredible $1.1 billion on a commuter-rail service that started in 2000. The commuter line attracted far fewer riders than projected, and Sound Transit ended up selling 47 out of the 75 cars it purchased for the trains.

St. Louis: Opening in 1993 after a mere 22 percent cost overrun, the region's first light-rail line initially attracted many new riders.[136] Between 2001 and 2008, however, St. Louis added several extensions to its light-rail system that were less successful: the new lines generated no new rail riders but were accompanied by a decline in bus ridership. Total transit ridership in 2008 was less than in 1998, before any of the extensions opened.

Construction of the new lines led to an unusual degree of rancor between St. Louis' transit agency, Metro, and its contractors. The two filed lawsuits and countersuits over cost overruns that—after the longest jury trial in St. Louis history—the agency ultimately lost, costing Metro millions of dollars in legal fees and claims by the contractors.[137] This left the agency unable to meet its debt and pension obligations and resulted in the forced resignation of Metro's general manager, Larry Salci.[138]

Bus ridership declined for a simple reason: bus service declined. Between 1995 and 2008, vehicle revenue miles of bus service declined by 15 percent, contributing to a 25 percent drop in bus ridership.

Partly to recover from the lawsuit and partly to get its rail construction program going again, Metro asked voters for a half-cent sales-tax increase in November 2008. Supporters outspent opponents by 500 to 1, yet the measure received only 48 percent of the vote.[139] For the moment, St. Louis Metro has no firm plans to expand its rail system.

Washington: In 1962, the initial planners of the Washington Metrorail system projected that a 103-mile system would cost $793 million (about $4.6 billion in 2009 dollars) and that fares would cover all of the operating costs and more than 75 percent of the capital costs.[140] In an early example of transit apartheid, planners deliberately routed the initial lines away from low-income neighborhoods that, they believed, would not be able to pay enough fares to recover capital costs. As it turned out, the actual construction costs of the 103-mile system were nearly four times greater than anticipated, and fares cover only about 60 percent of operating costs and no capital costs.

Federal taxpayers paid most of the construction cost. Local governments subsidize the operations. But today, more than 30 years after the first rail lines opened, no one has allocated funds to rebuild the Metrorail system, which is why it suffers frequent breakdowns and why maintenance failures led to the deaths of nine people in an accident in June 2009.[141] Aside from the crash, the Metrorail system suffers from a variety of routine problems, including broken rails, smoke in the tunnels requiring train evacuations, and malfunctioning elevators and escalators at train stations, all of which can be traced to Metro's lack of funding for maintenance. In January 2010, Washington Metropolitan Area Transit Authority general manager John Catoe announced he would "take the fall" for the agency's problems by resigning.[142]

Despite WMATA's inability to maintain its rail system, the federal government granted $900 million toward the first stage of a $5.2 billion, 23-mile Metrorail extension to Dulles Airport. This project is being built by the Metropolitan Washington Airports Authority, but WMATA will be saddled with the costs of operations and maintenance.

Though Washington Metrorail's initial planners predicted fares would cover all operating costs and 75 percent of capital costs, in fact they barely cover 60 percent of operating costs and no capital costs.

Notes

1. Neil Schickner, "Audit of the Champlain Flyer Commuter Rail Service," Joint Fiscal Office, Vermont Legislature, 2003, p. 3.

2. Ibid., pp. 15–16.

3. "Champion Flyer Audit, Attachment D," memorandum from Leslie Barbour, Resource Systems Group, to Neil Schickner, Joint Fiscal Office, 2003, pp. 6, 8.

4. Jonathan Meador, "Ride the Rails," *Leo Weekly*, October 1, 2008, tinyurl.com/yctbzn6.

5. *2008 National Transit Database* (Washington: Federal Transit Administration, 2009), "service," "operating expense," and "fare revenue" spreadsheets.

6. Calculated by amortizing the capital costs over 30 years at 7 percent interest, adding to the annual operating subsidy, and dividing by the 264 rush-hour commuters.

7. Dan McFeely, "Choosing the Right Track," *Indianapolis Star*, June 13, 2008, tinyurl.com/4g49e5.

8. Calculated by comparing rail passenger miles in *2007 National Transit Database* (Washington: Federal Transit Administration, 2008), "service" spreadsheet with the highway vehicle miles in the same, Table HM-72; highway vehicle miles converted to passenger miles by multiplying by 1.6 as estimated in Pat S. Hu and Timothy Reuscher, *Summary of Travel Trends: 2001 National Household Travel Survey* (Washington: Federal Highway Administration, 2004), Table 16.

9. *2008 National Transit Database*, "operating expense" and "fare revenue" spreadsheets.

10. Don Pickrell, "Urban Rail Transit Projects: Forecast Versus Actual Ridership and Costs," Department of Transportation, Cambridge, MA, 1989, p. xv.

11. For more examples, see Randal O'Toole, "Does Rail Transit Save Energy and Reduce Greenhouse Gas Emissions?" Cato Institute Policy Analysis no. 615, April 14, 2008, pp. 4, 14.

12. Federal Transit Administration, "Obama Administration Proposes Major Public Transportation Policy Shift to Highlight Livability," press release, January 13, 2010, tinyurl.com/yg7bj5r.

13. "Changes to the New Starts Rating Process," letter from Mary Peters to transit agencies, April 29, 2005, tinyurl.com/yzovfps.

14. Dylan Rivera, "Federal Rules Prefer Buses over Streetcar Expansion," *Oregonian*, December 27, 2007, tinyurl.com/y9oocw8.

15. *2008 National Transit Database*, "service" spreadsheet; calculated by dividing vehicle revenue miles by vehicle revenue hours. The results (31 mph for commuter rail, 20 mph for heavy rail, 15 mph for light rail, and 7 mph for streetcar) are somewhat underestimated because vehicle revenue hours include dwell time at transit terminals.

16. Moshe Ben-Akiva and Takayuki Morikawa, "Comparing Ridership Attraction of Rail and Bus," *Transport Policy Journal* 9, no. 2 (2002).

17. "Kansas City's First Bus Rapid Transit Line," Kansas City Transportation Authority, 2006, p. 11.

18. Clifford Winston and Vikram Maheshri, "On the Social Desirability of Urban Rail Transit Systems," *Journal of Urban Economics* 62, no. 2 (September 2007): 362–82.

19. Amy Cortese, "New Rail Lines Spur Urban Revival," *New York Times*, June 13, 2009, tinyurl.com/yc9jf4e.

20. Ibid.

21. Tony Robinson and Chris Nevitt, "Are We Getting Our Money's Worth? Tax-Increment Financing and Urban Redevelopment in Denver, Part I," Front Range Economic Strategy Center, Denver, CO, 2005, p. 14; tinyurl.com/2m9s4f.

22. Dianne Solis, "Officials Reshaping Downtown Carrollton Around Light-Rail Hopes," *Dallas Morning News*, June 10, 2009, tinyurl.com/ lf5urx.

23. See, for example, *Portland Streetcar Development Oriented Transit* (Portland, OR: City of Portland, 2006), pp. 10–14.

24. Nancy Sarnoff and David Kaplan, "High-Density, Mixed-Use Trend Takes Root in Houston," *Houston Chronicle*, March 3, 2007, www.chron.com/disp/story.mpl/business/realestate/4599231.html.

25. Randal O'Toole, "Debunking Portland: The City That Doesn't Work," Cato Institute Policy Analysis no. 596, July 9, 2007, p. 7.

26. Robert Cervero and Samuel Seskin, *An Evaluation of the Relationship between Transit and Urban Form* (Washington: Transportation Research Board, 1995), p. 3.

27. Michael Wall, "Waiting for a Ride: The Racial Reality Behind MARTA's Downward Spiral," *Creative Loafing*, April 19, 2006, tinyurl.com/55ul4x.

28. Winston and Maheshri, p. 379.

29. Nasiru A. Dantata et al., *Trends in U.S. Rail Transit Project Cost Overrun*, paper presented to the Transportation Research Board, 2006, Table 2, tinyurl.com/34g9rd; *The Predicted and Actual Impacts of New Starts Projects—2007* (Washington: Federal Transit Administration, 2008), p. 11, tiny url.com/8kpnyr.

30. Ben Wear, "Capital Metro Chief Stepping Down: Gilliam's 7 Years at Helm Marked by Union Turmoil, Laggard Rail Line, Sinking Reserves," *American-Statesman*, October 1, 2009, tinyurl.com/yc7tet2; Jeffrey Leib, "RTD Boss Marsella Resigning after a Sometimes Bumpy Ride," *Denver Post*, April 29, 2009, tinyurl.com/yfvp8bj; Debbie Messina, "HRT Head Michael Townes, Under Pressure, Agrees to Retire," *Virginian-Pilot*, January 12, 2010, tinyurl.com/ya8vo5n; "GM of VTA Resigns," *Gilroy Dispatch*, January 4, 2005, tinyurl.com/yjtuvyv; Kurt Greenbaum, "Metro's Larry Salci: He's Out," *St. Louis Post-Dispatch*, December 6, 2007, tiny url.com /y9tvzbb; Bob Thomson, "Metro General Manager John Catoe Will Resign," *Washington Post*, January 14, 2010, tinyurl.com/yevfgu3.

31. Bruce Podobnik, "Assessing the Social and Environmental Achievements of New Urbanism: Evidence from Portland, Oregon," paper presented at the annual meeting of the American Sociological Association, San Francisco, August, 2009, pp. i, 13, tinyurl.com/yk446na.

32. William T. Bogart, *Don't Call It Sprawl: Metropolitan Structure in the Twenty-First Century* (New York: Cambridge, 2006), p. 7.

33. Dowell Myers and Elizabeth Gearin, "Current Preferences and Future Demand for Denser Residential Environments," *Housing Policy Debate* 12, no. 4 (2001): 633–59.

34. Robert Cervero et al., "Transit-Oriented Development in the United States: Experiences, Challenges, and Prospects," Transportation Research Board, Washington, 2004, p. 72, tinyurl.com/yjg cpju.

35. "Rail Modernization Study Report to Congress," Federal Transit Administration, Washington, 2009, p. 2, tinyurl.com/coxk3c.

36. Ibid., pp. 3–4.

37. Ibid., p. 28.

38. Ibid., p. 4.

39. *2009 Public Transportation Fact Book* (Washington: American Public Transportation Association, 2009), Tables 17 and 18.

40. Melvin M. Webber, "The BART Experience—What Have We Learned?" Institute of Transportation Studies Monograph no. 26, Berkeley, California, 1976, pp. 8, 18, 35, 37, 39, tinyurl.com/ydtwvjp.

41. Tzveta Panayotova, "People Movers: Systems and Case Studies," University of Florida, 2003, p. 9, tinyurl.com/yaudd5e.

42. American FactFinder, factfinder.census.gov, American Community Survey, Table B08006, "Means of Transportation to Work" for years 2001–2008; summary tape file 3, Table P30, "Means of Transportation to Work" for the 2000 census; summary tape file 3, Table P049, "Means of Transportation to Work" for the 1990 census.

43. *National Transit Database*, www.ntdprogram.gov/ntdprogram/data.htm.

44. *Highway Statistics* (Washington: Federal Highway Administration), Table HM-72.

45. Hu and Reuscher, Table 16.

46. Gross domestic product deflators are from "Current Dollar and 'Real' GDP" spreadsheet published by the Bureau of Economic Analysis, 2009, tinyurl.com/ylz3htt.

47. "FTA Handbook, 3.4 Cost Effectiveness," Federal Transit Administration, 2001, Table 3-7, tiny url.com/ylrjevl.

48. *2008 National Transit Database*, "service," "operating expense," and "fare revenue" spreadsheets.

49. *1985 National Transit Database* (Washington: Federal Transit Administration, 1986), "T3161" spreadsheet; *National Transit Database Historical Datafiles* (Washington: Federal Transit Administration, 2009), "Service Data and Operating Expenses by Mode Time-Series" spreadsheet, tiny url.com/yacv8jr; *2008 National Transit Database*, "service" spreadsheet.

50. "Capital MetroRail Faces More Delays," KXAN, October 1, 2008, tinyurl.com/ygdsvhk.

51. Wear, "Capital Metro Chief Stepping Down."

52. Ben Wear, "Why Commuters Are Still Waiting on Cap Metro's Train: Transit Agency Says It Didn't Realize How Daunting a Task Planning, Building and Operating a Rail Line Could Be," *American-Statesman*, September 20, 2009, tinyurl.com/y93pv6j.

53. "MetroRail $15M More Than Expected," KXAN, January 30, 2009, tinyurl.com/ydrr9gy.

54. Ben Wear, "Will New Transit Board Get It 'Just Right'?" *American-Statesman*, January 2, 2010, tiny url.com/yezrqgk.

55. Dantata et al., Table 1.

56. Ibid., Table 2.

57. *1982 National Transit Database* (Washington: Federal Transit Administration, 1983), spreadsheet number 408082 (operating costs by mode).

58. *2008 National Transit Database*, "operating expense" spreadsheet.

59. *National Transit Database* for 1982, 1985, and 2000–2007 (Washington: Federal Transit Administration, various years), "service" spreadsheets.

60. "Don't Let MBTA Go Off the Rails," *Boston Globe*, November 8, 2009, tinyurl.com/ye39jmg.

61. David F. D'Alessandro et al., "MBTA Review," State of Massachusetts, 2009, pp. 8–12, tinyurl. com/yhcg7m9.

62. Ibid., p. 23.

63. Ibid., p. 20.

64. *The MBTA 2009 Budget* (Boston: Massachussetts Bay Transportation Authority, 2009), p. 16, tinyurl.com/yanze99.

65. D'Alessandro et al., p. 31.

66. Dantata et al., Table 1.

67. *1989 National Transit Database* (Washington: Federal Transit Administration, 1990), *2008 National Transit Database*, "service" spreadsheets, counting bus and light-rail transit trips.

68. Gabe Armstrong, "The 10 Crappiest Things about Downtown Buffalo," *The Buffalo Beast*, April 20, 2005, tinyurl.com/yeurzyh; Neil Fraser, "A Pedestrianised City Is Not the Answer," Joburg, June 6, 2005, tinyurl.com/yat6xbj.

69. "Taxpayers Pay Price for Lightly Used Charlotte Light-Rail Line," *Carolina Journal*, October 6, 2008, tinyurl.com/yl7l59a.

70. "Chicago Rail System on Verge of Collapse," *Engineering News Record*, November 21, 2007, tinyurl.com/2xlpqy.

71. Ben Meyerson, "Majority of Metra Bridges Past Their Useful Life," *Chicago Current*, November 20, 2009, tinyurl.com/yk8n34h.

72. *2010 Budget Book*, Chicago Transit Authority, 2009, pp. 73–78, tinyurl.com/ydmzpra.

73. *Journey to Work Trends in the United States and Its Major Metropolitan Areas, 1960–2000* (Washington: Federal Highway Administration, 2003), pp. 6-19–6-23.

74. Booz Allen Hamilton, Inc., *Managing Capital Costs of Major Federally Funded Public Transportation Projects* (Washington: Transportation Research Board, 2005), p. 55.

75. *Final Report: Southeast Corridor Major Investment Study* (Denver: Colorado, Department of Transportation, 1997), p. 4-24; *Project Fact Book* (Denver: Regional Transit District, 2006), p. 14.

76. Kevin Flynn, "Critic Blasts Proposed Cost Estimate for FasTracks Plan," *Rocky Mountain News*, August 31, 2004.

77. Greg Griffin, "Money Woes Could Derail FasTracks Completion," *Denver Post*, July 5, 2009, denverpost.com/ci_12755554.

78. Jeffrey Leib, "RTD Boss Marsella Resigning."

79. Kevin Flynn, "FasTrack's Price Tag Down by Half Billion Dollars, But Lower Sales Tax Estimate Means RTD Can't Afford to Run the Trains Even If It's Built," *Inside Lane*, January 5, 2010.

80. Jeffrey Leib, "RTD: Without Grant and Sales-Tax Hike, Only West, DIA Rail Lines Will Be Built," November 18, 2009, denverpost.com/ci_ 13811619.

81. Roger Snoble, "Metro Fare Hikes Are the Only Way," *Los Angeles Times*, April 27, 2007, tinyurl. com/y94unds.

82. Larry Lebowitz and Rob Barry, "Tax Money Inflated Salaries, Overtime," *Miami Herald*, December 21, 2008, tinyurl.com/yh8tezl.

83. Larry Lebowitz, "How 'New Money for New Projects' Winds Up Fixing Old Problems First," *Miami Herald*, June 8, 2008, tinyurl.com/y9rfm8q.

84. Larry Lebowitz, "Promise of Transit Tax Derailed," *Miami Herald*, June 8, 2008, tinyurl.com/ ygh7spe.

85. *2008 National Transit Database*, "operating expense" and "fare" spreadsheets.

86. *National Transit Database Historical Datafiles*, "capital expenditures time-series" spreadsheet, tinyurl. com/yhubppv.

87. *Annual Report on New Starts: Proposed Allocation of Funds for Fiscal Year 2000* (Washington: Federal Transit Administration, 1999), Appendix A, "Tri-County Commuter Rail," tinyurl.com/ykyayjo.

88. *2008 National Transit Database*, "service" spreadsheet.

89. Dantata et al., Table 2.

90. Laurie Blake, "Light Rail Will Always Slow the Flow," *Minneapolis Star-Tribune*, December 12, 2004.

91. Wendell Cox, "Urban Rail Success Stories: New York," 2000, tinyurl.com/yff88en.

92. "New York Subway Centennial," Metropolitan Transportation Authority, 2004, tinyurl.com/ybxvavo.

93. "Proposed 2010–2014 MTA Capital Program," Metropolitan Transportation Authority, September 2009, p. 6, tinyurl.com/yf2t4m3.

94. "A Review of MTA New York City Transit 'State of Good Repair' Expenditures," New York City Comptroller, 2007, p. 7, tinyurl.com/y9wuyu5.

95. "MTA 2010 Preliminary Budget," Metropolitan Transportation Authority, 2009, p. 3, tinyurl.com/yllexwj.

96. Dave Henley, "New York City Transit," presentation to the 2009 State of Good Repair Roundtable, Washington, DC, 2009, p. 15, tinyurl.com/yagtxum.

97. Greg Sargent, "The Line That Time Forgot," *New York Magazine*, March 29, 2004, tinyurl.com/2q8hyl.

98. "Annual Report on Funding Recommendations: Fiscal Year 2010—New Starts, Small Starts, and Paul S. Sarbanes Transit in Parks Program," Federal Transit Administration, 2009, pp. A-43–A-45, tinyurl.com/y8f8qnr.

99. *Annual Report on Funding Recommendations: Fiscal Year 2005—New Starts* (Washington: Federal Transit Administration, 2003), Appendix A: Norfolk LRT, tinyurl.com/ya4eyjd.

100. Debbie Messina, "Resign or Be Fired, HRT Chief Is Told by 4 Board Members," *Virginian-Pilot*, December 31, 2009, tinyurl.com/y8usmx5.

101. Messina, "HRT Head Michael Townes, Under Pressure, Agrees to Retire."

102. Seth Budick, "How SEPTA Funding Works," PlanPhilly, December 20, 2008, tinyurl.com/yb95zwx.

103. "SEPTA's Money," *Philadelphia Inquirer*, November 6, 2009, tinyurl.com/yf4fvxz.

104. Paul Nussbaum, "SEPTA Strike Over, But Fare Hikes Loom," *Philadelphia Inquirer*, November 10, 2009, tinyurl.com/yz46834.

105. Shai Ben-Yaacov, "SEPTA Pushes Back Deadline to Modernize," WHYY, August 20, 2009, tinyurl.com/ykvlxel.

106. John Schmitz, "How Did Port Authority Get Into This Deep, Expensive Hole of River Tunnel?" *Pittsburgh Post-Gazette*, March 15, 2009, tinyurl.com/ycrk4a4.

107. Department of Land Conservation and Development, *Using Income Criteria to Protect Commercial Farmland in the State of Oregon* (Salem, OR: DLCD, 1998), p. 2.

108. Dionne Peeples-Salah, "Rezoning for Transit Traps Downtown Homeowners," *Oregonian*, January 18, 1996, p. A1.

109. *2000 Census* (Washington: Census Bureau, 2002), Table QT-P23, "Journey to Work, Portland, OR-WA Urbanized Area," tinyurl.com/pavuck; *2007 American Community Survey* (Washington: Census Bureau, 2008), Table S0801, "Commuting Characteristics by Sex, Portland, OR-WA Urbanized Area," tinyurl.com/lxfgxo.

110. Podobnik, p. 13.

111. John Charles, "The Mythical World of Transit-Oriented Developments: Light Rail and the Orenco Neighorhood," Cascade Policy Institute, Portland, Oregon, 2003, pp. 11–13, tinyurl.com/ycyk39s.

112. *2006 Metropolitan Transportation Plan for the SACOG Region* (Sacramento, CA: Sacramento Area Council of Governments, 2006), pp. 2–3.

113. David Schrank and Tim Lomax, "2009 Urban Mobility Report," Texas Transportation Institute, College Station, TX, 2009, "Performance Measure Summary—Sacramento, CA," measured by "total annual delay" and "delay per peak traveler," tinyurl.com/yc3kkqo.

114. *2006 Metropolitan Transportation Plan for the SACOG Region*, p. 3.

115. Ibid., p. 4.

116. Ibid., p. 23.

117. See, for example, "Sacramento Revitalization: North Sacramento," City of Sacramento, 2005, pp. 6–14, tinyurl.com/y9anpas.

118. Robert Cervero et al., p. 48.

119. Christopher Leinberger, "Sacramento's Transit-Oriented Development Plan a Model for the Nation," *Sacramento Bee*, March 18, 2009, tinyurl.com/ylpjxgo.

120. *2006 Metropolitan Transportation Plan for the SACOG Region*, p. 23.

121. Robert Cervero et al., p. 133.

122. David Brownstone, "Key Relationships between the Built Environment and VMT," Transportation Research Board, 2008, pp. 2–4, tinyurl.com/y9mro58.

123. Brandon Loomis, "New TRAX Passenger Tracking System Shows Ridership Lower Than Thought," *Salt Lake Tribune*, December 20, 2007, www.sltrib.com//ci_7766085.

124. "A Review of the Transportation Prioritization Process," Legislative Auditor General, Salt Lake City, 2007, pp. 5–6, tinyurl.com/35uw36.

125. Nico Calavita, "Vale of Tiers: San Diego's much-lauded growth management system may not be as good as it looks," *Planning*, March 1997, pp. 18–21.

126. *1970 Census of Housing, vol. 1, Housing Characteristics for States, Cities, and Counties, Part 1, United States Summary* (Washington: Census Bureau, 1973), Table 17, and Section 2, Table 366, "Median Income in 1969 of Families by Type of Family and Race of Head for Standard Metropolitan Statistical Areas of 250,000 or More."

127. Randal O'Toole, "The Planning Tax: The Case against Regional Growth Management Planning," Cato Institute Policy Analysis no. 606, December 6, 2007, p. 12.

128. Calavita, pp. 18-21.

129. David Schrank and Tim Lomax, "2009 Urban Mobility Report," "Performance Measure Summary–San Diego, CA," "total annual delay," "delay per peak traveler," and "congestion cost," tinyurl.com/y9ptvfs.

130. Belinda Griswold, "Tunnel vision," *San Francisco Bay Guardian*, November 5, 1997.

131. Bob Egelko, "Inequality in Funding Discriminates Against AC Transit Riders, Plaintiffs Claim in Suit," *San Francisco Chronicle*, April 20, 2005, p. B-5, tinyurl.com/8otrw.

132. "Comprehensive Annual Financial Report, Fiscal Year 2003," Santa Clara Valley Transportation Authority, San Jose, California, 2003, tinyurl.com/2wlg5e.

133. *BART Extension to Milpitas, San Jose, and Santa Clara DSEIR* (San Jose, CA: Santa Clara Valley Transportation Authority, 2007), 4.2–17, tinyurl.com/32qqmj.

134. Tom Rubin, "San Francisco Bay Area Rail Expansion Projects—Promise and Performance," presentation given to the American Dream conference, Reston, Virginia, December 4, 2008, p. 21, tinyurl.com/ya5ujkn.

135. Ibid., pp. 43, 49.

136. "Contractor Performance Assessment Report," Federal Transit Administration, 2007, Table 2, tinyurl.com/ykk7xza.

137. "Victory for Metro Defendants," *St. Louis Business Journal*, November 30, 2007, tinyurl.com/yfd5qoo.

138. Kuumba Chi Nia, "Metro on Trial: Is the End of Salci Near?" *Mathaba*, November 29, 2007, tinyurl.com/y9mspf8; "Salci Out as Metro Head," *St. Louis Business Journal*, December 6, 2007, tinyurl.com/ybe5t3d.

139. Tom Finkel, "Money Train: Pro-Proposition M Fundraising Squashes the Opposition," *Daily-RFT*, October 22, 2008, tinyurl.com/ydpntls; Phil Sutin, "North St. Louis County Undid Transit Tax Proposal," *St. Louis Post-Dispatch*, November 10, 2008, tinyurl.com/6d2hgt.

140. Zachary M. Schrag, *The Great Society Subway: A History of the Washington Metro* (Baltimore: Johns Hopkins, 2006), pp. 53–54.

141. Lena H. Sun and Lyndsey Layton, "Circuit Problem in Metro Crash Began in '07, NTSB Say," *Washington Post*, July 24, 2009, tinyurl.com/yglrxgr; Mike DeBonis, "Old Questions about Crashworthiness of Metro Cars," *Washington City Paper*, June 22, 2009, tinyurl.com/ycvnh6z.

142. Robert McCartney, "Metro's Resigning Manager Inherited Funding and Board Problems," *Washington Post*, January 15, 2010, tinyurl.com/ycl4ykr.

STUDIES IN THE POLICY ANALYSIS SERIES

662. **They Spend WHAT? The Real Cost of Public Schools** by Adam Schaeffer (March 10, 2010)

661. **Behind the Curtain: Assessing the Case for National Curriculum Standards** by Neal McCluskey (February 17, 2010)

660. **Lawless Policy: TARP as Congressional Failure** by John Samples (February 4, 2010)

659. **Globalization: Curse or Cure? Policies to Harness Global Economic Integration to Solve Our Economic Challenge** by Jagadeesh Gokhale (February 1, 2010)

658. **The Libertarian Vote in the Age of Obama** by David Kirby and David Boaz (January 21, 2010)

657. **The Massachusetts Health Plan: Much Pain, Little Gain** by Aaron Yelowitz and Michael F. Cannon (January 20, 2010)

656. **Obama's Prescription for Low-Wage Workers High Implicit Taxes, Higher Premiums** by Michael F. Cannon (January 13, 2010)

655. **Three Decades of Politics and Failed Policies at HUD** by Tad DeHaven (November 23, 2009)

654. **Bending the Productivity Curve: Why America Leads the World in Medical Innovation** by Glen Whitman and Raymond Raad (November 18, 2009)

653. **The Myth of the Compact City: Why Compact Development Is Not the Way to Reduce Carbon Dioxide Emissions** by Randal O'Toole (November 18, 2009)

652. **Attack of the Utility Monsters: The New Threats to Free Speech** by Jason Kuznicki (November 16, 2009)

651. **Fairness 2.0: Media Content Regulation in the 21st Century** by Robert Corn-Revere (November 10, 2009)

650. **Yes, Mr President: A Free Market Can Fix Health Care** by Michael F. Cannon (October 21, 2009)

649. **Somalia, Redux: A More Hands-Off Approach** by David Axe (October 12, 2009)

648. **Would a Stricter Fed Policy and Financial Regulation Have Averted the Financial Crisis?** by Jagadeesh Gokhale and Peter Van Doren (October 8, 2009)

647. **Why Sustainability Standards for Biofuel Production Make Little Economic Sense** by Harry de Gorter and David R. Just (October 7, 2009)

646. **How Urban Planners Caused the Housing Bubble** by Randal O'Toole (October 1, 2009)

645. **Vallejo Con Dios: Why Public Sector Unionism Is a Bad Deal for Taxpayers and Representative Government** by Don Bellante, David Denholm, and Ivan Osorio (September 28, 2009)

644. **Getting What You Paid For—Paying For What You Get: Proposals for the Next Transportation Reauthorization** by Randal O'Toole (September 15, 2009)

643. **Halfway to Where? Answering the Key Questions of Health Care Reform** by Michael Tanner (September 9, 2009)

642. **Fannie Med? Why a "Public Option" Is Hazardous to Your Health** by Michael F. Cannon (July 27, 2009)

641. **The Poverty of Preschool Promises: Saving Children and Money with the Early Education Tax Credit** by Adam B. Schaeffer (August 3, 2009)

640. **Thinking Clearly about Economic Inequality** by Will Wilkinson (July 14, 2009)

639. **Broadcast Localism and the Lessons of the Fairness Doctrine** by John Samples (May 27, 2009)

638. **Obamacare to Come: Seven Bad Ideas for Health Care Reform** by Michael Tanner (May 21, 2009)

637. **Bright Lines and Bailouts: To Bail or Not To Bail, That Is the Question** by Vern McKinley and Gary Gegenheimer (April 21, 2009)

636. **Pakistan and the Future of U.S. Policy** by Malou Innocent (April 13, 2009)

635. **NATO at 60: A Hollow Alliance** by Ted Galen Carpenter (March 30, 2009)

634. **Financial Crisis and Public Policy** by Jagadeesh Gokhale (March 23, 2009)

633. **Health-Status Insurance: How Markets Can Provide Health Security** by John H. Cochrane (February 18, 2009)

632. **A Better Way to Generate and Use Comparative-Effectiveness Research** by Michael F. Cannon (February 6, 2009)

631. **Troubled Neighbor: Mexico's Drug Violence Poses a Threat to the United States** by Ted Galen Carpenter (February 2, 2009)

630. **A Matter of Trust: Why Congress Should Turn Federal Lands into Fiduciary Trusts** by Randal O'Toole (January 15, 2009)

629. **Unbearable Burden? Living and Paying Student Loans as a First-Year Teacher** by Neal McCluskey (December 15, 2008)

628. **The Case against Government Intervention in Energy Markets: Revisited Once Again** by Richard L. Gordon (December 1, 2008)

627. **A Federal Renewable Electricity Requirement: What's Not to Like?** by Robert J. Michaels (November 13, 2008)

626. **The Durable Internet: Preserving Network Neutrality without Regulation** by Timothy B. Lee (November 12, 2008)

625. **High-Speed Rail: The Wrong Road for America** by Randal O'Toole (October 31, 2008)

624. **Fiscal Policy Report Card on America's Governors: 2008** by Chris Edwards (October 20, 2008)

623. **Two Kinds of Change: Comparing the Candidates on Foreign Policy** by Justin Logan (October 14, 2008)

622. **A Critique of the National Popular Vote Plan for Electing the President** by John Samples (October 13, 2008)

621. **Medical Licensing: An Obstacle to Affordable, Quality Care** by Shirley Svorny (September 17, 2008)

620. **Markets vs. Monopolies in Education: A Global Review of the Evidence** by Andrew J. Coulson (September 10, 2008)

619. **Executive Pay: Regulation vs. Market Competition** by Ira T. Kay and Steven Van Putten (September 10, 2008)

618. **The Fiscal Impact of a Large-Scale Education Tax Credit Program** by Andrew J. Coulson with a Technical Appendix by Anca M. Cotet (July 1, 2008)

617. **Roadmap to Gridlock: The Failure of Long-Range Metropolitan Transportation Planning** by Randal O'Toole (May 27, 2008)

616. **Dismal Science: The Shortcomings of U.S. School Choice Research and How to Address Them** by John Merrifield (April 16, 2008)

615. **Does Rail Transit Save Energy or Reduce Greenhouse Gas Emissions?** by Randal O'Toole (April 14, 2008)

614. **Organ Sales and Moral Travails: Lessons from the Living Kidney Vendor Program in Iran** by Benjamin E. Hippen (March 20, 2008)

613. **The Grass Is Not Always Greener: A Look at National Health Care Systems Around the World** by Michael Tanner (March 18, 2008)

612. **Electronic Employment Eligibility Verification: Franz Kafka's Solution to Illegal Immigration** by Jim Harper (March 5, 2008)

611. **Parting with Illusions: Developing a Realistic Approach to Relations with Russia** by Nikolas Gvosdev (February 29, 2008)

610. **Learning the Right Lessons from Iraq** by Benjamin H. Friedman, Harvey M. Sapolsky, and Christopher Preble (February 13, 2008)

609. **What to Do about Climate Change** by Indur M. Goklany (February 5, 2008)

608. **Cracks in the Foundation: NATO's New Troubles** by Stanley Kober (January 15, 2008)

607. **The Connection between Wage Growth and Social Security's Financial Condition** by Jagadeesh Gokhale (December 10, 2007)

606. **The Planning Tax: The Case against Regional Growth-Management Planning** by Randal O'Toole (December 6, 2007)

605. **The Public Education Tax Credit** by Adam B. Schaeffer (December 5, 2007)

604. **A Gift of Life Deserves Compensation: How to Increase Living Kidney Donation with Realistic Incentives** by Arthur J. Matas (November 7, 2007)

Published by the Cato Institute, Policy Analysis is a regular series evaluating government policies and offering proposals for reform. Nothing in Policy Analysis should be construed as necessarily reflecting the views of the Cato Institute or as an attempt to aid or hinder the passage of any bill before Congress. Contact the Cato Institute for reprint permission. Additional copies of Policy Analysis are $6.00 each ($3.00 each for five or more). To order, or for a complete listing of available studies, write the Cato Institute, 1000 Massachusetts Ave., N.W., Washington, D.C. 20001 or call toll free 1-800-767-1241 (8:30-4:30 eastern time). Fax (202) 842-3490 • www.cato.org

CATO INSTITUTE