New England
Fiscal Facts

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Is New England Underinvesting in Public Infrastructure?

By Daniel G. Swaine

In June 1983, three motorists were killed when a 100-foot section of bridge fell 75 feet into the Mianus River near Greenwich, Connecticut, along a heavily traveled section of Interstate 95. Four years later, ten motorists were killed when a bridge on the New York State Thruway collapsed in an incident almost identical to the earlier Connecticut accident. More recently, in December 1997, the federal government ordered the Commonwealth of Massachusetts to build a $200 million water treatment plant to improve water quality in the greater Boston area.

Throughout the 1980s and 1990s, highly publicized incidents such as these have led many experts to claim that our rate of investment in public infrastructure is inadequate, even suggesting that we suffer from an "infrastructure crisis." Many others claim that the infrastructure crisis is an illusion intended to rationalize increases in government spending during an era of "smaller government." In this issue, *Fiscal Facts* explores the question of how infrastructure deficiencies are evaluated.

The term infrastructure applies to the roads, bridges, highways, mass transit systems, railways, electrical grids, water reservoirs, pipelines and treatment facilities, waste treatment and disposal facilities, and communications networks that provide the foundations for the functioning of a modern economy. Two basic methods are used to evaluate the adequacy of public infrastructure: an engineering approach and an economic efficiency approach. In the engineering approach, an analyst evaluates two qualities of a public infrastructure facility: the extent to which it incorporates state-of-the-art technology and design, and the extent to which it performs intended functions according to an engineer's standards of reliability, durability, safety, and mechanical efficiency. In the economic efficiency approach, an analyst focuses on the degree to which public infrastructure investment enhances the productivity of the private sector. Treating the economy as if it were a single large company, economists gauge the extent to which total output could be produced less expensively with a different mix of inputs, and specifically with a mix that includes both a larger quantity and a better quality of public infrastructure.

A Profile of New England's Public Investment Spending

What is the level of New England's infrastructure spending? In FY94 (the last year for which comparable data are available), New England invested $5.4 billion in public infrastructure. For every $1 billion in output, New England spent approximately $14 million in public investment. This figure is slightly less than for the nation as a whole, which spent $16 million for every $1 billion in output. Among the New England states, spending levels varied from a low of $7 million per $1 billion of output in New Hampshire to a high of $17 million per $1 billion of output in Massachusetts.

What forms of infrastructure do the New England states

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State Budget Timetable

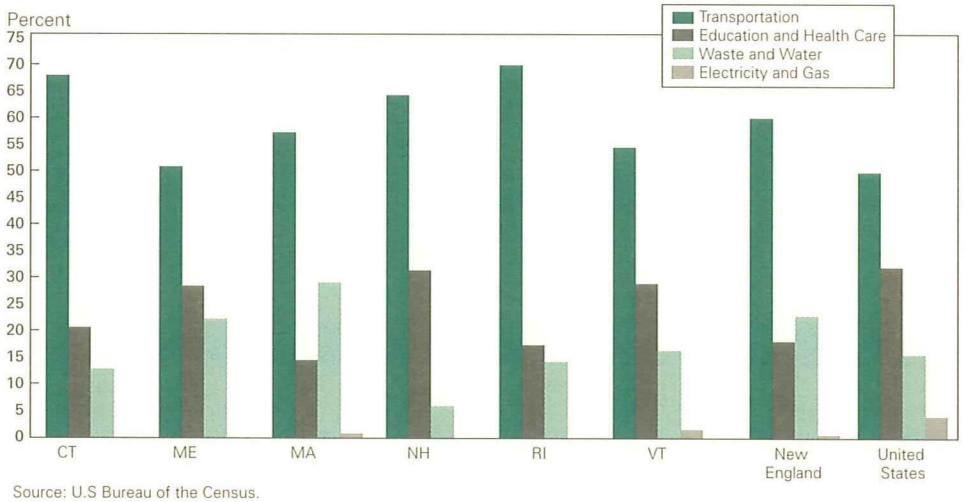
Annual Budgets
Massachusetts
Rhode Island
Vermont
FY98: July 1, 1997 to June 30, 1998
FY99: July 1,1998 to June 30, 1999

Biennial Budgets
Connecticut
Maine
New Hampshire
FY98-99: July 1, 1997 to June 30, 1999

Chart 1

New England Infrastructure Spending

Expressed as a Percent of Expenditures, FY1994



Source: U.S Bureau of the Census.

invest in? Chart 1 answers this question. The vast majority of infrastructure investment is made in the area of transportation (highways, local roads, airports, rail and transit terminals, harbor facilities). In FY94, New England invested 59 percent of infrastructure spending in transportation, well above the national average of 49 percent. Within the region, infrastructure spending on transportation ranged from 50 percent in Maine to 69 percent in Rhode Island.

The New England states as a whole devote a much smaller portion of public infrastructure spending to education and health care than the nation overall (18 percent for New England versus 32 percent for the United States in FY94), primarily because the region hosts a large number of private educational and health care facilities. Nevertheless, New England exhibits considerable interstate variation in educational and health care investment. The states of Connecticut, Massachusetts, and Rhode Island all invested at about half the national average in FY94, between 14 and 20 percent, while the three rural states of Maine, New Hampshire, and Vermont spent between 28 and 31 percent, much closer to the national average of 32 percent. Investment in electric grids and natural gas distribution facilities is another area where the private sector in New England makes a relatively large contribution and the public sector, consequently, a smaller one. In FY94, the New England states spent a minuscule 0.6 percent of their infrastructure funds on such projects, in contrast with 4 percent for the nation overall.

The New England states as a whole invest a somewhat greater portion of infrastructure spending in waste and water treatment and distribution than the nation overall (23 percent versus 15 percent in FY94). But again, this regional statistic disguises clusters among the individual states. In FY94, Connecticut, Rhode Island, and Vermont invested in waste and water facilities at about the national average of 15 percent, while Maine and Massachusetts invested at higher rates of 22 percent and 29 percent, respectively. New Hampshire trailed the other New England states with 6 percent of spending invested in waste and water facilities — about one-third of the national average.

Engineering Assessments of Infrastructure Adequacy

Most of the New England states have capital budgets and must put together five- to ten-year plans for infrastructure investments in such areas as transportation. Nevertheless, there are few publicly available state-specific engineering assessments of New England's public infrastructure. A search by *Fiscal Facts*

uncovered three state-specific studies. Two were conducted by the state of Maine, one for bridges and one for highways. The third study, conducted by a Massachusetts special commission on infrastructure finance, suggested that the Commonwealth would need $39 billion in additional infrastructure investment in the late 1980s. Engineering assessments rate the adequacy or deficiency of existing public capital assets in performing their intended functions. For example, Maine determined that, in 1997, approximately one-third of its bridges had some marked deficiencies. An Associated Press (AP) report on federal highway data released in the fall of 1997 corroborated this assessment, noting that 37 percent of Maine's bridges were deficient.[1] For New England as a whole, the report indicated that 42 percent of bridges were deficient, ranging from a low of 29 percent in Connecticut to a high of 57 percent in Massachusetts.

While few engineering assessments have been undertaken specifically for the New England states, several have been conducted at the national level. The most widely quoted study, published by the National Council on Public Works Improvement, is a comprehensive assessment of the nation's infrastructure in the mid-1980s.[2] It provides indicators of quality for several infrastructure categories including highways and bridges, airports, mass transit, water supply, and waste treatment facilities. For example, as indicators of the quality of water supply, the Council considers the incidence of water shortages and waterborne diseases, rates of water main breaks, and finished water purity. The Council painted a dim picture of the nation's infrastructure. It estimated that in 1982 it would have cost $2.9 trillion (in 1997 dollars) to bring the nation's infrastructure up to "standard." The value of the nation's infrastructure capital in 1982 was estimated at $3.4 trillion. Thus, the Council's estimate implies that the value of an adequate stock of public infrastructure would have been $6.3 trillion, or 92 percent of gross domestic product. In order to achieve this ratio of public capital stock to gross regional product, New England would have needed $357.3 billion in public infrastructure capital in FY94 — much greater than the $110.3 billion in place in that year.

For at least three reasons, many experts contend that engineering assessments of public infrastructure exaggerate the deficiencies in public capital stocks:

- First, many structures rated as deficient by such a study, although obsolete given today's technology, may still adequately perform their intended purpose. Engineering studies implicitly assume that all obsolete structures should be replaced, even if the structure is performing adequately.
- Second, it is not clear from these studies how the replacement of a nonperforming or obsolete structure will benefit society. By not comparing benefits relative to cost, engineering assessments ignore the fact that for any particular project, investment funds may be better allocated to alternative uses.
- Finally, engineering assessments focus primarily on the existing infrastructure base, neglecting future projects that might conceivably pay a higher social return.

Economic Efficiency Studies

Although it has shortcomings of its own, the economic efficiency approach attempts to correct for these problems by incorporating the trade-off between technological obsolescence and performance, the allocation of resources to their most productive use, and the assessment of future needs. In the economic efficiency approach, the economy is viewed as if it were one large firm producing output with three inputs: labor, private capital, and public capital. To evaluate the efficiency of the current input mix, economists ask whether the current level of output could be produced at less cost with a different input mix. The answer depends on the productivity of various mixes of inputs, the degree to which inputs are substitutable for each other in production, and the relative prices of inputs. By answering this question, economists can determine whether the economy could operate more efficiently with an input mix that included an expanded quantity and quality of public infrastructure capital, even if this required using less private capital and employment.

During the late 1980s and early 1990s, a series of economic efficiency studies suggested that significantly increasing the rate of public investment relative to private investment would pay dividends in terms of higher productivity in the private sector. Thus, shifting the mix of resources from private to public investment would benefit society. These ini-

1 The Federal Highway Administration (FHA) records two deficiencies: structural deficiency and functional obsolescence. A bridge is considered structurally deficient if not repairing or replacing it would jeopardize public safety. A bridge is defined as functionally obsolescent if the design, clearance, carrying capacity, or roadway approaches are not up to today's standards, although the bridge is performing its intended function and meets the original design standard. The FHA rated 15.2 percent of Maine's bridges as structurally deficient and another 22.1 percent as functionally obsolescent — a total of 37.3 percent with a deficiency rating.

2 In addition to the study by the National Council on Public Works Improvement, three other widely quoted studies were done in the mid-1980s. The Congressional Budget Office (CBO) published *Public Works Infrastructure: Policy Considerations for the 1980s*, and the Office of Technology Assessment published *Rebuilding the Foundations*. Both of these congressional studies were cited in the National Council's work. A third widely quoted study, *Guide to Benchmarks of Urban Capital Condition*, was published by the Urban Institute.

tial studies drew a lot of attention and generated numerous follow-up studies. The approach continues to be controversial, and the results generated by using this method are considered highly imprecise. While most economists believe that public infrastructure investment contributes to private sector productivity, there is little consensus regarding the magnitude of this contribution.

Comparing the Two Approaches

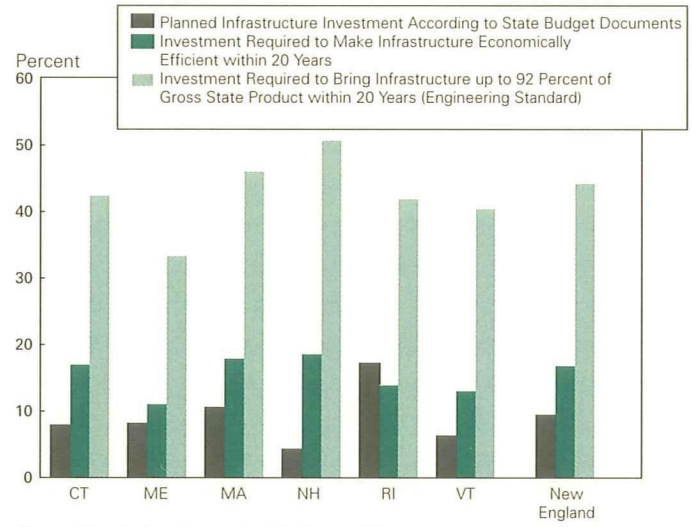
Mindful of these concerns, *Fiscal Facts* employed variants of both the engineering and the economic efficiency approaches to estimate the average annual infrastructure investment that each New England state would have to undertake to bring its public capital stock up to "standard" within 20 years.

Chart 2 illustrates the estimates prepared by *Fiscal Facts*. They are compared with each other and with planned public infrastructure investment according to the latest capital spending plans of the individual states as reported in state budget documents. All investment estimates are expressed as a percent of state and local own-source revenues. The first bar for each state and for New England shows planned public infrastructure investment. The second bar, computed by *Fiscal Facts*, shows the average annual infrastructure investment required to bring public capital stock up to an economically efficient level within 20 years.[3] The third bar, also computed by *Fiscal Facts*, illustrates the average annual infrastructure investment required to bring public capital stock up to 92 percent of gross state product (the engineering standard implied by the study of the National Council on Public Works Improvement) within 20 years.

Chart 2

Annual Infrastructure Investment in New England

Expressed as a Percent of State and Local Own-Source Revenues



Source: State budget documents; U.S. Bureau of the Census; author's calculations.

As the chart shows, in every state except Rhode Island, the stock of public capital is inefficiently low according to the economic efficiency standard. In each state except Rhode Island, the investment required to achieve economic efficiency is greater than the investment called for in state capital spending plans. In all states, including Rhode Island, meeting the implied engineering standard would require substantially greater annual infrastructure investment – in all cases, at least double the investment required to achieve economic efficiency. The economic efficiency computations suggest that, with an efficient level of public capital stock in FY94, the product of each member of New England's labor force would have been $1,713 higher, implying that an additional $11.2 billion in gross regional product could have been produced.

Implications and Conclusions

An assessment of New England's public infrastructure using both the engineering and the economic efficiency approaches suggests that the region may be underinvesting in public infrastructure. New England is not alone in this regard. Applications of these two approaches by other analysts have yielded similar conclusions for other regions and for the nation as a whole. Altogether, the evidence suggests that policymakers may be underestimating the contribution of public investment to private sector productivity and forgoing projects that may be in the best interests of both the public and the private sectors.

While our analysis does suggest that New England might be better off with a higher rate of investment in infrastructure, financing an increase may prove to be problematic. Projections of future benefits flowing from such investment are uncertain, especially relative to likely future costs. Consequently, policymakers, after weighing all considerations, may

3 The economically efficient levels of all three productive inputs can be computed from a system of demand equations that are guaranteed to achieve the lowest possible cost of production. The demand equation for public infrastructure capital provides the economically efficient infrastructure level given the level of output and the relative prices of each of the three inputs: private capital, labor, and public infrastructure capital. Using a forecast of output 20 years hence and current input prices adjusted for inflation, we compute the efficient level of infrastructure capital needed 20 years from now. Chart 2 reports the annual public investment needed to reach this efficient level of infrastructure capital in 20 years. For additional details, a technical appendix is available upon request.

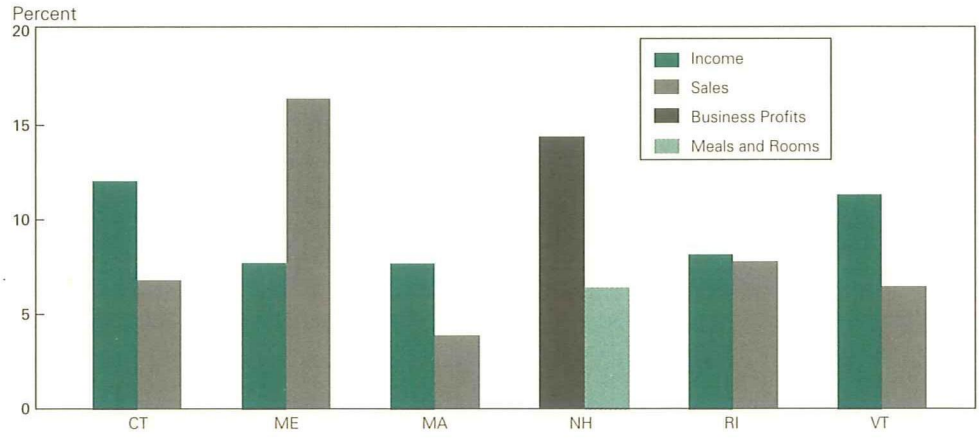
reject accelerating infrastructure investment. Furthermore, our application of the economic efficiency approach does not suggest that the region's economy will suffer irreparably if the rate of public investment is not significantly raised. In fact, one of the implications of using this approach is that increasing the rate of public investment without fully assessing the costs and benefits is foolhardy.

These results should be interpreted with caution and should be seen more as illustrating an economic analysis than as providing a definitive assessment. Much greater study of this important issue is required before any findings can be viewed as definitive. Nevertheless, the analysis does suggest that when evaluating alternative public investment projects, policymakers should take a broad view of each project's potential benefits, including enhanced private sector productivity. **FF**

Across *the* Region

Prosperous times continue across the region. Through the first five months of FY98, revenues exceeded early projections for all six New England states. In every state except New Hampshire, officials were discussing ideas for the disposition of expected budget surpluses. Tax cuts, infrastructure spending, "rainy-day" fund deposits, and educational finance reforms were the primary ideas under consideration. In Vermont, a key topic for the new legislative session was adjustment of the recently enacted Education Finance Reform Act (see *Fiscal Facts*, Fall 1997) in order to ease the fiscal pain the legislation has imposed on some communities.

Revenues from the Two Largest Taxes in Each New England State
Percentage Rate of Growth
First Five Months of FY98 Compared with First Five Months of FY97



Source: Official budget documents, state financial statements, conversations with state budget officials.

Six-State Review

Connecticut

Connecticut collected tax revenues of $2.5 billion through November, up 6.4 percent from the same period one year earlier. This was considerably better than expectations. If revenue continues to flow in at this pace, Connecticut should realize a substantial surplus, even with recently enacted income tax cuts taking effect in January (see *Fiscal Facts*, Fall 1997). Income and sales tax collections both posted healthy gains, up 12 percent and 6.7 percent, respectively.

The good news on the revenue front has set the stage for a renewed debate on spending priorities for the remainder of the FY98-99 biennium budget. Governor John Rowland would like to return surplus revenues to taxpayers. However, the Connecticut Economic Conference Board has suggested using the budget surplus for public investment in infrastructure, education, and urban revitalization, along with a deposit to a "rainy day" stabilization fund. Furthermore, in its 1996 *Sheff v. O'Neill* ruling (see *Fiscal Facts,* Spring 1997), the state Supreme Court ordered the state to address school funding and racial inequity issues, and the legislature passed a bill last year directing the governor to develop a five-year plan dealing with these concerns. Governor Roland and the state Department of Education have promised to issue their plan in time for the FY98 budget adjustment, to be considered by the legislature in the spring.

Daniel G. Swaine

Maine

Through October, Maine had a revenue surplus of 10 percent over projections. After ending FY97 with a budget surplus (see *Fiscal Facts*, Fall 1997), and just three months into the current biennium, the state's five-member revenue forecasting committee decided that the state's robust economy would produce $145 million more in taxes than originally projected. Under current rules, this will automatically add $111 million to the tax relief fund set up last year. (In the fall of 1997, state legislators decided that any extra income or cigarette tax revenue collected over the two-year period that began July 1, 1997, would be used to lower income, sales, or property taxes; see *Fiscal Facts*, Fall 1997.) The committee also determined that revenues would come in higher than initial projections, predicting an additional $45.2 million in cigarette tax revenues as a result of the hike in the cigarette tax from 37 to 74 cents per pack, enacted November 1, 1997. All told, including carryover funds from FY97, the total amount available for tax relief was projected to be $185 million.

Thus far, the legislature's taxation committee has decided that the one-time surplus of $28.4 million from FY97 should be placed in one fund, to be used for one-time projects, with ongoing extra income and cigarette tax revenues placed in a second fund, to be used for lowering tax rates or repealing a tax. A variety of proposals are being discussed for each fund and will be considered in debate over budget adjustment legislation, slated for spring 1998.

Marie Willard

Massachusetts

Slowing from the blistering pace set last year, Massachusetts tax revenues totaled $4.9 billion through November, up 4.4 percent from the same period one year earlier. Although it is still early in the fiscal year, the Commonwealth appears to be tracking the 4 percent revenue growth projected by the Massachusetts Taxpayers Foundation. The administration's forecast is a pessimistic 0.2 percent decline. Both income and sales tax revenues posted strong growth, up 7.6 percent and 3.8 percent, respectively, from the same period one year ago. Growth in these two tax revenues kept pace with forecasts of the New England Economic Project that personal income and personal consumption would rise by 4 to 6 percent in FY98. All other taxes were down 3.7 percent from the same period one year earlier, reflecting the phased-in implementation of recently legislated business tax breaks.

During its fall session, the legislature considered a number of issues left over from the FY98 budget legislation enacted in June. First, it passed an override of the governor's veto of a $944.7 million measure authorizing the Commonwealth to issue bonds to finance new convention centers in Boston, Worcester, and Springfield. The lion's share of the funds will be committed to the construction of a $695 million convention center for the city of Boston. Second, the legislature postponed consideration until spring of two issues: (1) tax cuts proposed by former Governor Weld last January — eliminating the 14 percent investment income tax on life insurance companies, and cutting the tax rate on unearned income from 12 percent to 5.95 percent — and (2) a rollback from 5.95 percent to 5 percent in the tempo-

rary personal income tax increase enacted in FY90.

After the FY98 budget was enacted, Massachusetts received distressing news from Washington. The state's plan to finance the remaining cost of the Central Artery/Tunnel (CA/T) project assumes a "most-likely" federal funding level of $528 million per year. Two congressional committees responsible for re-authorizing federal transportation funding were considering proposals that would provide the Commonwealth with less aid than this assumed funding level. Although the outcome of these legislative proposals is uncertain, either would force the Commonwealth to cut spending on other public investment projects or acquire a significant volume of new debt that would exceed the state's debt acquisition limit.

Daniel G. Swaine

New Hampshire

New Hampshire's revenues were strong in the first five months of FY98. Through November, revenue growth was 7.6 percent, while the legislature had estimated only a 2.9 percent increase. Receipts from the business profits tax and the meals and rooms tax were especially strong, up 14 percent and 6 percent, respectively, over year-ago levels.

The increase in receipts from these taxes was due in part to more vigorous enforcement efforts. The Department of Revenue Administration (DRA) has partially implemented an electronic filing system that enables the department to find previously delinquent taxpayers. Success in locating 370 non-filers accounted for about 16 percent of the FY97 general fund surplus. These new taxpayers will now continue to file returns and pay taxes in subsequent years. In addition, DRA offered a period of tax amnesty. Through February 15, 1998, delinquent taxpayers were allowed to submit returns without penalty.

The New Hampshire Supreme Court ruled recently that property tax funding of public education was unconstitutional. This follows a similar ruling in Vermont last year and in 17 other states across the nation since 1971. Future issues of *Fiscal Facts* will include more on educational reform.

Marie Willard

Rhode Island

Rhode Island collected tax revenues of $552.6 million through November, up 7.3 percent from the same period one year earlier. This was considerably better than revised projected growth of 4.4 percent. The three biggest taxes — income, sales, and corporate — all posted healthy gains, up 8.1 percent, 7.7 percent, and 49 percent, respectively, and significantly above projections. If revenue flows continue at this pace, Rhode Island should realize another year with a budget surplus. However, a number of tax cuts are scheduled to take effect mid-way through the fiscal year, possibly slowing the pace of tax collections. Even so, the better-than-expected results led the state's revenue-estimating panel to recommend boosting projected revenues by $60 million.

As in Connecticut, the good news on the revenue front set the stage for a renewed debate on spending priorities for the remainder of FY98 and for the FY99 budget proposal. The governor would prefer to allocate any surplus toward accelerating the phase-in of the recently enacted income tax cut and toward increased transportation spending. However, a coalition led by the Rhode Island Public Expenditure Council (RIPEC) favors an "urban strategy" that would shift spending towards local aid. While the state has repeatedly cut taxes in recent years, its transportation infrastructure is said to be in need of repair. To help meet that goal, U.S. Senator John Chafee has proposed a re-authorization of federal transportation funding that would increase federal aid to Rhode Island by $31 million.

Daniel G. Swaine

Vermont

Five months into FY98, Vermont appeared to be fiscally comfortable. The state was near year-to-date projections, with a surplus expected at the end of the fiscal year. Tax revenues were 6.1 percent above last year's levels. Personal income tax revenues were up 11.2 percent, while sales tax collections were up 6.4 percent. Corporate tax collections were up a hefty 38.3 percent, reflecting a tax rate increase, retroactive to January 1, to fund education finance reform (see *Fiscal Facts*, Fall 1997).

If trends continue, Vermont will pay off more bond debt than it will add, reducing state debt by $1.4 million. It is hoped that this effort will lead to an improvement in the state's bond ratings. Vermont's fiscal comfort has prompted Governor Howard Dean to consider cutting taxes. In his annual budget message in January, he planned to propose changes in the Education Finance Reform Act.

Patricia Bankowski