

**ECONOMIC IMPACTS OF FLETCHER ALLEN HEALTH CARE
RENAISSANCE PROJECT**

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Prepared by

**Nicolas Rockler, Ph. D., Economist
Watertown, Massachusetts**

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EXECUTIVE SUMMARY

By most measures, the Renaissance Project at Fletcher Allen Health Care (FAHC) in Burlington, Vermont is a large project. Certainly in the context of Vermont nonresidential construction, it is one of the largest projects started during the last two decades and one that would appear likely to have a significant impact on the state economy. However, based on our simulation of both construction and operating impacts over the 2001-2008 period, we believe that the project will have little measurable effect on the state's economy. Using data collected on-site at FAHC, extracted from financial analyses, and federal data concerning the direct impacts of hospital and health care construction, we have prepared forecasts of impacts for several different components of the project.

In the context of overall state construction activity, annual expenditures on the project *within* Vermont represent approximately 1% of Vermont's total annual construction volume. While this is large for a single project, the impacts on the State's economy are relatively small and transitory. Offsetting the gains from construction are the effects of higher service fees at FAHC, a change which translates into higher insurance premiums and Medicaid costs that will, most likely, be passed on to patients, premium payers, and taxpayers. These increased costs are likely to create a small drag on the State's economy during the latter part of the forecast period. The small stimulative effect of construction and the small contractionary effect of rate increases offset one another almost exactly.

The results presented here are sensitive to assumptions regarding the operating impacts. Should the Renaissance Project serve to increase FAHC's share of the regional medical services market by drawing patients from adjacent states and not nearby hospitals, the overall economic impacts would likely be positive and more substantial than those we forecast here.

INTRODUCTION

We have prepared estimates of the economic impacts associated with the construction and operation of the Fletcher Allen Health Care Renaissance Project (the Project) in Burlington, Vermont. This research has been conducted on behalf of the State of Vermont, Department of Banking, Insurance, Securities, and Health Care Administration (BISHCA.) Because the project is partially complete, our estimates are based on a combination of actual and expected Project expenditures. The estimated direct effects drive a comprehensive state economic model for Vermont prepared by Regional Economic Models, Inc. (REMI) from which impact estimates are derived. For the purposes of this study, economic impacts are limited to those derived from construction activity, including design and project administration, and from operations of the new facility including changes in operating costs, taxes, and premiums linked to using the new facility. These estimates cover a range of economic and demographic measures including employment, income, cost, consumption, and population at various levels of detail.

Our estimates of the initial impacts are based on data obtained directly from the construction managers or from several consulting sources that have reviewed the Project. With actual project data, our estimates better reflect the as-built character of the facilities, thereby offering a more accurate accounting for use of Vermont economic resources in the construction phase. To supplement these data, we drew on a review of the Project design and engineering costs prepared by NBBJ, Inc, which included a number of project expenditures yet to be made for on-site and off-site construction. Our estimates of operating impacts are based on recent financial analyses prepared by Mercer Risk, Finance, and Insurance Consulting and Kaufman, Hall and Associates Inc.

This study is presented in five parts: In the first part, we present a brief description of the project and include a discussion of the initial construction and operating impacts, often-termed “direct” effects. In the second section, we present the baseline economic forecast for the State of Vermont as developed in the economic model prepared by Regional Economic Models, Inc., (REMI). In the third section, we present the impact estimates for the project as a whole and for the construction and

operating impacts separately. We present alternative estimates for the operating impacts to examine a range of impacts that might occur, depending on whether the completed facility shifts some of the care provided by nearby medical facilities to FAHC or expands the size of the regional medical care market. In the fourth section, we summarize our findings with respect to impact on the State economy. The Appendix contains a description of the REMI model and tables containing detailed results of the REMI model simulations from which the figures in this report are drawn.

PROJECT DESCRIPTION

By all measures, the Renaissance Project is a major construction project. It includes new hospital space, emergency care center, outpatient care facilities, various specialized clinics, medical practice offices, teaching facilities, diagnostic technology and laboratory facilities, and a parking garage. The project also includes significant renovations of existing patient care space and the physical plant, including the central heating and cooling plant. In total, the project is estimated to cost \$372 million of which \$362.5 million will be borne by FAHC and \$9.5 million by the University of Vermont. Construction started in the last quarter of 2001, and completion is expected in 2005. For the purposes of this study, we assume start-up of service delivery in the new facilities in calendar year 2006 and present forecasts of economic impacts through 2008.¹

The project construction expenditures (the “hard” costs) amount to a net total of \$260 million, including the general contract, subcontracts, site work, and contingencies. The general contract is subject to a guaranteed maximum price, and at present, the general contractors anticipate no overruns on the balance of work remaining.²

Project design and management fees, furnishings, and administration (the “soft” costs) amount to \$104 million. The financing for the project consists of construction

¹ The financial analysis prepared by Mercer (2003) uses Vermont’s July 1-June 30 fiscal year. We have shifted their results six months forward in developing annual calendar year operating impacts needed for the REMI model. We believe this change accurately depicts the complete start of operations at the Project from which the identified impact originate.

² Hospital construction is, however, among the most complex forms of nonresidential construction, largely due to the intensive use of custom-designed systems to support a variety of electrical and mechanical systems including diagnostic equipment, specialized heating and ventilation systems, computer networks and data storage, laboratory functions, specialized waste handling, emergency power, etc. It would not be surprising if actual costs changed somewhat as work plans and designs progress.

loan costs to FAHC of \$8.25 million. On completion of construction, it is expected that the loan will be capitalized in the form of a bond that will require \$8.4 million in interest payable by FAHC starting in 2005.³ We present a summary of major project expenses for the 2001-2005 period in Table 1.

Construction Impacts

Construction projects of this complexity and scale generally draw on labor and materials from a wide geographic area. As a rule, the area increases in size as the need for specialized labor, material, or technology rises. In the case of highly specialized trades such as steel erection, elevator installation, or masonry work, the entire US and adjacent countries are one market area in which contractors travel great distances from job to job, taking key laborers with them to each job. In the case of this project, a number of foreign contractors and non-U.S. workers are employed on-site. The project has two general contractors working together as a joint venture of Macomber Builders and Construction Managers, Inc. of Boston, Massachusetts and Barton Malow Design and Construction Services of Detroit, Michigan. With thousands of different components needed to complete the structure, materials are purchased from all over the country, with a small percentage imported from outside North America. Some commodity products like crushed stone are generally produced locally, but the likelihood of using local material decreases as the good itself becomes more specialized or complex, or as the distance-to-ship or market-area size needed to support production increases. Vermont produces comparatively little in the way of the manufactured construction products needed on the project. After accounting for commodity products, less than 25% of the total required is produced in Vermont. That said, many construction products are wholesaled in Vermont, and thus economic impacts of materials produced elsewhere but purchased from a Vermont wholesaler will still generate some economic impact at the state-level.

In addition to labor and material, contractors make expenditures for their overhead activities and also hope to earn a profit. Some overhead expenditures are

³ See Mercer (2003), p. 63.

Table 1
Renaissance Project Construction Costs: 2001-2005

COST DESCRIPTION	TOTAL COST (\$ million)
Construction Costs	259.6
Parking Garage	40.6
Acute Care Center	106.6
Birthing Center	4.4
Central Plant	22.0
Education Center	12.5
Mary Fletcher Restoration	1.0
Shepardson/Mental Health	13.1
Misc. Projects and Contingencies	35.3
Site Work	24.1
Equipment, Fees, Administration	104.1
Equipment	17.8
Fees	40.3
Administration	26.4
Contingencies	19.6
Financing	8.3
Total Project	372.0
UVM Payment	-9.5
FAHC Grand Total	362.5

Source: NBBJ, Inc. and BISHCA Cost Reconciliation, March, 2003.

local, in so much as they are site dependent, such with office space rentals, payroll, personnel administration, and for local administrative functions related to licensing, registration, etc. A certain amount may also be incurred if contractors' fixed business location is not in or near the location of the site. Thus, some overhead expenditure may take place outside of Vermont. Similarly, some of the profits generated will flow to contractors' fixed locations outside of Vermont.

Three other categories of expenditures for which we have prepared estimates are subcontracting, equipment rental, and capital investment. The share of total

expenditures in each of these expenditure subcategories is based on Vermont data from the 1997 Census of Construction for each specialty contractor category (Census, 1999.) In the case of equipment rentals, most are local (the REMI model for Vermont indicates that approximately 60% of rentals are obtained locally), but once again, much depends on the types of equipment rented.

Capital investment is very similar to overhead with respect to location. Some proportion will be local, regardless of a contractor's fixed office location, because rapid acquisitions can be forced by unexpected wear-out or malfunction of equipment. Some investment will be outside the region if a contractor has offices elsewhere. We observe that in the REMI model, Vermont manufacturers supply approximately 10% of local capital goods required for construction.

In view of the large number of contractors and complexity and cost of collecting highly detailed data regarding expenditures on labor, material, overhead, etc., we limited ourselves to on-site collection of data for the general contractors and the 25 largest subcontractors. The 25 largest subcontractors we identified account for \$171 million of the construction costs. Their Vermont expenditures on construction wages (\$43 million), materials by the producing manufacturing industry (\$75.5 million), overhead and profit (\$18.2 million), capital investment (\$0.7 million), and equipment rental (\$9.2 million) enter the REMI as changes in level of each expenditure type. The balance, \$89 million, consists of unspecified contractor expenditures for smaller tasks, future tasks, and subcontractors yet to be selected. For modeling purposes, we treat this total of \$89 million as new hospital and health care expenditures, letting the REMI about 3% of the estimated 2001 county construction volume of approximately \$1.2 billion⁴.

⁴ Estimated from 1997 gross state product-output ratios for Vermont, 1997 Chittenden County construction output, and 2001 gross state product data from the U.S. Bureau of Economic Analysis (BEA, 2003.)

Table 2
Renaissance Project: Initial Direct Construction Expenditures by
Type and Location: 2001-2005

COST TYPE	LOCATION		
	VERMONT	OUTSIDE VERMONT	TOTAL
Labor	43,021.4	15,109.7	58,131.1
Material**	75,583.6	6,508.6	82,092.2
Overhead	17,473.8	17,835.7	35,309.5
Profit	682.2	752.3	1,434.4
Subcontracting*	57,830.5	3,043.7	60,874.3
Capital Investment*	706.4	6,381.4	7,063.6
Equipment Rental*	9,177.1	5,529.8	14,706.9
TOTAL	204,475.0	55,161.2	259,612.0

Source: Nicolas Rockler, Economist

* Vermont portions estimated by REMI

** 80% of initial material purchases leave state after wholesaling stage.

Operating Impacts

As we understand the Project's overall objectives, there will be a general upgrade in the quantity and quality of space at FAHC that will promote improved patient care. The new space will lead to a moderate expansion of personnel and enhance the range of services offered. Based on the findings contained within the Mercer and Kaufman, Hall and Associates, Inc. financial analyses, we have identified five major operating impacts that may have economic impacts on Vermont residents and businesses:

1. Higher outpatient utilization rates attributable to the project that generate an additional \$19 million in FAHC net operating revenue. (Part or all of these additional services may displace those of nearby Vermont hospitals, as modeled in Mercer, p. 60, with a possible lowering of net impacts.)
2. Net increases in FAHC operating revenue of \$19 million from higher billing rates for services. (Mercer, p. 58.)

3. Higher operating costs for the state's Medicaid program of \$2 million per year starting in 2006 due to service charge increases for Medicaid patients. (Mercer, p. 57)
4. Increased costs to private insurers of \$32 million through service charge increases, representing about 2% of 2001 total costs covered by private insurance. (Mercer, p. 58.)
5. Short-lived increases in medical staff productivity as implied by the differential between revenue-value units of service output and staff level increases of physicians. (Kaufman, Hall and Associates, pp. 35, 40)

Mercer modeled the scenario that once service delivery starts at the new facilities, the Project may draw patients from four smaller nearby medical centers: Copley Hospital, Central Vermont Medical Center, Porter Medical Center, and Northwestern Medical Center.⁵ This view is based on the assumption that services at one center are perfectly substitutable for those of another nearby medical center. If this proves to be true, then under this assumption, there will be no net gain in medical service outputs for Vermont. Service increases at FAHC would be offset by losses of an equal amount at one or another nearby centers. Conversely, if FAHC's increased service outputs are derived from noncompetitive activities that the other centers appear not to provide, then most or all of the \$19 million would represent a net increase in delivery of medical services in the State. We are not in a position to evaluate the merits or likelihood of either scenario and we, therefore, conducted simulations of the two extreme conditions, i.e., where \$0 or \$19 million of additional outpatient services enter into the Vermont economy. In addition, we opted for a middle course in preparing our aggregate impact estimates when we look at construction, soft costs, and operating impacts. We assumed a \$9.5 million increase in outpatient medical service outputs

⁵ The competitive environment for medical care in Vermont may not be strictly a function of distance and/or proximity to nearby medical centers. Once the Project is completed, FAHC may be better positioned to compete with Dartmouth-Hitchcock Medical Center in Lebanon, NH for specialized or complex patient needs. If that proves to be the case, then more than the \$19 million will be at stake for Vermont providers, with consequent increases in economic activity if overall market shares for FAHC services increase.

(item 2 above) in addition to the other four operating impacts listed, evaluating the total of \$28.5 million in additional net revenues to FAHC as a direct effect.

Mercer's analysis provides forecasts of FAHC revenue changes that are directly linked to the Project. These are derived from higher facility utilization rates in the existing service area and higher billing rates that accompany the start of services. The utilization rate increases are expected to occur among all patients regardless of payer status, affecting both the privately insured and Medicaid-assisted patients alike. The billing rate increases, however, are experienced only by privately insured patients (or their employers) who will likely see rate increases in the form of higher premiums and/or deductibles.

For private insurance cost increases, the Mercer data lead us to estimate that the 2% increase in private insurance payments to FAHC would represent \$7.6 million in 2006 rising steadily to \$8.6 million by 2008. Of this amount, approximately 80% of the costs will likely be paid by Vermont rate payers, with the balance borne by New York and other states' premium payers.⁶ To gauge the impact of these additional costs on Vermont consumers or businesses, we have modeled them as a reduction in disposable income, not unlike an income tax change.⁷ Unlike a tax, however, there is some demand elasticity for private insurance such that higher premiums will result in some individuals reducing their coverage to offset the increase. We cannot determine a precise figure for this response, but believe it to be small. In our simulation, we assume that employers or individual policyholders pay 95% of the increase and that the other 5% is unrealized. Similarly, we increase insurance sector output by an equal amount to reflect their increased revenue.

Mercer's forecast for additional Medicaid costs are for an additional \$2 million per year starting in 2006. We have modeled the impact of this increase as if it were added to the personal tax burden of state residents. Although recent additional funding for

⁶ We assume that the 2001 share of FAHC services to out-of-state residents holds constant through the forecast period.

⁷ We treat a premium increase as if it were a tax because the REMI model does not permit direct manipulation of the size of insurance payments to recipients in either an absolute or relative sense without significant modification of the model structure. As before, the economic impact ultimately is one of reducing discretionary income and expenditures and this can be reasonably estimated by this means.

Medicaid has come from the State cigarette tax, there is no fixed funding provision for this. Since REMI is not designed to handle unique fiscal structures of counties and state governments, we impose the cost changes on the overall personal tax burden. From an economic perspective, it does not matter a great deal whether a small aggregate tax increase enters as an excise tax (like the cigarette tax in Vermont), or as a pure income tax as we have done in REMI. Either way, such a tax increase has the immediate effect of reducing disposable income and therefore, personal consumption.⁸ If no net service outputs offset the changes in disposable income, then a small negative economic impact would be realized in the form of lower overall employment, consumption, income, and output.

The Kaufman, Hall and Associates, Inc. financial analysis presents the case of increasing revenue value units that grow at rates that exceed the growth rate of FAHC staff for two years after the Project is completed. This implies a higher rate of output per employee once the facility opens, the definition of increasing labor productivity. We have included the short-lived productivity increases in our model. These have the effect of generating small positive income increases that then stimulate the economy through subsequent personal consumption expenditures. The effects are, however, small.

BASELINE ECONOMIC FORECAST

In this section, we present the baseline economic forecast against which the impacts of the Project can be measured. The Vermont REMI model provides a comprehensive view of the state's economy, offering an exhaustive treatment of employment, income, wages, prices, and demographic characteristics. See the Appendix for a description of the model structure. The latest version, prepared in July 2003, incorporates the latest regional economic data from federal sources, including revised Census of Population 2000 figures for the demographic variables.⁹ As the most

⁸ Were the revenue needs greater, then the different effects of each tax would be a concern. An excise tax on cigarettes tends to be regressive, affecting those of generally lower income levels, while income taxation is usually income neutral or progressive, depending on the taxation scheme in place. Vermont's is of the latter type, being linked in large part to the US federal tax structure.

⁹ At the beginning of our research, it was unclear whether the REMI model used the latest census data. We have compared the 1-year age cohort data against those used in the state's fiscal-economic model and found that although small differences exist, they are largely in the working-age population group (16 through 64 years old), and will not have a measurable effect on the impact estimates presented here.

recent federally developed economic data for U.S. counties (from which the REMI model is constructed) are current through 2000, values shown for 2001 and 2002 are forecasts and not actual data.

In Table 3, we show a cross-section of basic economic indicators that we use in later analysis of economic impacts. The primary indicators shown are employment, personal income, the consumer price index, measures of gross state product and output, population, and migration induced by economic conditions. Many of the categories are familiar to readers, with the possible exception of real gross state product, real output, and economic migration. We provide the following definitions:

Real Gross State Product: The value of all goods and services produced minus the value of intermediate production, adjusted for price-level changes, such as that due to inflation. It is the sum of value-added at all stages of production.

Real Output: The value of all goods and services produces, including intermediate production, adjusted for price-level changes.

Economic Migration: A measure of population change that reflects responses to changes in wage rates, employment opportunities, and amenities, such as level and quality of public services. When positive, it indicates favorable conditions for economic growth, and when negative, unfavorable conditions.

In general, the forecast for economic activity in Vermont is for moderate growth in output, state product, and income, with relatively low overall growth anticipated for employment and population. In the employment categories of interest, construction and trade employment are expected to grow very slowly without the Project (0.4% and 0.5% per year, respectively), manufacturing is expected to shrink at a 1.2% rate per year, and left after payment of taxes after adjusting for inflation) growing at a 3.4% rate per year. Price level changes are expected to be modest with the personal consumption expenditure index growing at about 2% per year.

Table 3: Baseline Economic Forecast: Vermont, 2001-2008

INDICATOR/TIME PERIOD	History	Forecast								GROWTH
	2000	2001	2002	2003	2004	2005	2006	2007	2008	RATE (%)
Total Employment (000)	405.7	411.3	408.5	411.3	416.0	420.5	424.9	429.7	434.1	0.85
Construction	26.7	28.2	27.5	26.9	26.9	27.0	27.1	27.3	27.5	0.37
Manufacturing	53.4	51.4	49.4	48.9	48.8	48.7	48.7	48.6	48.5	-1.20
Trade	80.7	82.1	81.0	81.7	82.3	83.0	83.6	84.1	84.5	0.58
Services	136.4	139.9	140.7	143.5	147.0	150.0	153.1	156.4	159.6	1.98
Medical Services	32.4	33.9	34.7	35.6	36.8	37.7	38.7	39.7	40.8	2.90
Misc. Business Services	17.6	17.9	17.6	18.1	18.8	19.4	20.1	20.8	21.5	2.53
Misc. Professional Services	18.3	18.3	18.1	18.4	18.7	19.1	19.5	19.9	20.2	1.26
Personal Income (\$, bil.)	16.4	17.4	18.0	18.9	19.9	21.0	22.1	23.3	24.5	5.15
Wage Rate (annual, per employee)	22.2	22.9	23.7	24.8	25.8	26.8	27.8	28.9	30.0	3.80
Real Disposable Income (\$ 96, bil)	12.0	12.6	13.0	13.4	13.8	14.3	14.7	15.2	15.6	3.36
Price Index (PCE, 1992=100)	117.2	118.7	120.1	122.7	125.4	128.2	131.0	133.9	136.9	1.96
Real Gross State Product (\$1996, bil.)	21.1	21.5	22.0	22.8	23.6	24.4	25.2	26.1	26.9	3.08
Real Output (\$1996, bil.)	34.9	35.2	35.9	37.3	38.7	40.2	41.6	43.1	44.6	3.14
Population (000)	609.7	615.1	618.2	620.6	623.0	625.3	627.8	630.5	633.4	0.48
Economic Migrants (000)	2.4	2.5	1.0	0.4	0.5	0.5	0.6	0.8	1.0	-10.84

Source: Nicolas Rockler, Economist. Forecast from the REMI Model.

ECONOMIC IMPACT ESTIMATES

Due to offsetting impacts, the Project has relatively minor net impacts on the state economy. Taking all direct construction and operating impacts into account, there is virtually no measurable impact on total employment, personal income, state product or output, or population viewed over the forecast interval. There are small changes in construction, manufacturing, and the several categories of service employment, but small gains in the early part of the forecast period during construction activity are offset by small losses in the later period due to the potential effects of higher costs for medical services. The middle-of-the road assumption of a \$28.5 million increase in net FAHC revenue attributable to the opening of the new facility (\$19 million from higher billing rates and ½ of the \$19 million from higher outpatient utilization after accounting for possible losses at neighboring hospitals) has little impact on employment or income. We summarize the combined effects of construction and operating impacts on the State's economy in Table 4, discussed below.

Employment Impacts

Total State employment over the forecast period is expected to grow from 406,000 in 2000 to 434,100 by 2008 without the project. With the project, employment will be slightly lower, reaching 433,800 by 2008, a difference of less than 1/10th of 1 percent compared to the baseline forecast. This result indicates that the state's economy is sensitive to health care cost changes, especially in view of the small economic growth linked to the higher operating revenues. Our hypothetical increase in net FAHC revenues of \$28.5 million per year over pre-Project levels represents 5% of the overall FAHC net revenues. The estimate presented here is sensitive to the treatment of higher service costs and revenue growth and we conclude that *there is essentially no impact from the project on the state economy*, viewed over an eight year forecast period.

During the construction period, total employment rises by 100 employees over the baseline figure in 2001. At the end of construction in 2005, total employment will have

Table 4: FAHC Combined Impacts of Construction and Operations (Assuming \$28.5 million net revenue increase.)

INDICATOR/TIME PERIOD	History	Forecast								GROWTH
	2000	2001	2002	2003	2004	2005	2006	2007	2008	RATE (%)
Total Employment (000)	405.7	411.4	409.3	412.0	416.5	421.2	425.3	429.2	433.8	0.84
Construction	26.7	28.2	27.7	27.0	27.0	27.2	27.1	27.1	27.4	0.30
Manufacturing	53.4	51.4	49.5	49.0	48.9	48.9	48.7	48.6	48.5	-1.22
Trade	80.7	82.1	81.1	81.8	82.4	83.2	83.6	84.0	84.4	0.56
Services	136.4	140.0	140.9	143.7	147.2	150.2	153.4	156.3	159.5	1.97
Medical Services	32.4	33.9	34.7	35.6	36.8	37.7	38.9	40.0	41.0	2.98
Misc. Business Services	17.6	17.9	17.7	18.1	18.8	19.5	20.1	20.5	21.2	2.40
Misc. Professional Services	18.3	18.3	18.2	18.4	18.8	19.1	19.5	19.8	20.2	1.23
Personal Income (\$, bil.)	16.4	17.4	18.0	18.9	20.0	21.0	22.1	23.3	24.5	5.14
Wage Rate (annual, per employee)	22.2	22.9	23.8	24.9	25.8	26.8	27.8	28.9	30.0	3.80
Real Disposable Income (\$ 96, bil)	12.0	12.6	13.1	13.4	13.9	14.3	14.7	15.1	15.6	3.35
Price Index (PCE, 1992=100)	117.2	118.7	120.1	122.7	125.4	128.2	131.0	133.8	136.8	1.95
Real Gross State Product (\$1996, bil.)	21.1	21.5	22.0	22.8	23.6	24.4	25.2	26.0	26.9	3.07
Real Output (\$1996, bil.)	34.9	35.2	36.0	37.4	38.8	40.2	41.7	43.1	44.6	3.12
Population (000)	609.7	615.1	618.4	620.9	623.3	625.7	628.2	630.8	633.7	0.48
Economic Migrants (000)	2.4	2.5	1.1	0.5	0.5	0.6	0.6	0.7	0.9	-11.76
Difference from Baseline Forecast										
Total Employment (000)	0.0	0.1	0.7	0.7	0.6	0.7	0.4	-0.4	-0.3	-0.01
Construction	0.0	0.0	0.2	0.2	0.2	0.2	0.0	-0.2	-0.2	-0.07
Manufacturing	0.0	0.0	0.1	0.1	0.1	0.1	0.0	-0.1	0.0	-0.01
Trade	0.0	0.0	0.2	0.2	0.1	0.2	0.0	-0.1	-0.1	-0.02
Services	0.0	0.0	0.2	0.2	0.2	0.2	0.3	-0.1	-0.1	0.00
Medical Services	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.08
Misc. Business Services	0.0	0.0	0.1	0.1	0.1	0.1	0.0	-0.2	-0.2	-0.13
Misc. Professional Services	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	-0.03
Personal Income (\$, bil.)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
Wage Rate (annual, per employee)	0.0	0.0	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.00
Disposable Income	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
Price Index (PCE, 1992=100)	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.01
Real Gross State Product (\$1996, bil.)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.01
Real Output (\$1996, bil.)	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.0	-0.01
Population (000)	0.0	0.0	0.1	0.2	0.3	0.4	0.4	0.3	0.2	0.00
Economic Migrants (000)	0.0	0.0	0.1	0.1	0.1	0.1	0.0	-0.1	-0.1	-0.92

Source: Nicolas Rockler, Economist. Forecast from the REMI Model.

increased by 700 persons above the baseline level. Construction, manufacturing and miscellaneous business services all benefit from the small gains produced by the project. These gains subsequently disappear with the end of construction spending and in later years, total employment drops below the baseline. See Table A.3 for the impacts of the construction expenditures independent of the operating cost and revenue changes.

Income Impacts

Personal income is expected to grow from \$16.4 billion in 2000 to \$24.5 billion in 2008. The project has virtually no net effect on personal income. Similarly, the project has almost no lasting net effect on disposable income or the average wage rate in the state.

Real Gross State Product and Output Impacts

The real gross state product is expected to grow at a 3.1% annual rate over the forecast period without the project. With the project, we forecast a virtually identical rate. Real output is expected to grow by identical amounts with or without the project. To the extent that the project generates small gains in the 2001 to 2005 period in output, these are offset by declines when the small increases in medical care related costs slow output growth.

Population Impacts

Population is expected to grow from 607,900 persons in 2000 to 633,400 in 2008 in the baseline forecast. With the Project, this figure is virtually unchanged. Economic migrant inflows slow somewhat as a result of the project, but such small changes may not be statistically significant. The net decline of in-migrants is apparently offset by non-economic (i.e., retired) migrants, so that overall population is unchanged. In the long run, if FAHC proved to enhance the perception of the region's amenities, something major health care facilities often do, some migration-induced economic growth may become a more important project impact.

SENSITIVITY OF RESULTS TO ALTERNATIVE MARKET SHARE ASSUMPTIONS

To test the sensitivity of our estimates to different assumptions with respect to a possible shift in services from neighboring facilities (and net reduction in overall state

medical services output) we have prepared alternative simulations of the project operating impacts in Appendix Table A.1 and A.2. In Table A.1, we show the effect of complete substitution of services at nearby hospitals with those from FAHC, with net Vermont service outputs of \$19.0 million instead of the \$28.5 million that is our mid-point estimate. The operating impacts (no construction is included here) show small gains in employment (an additional 200-300 services employees during the 2006-2008 period), but no measurable change in gross state product, output or income.

In Table A.2, we show the results of simulating no substitution of services. This means that the \$19 million from higher utilization has no effect on nearby hospitals and that State net revenues rise by \$38 million. Under this assumption, employment increases by approximately 800 persons, not enough to change the state product or income levels, but enough to offset the decline in construction employment that we forecast for 2006-2008 after the Project is complete, as shown in Table 4. If this assumption proves true, then economic effects of the Project will remain small, but uniformly positive.

SUMMARY OF FINDINGS

Our analysis shows that the Project has small overall net impacts on the State economy. Whether measuring employment, income, state product or output, the effects of the construction and operation are small. This conclusion rests largely on the assumption that FAHC generates only minimal increases in the net revenue attributable to the operation of the new facilities. If the Project facilities simply shift patient care from surrounding centers, then the cost impacts are likely to show larger negative effects on the economy, although still small ones. If, on the other hand, net revenues exceed the conservative estimate of \$28.5 million and these gains come at the expense of neighboring states, then the prospect for economic gains to the State would improve.

APPENDIX

1. The REMI Model

2. Tables for Alternative Simulations of Operating Impacts:

Table A.1: Operating Impacts Only (Assuming \$19 million increase in FAHC net medical services revenue .)

Table A.2: Operating Impacts Only (Assuming \$38 million increase in FAHC net medical services revenue .)

Table A3: Construction Impacts Only

The REMI Model

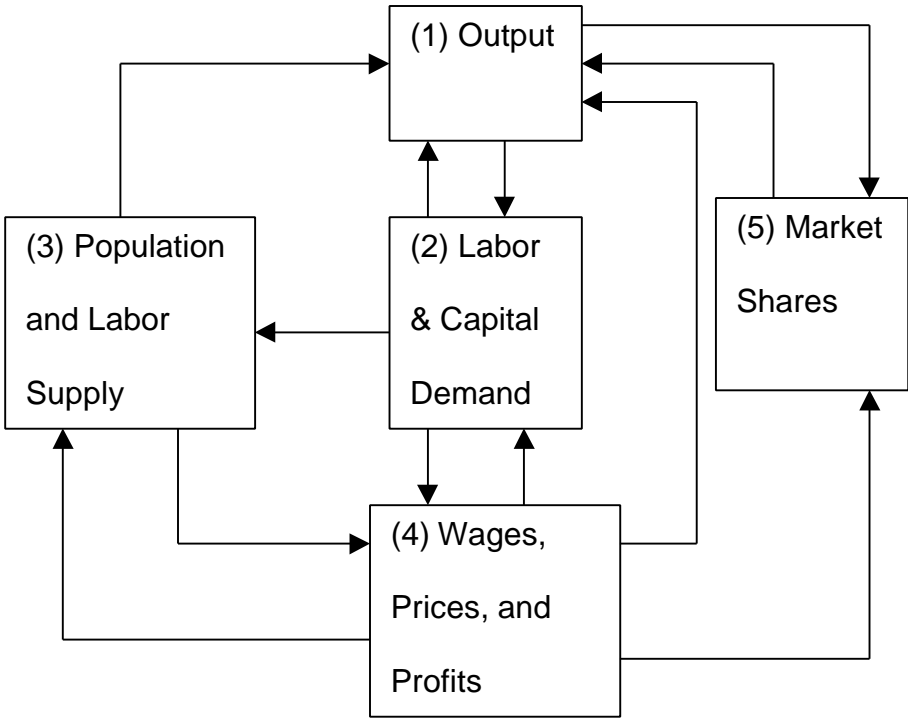
The Regional Economic Models, Inc. ("REMI") model utilizes blocks of regional equations that the vendor estimated on the basis of conventional behavioral assumptions commonly found in macro-econometric models. Characterized by highly flexible geographic coverage that has the capability to range from single counties to the entire country, its components include an equally geographically flexible non-survey-adjusted input-output model that is useful for disaggregating and "localizing" the effects of certain changes in final demand.

The REMI model is distinguished from other regional models by its application of regional purchase coefficients, for example measurements of relative regional sectoral self-sufficiency compared with the nation as a whole, for estimating regional imports and exports. This concept is developed in Treyz, Friedlaender, and Stevens (1980). We show the basic model linkages (Figure A.1), and Ehlen and Brown (2000) provide a useful compact summary of its operations and assumptions. The model is comprised of five "blocks" of behavioral equations estimated using multiple-regression techniques that link output, labor/capital demand, population/labor supply, wages/prices/profits, and geographically defined market shares. Using the model, an analyst can draw on the output, employment, and income blocks to make estimates at either a 53- or 172-sector level of detail. With the 53-sector model, we conduct our analysis of the Renaissance Project.

The REMI model has been a great benefit to regional analysts who face the daunting prospect of assembling and constructing local models that usually employ ad hoc structures with regard to behavioral assumptions and sectoral detail. It brings impact timing--something common in national econometric models but almost always lacking in regional analyses, which often use multiplier and input-output techniques--into regional economic analyses. When estimating the impacts we use a model that has three regions defined by the Joint Fiscal Committee of the Vermont legislature. These regions are comprised as follows:

FIGURE A.1

BASIC MODEL LINKAGES IN THE REMI MODEL



Source: George I. Treyz. 1993. *Regional Economic Modeling: A Systematic Approach to Economic Forecasting and Policy Analysis*. Boston, MA: Kluwer Academic Publishers.

Vermont Legislature Joint Fiscal Office Analysis Regions

Region 1

- Chittenden County
- Franklin County
- Grand Isle County

Region 2
Bennington County
Rutland County

Region 3
All other counties

Impact Types

The REMI model generates economic and demographic forecasts on an annual basis, constructed from more than 30 years of historical data. Its forecast horizon extends up to 35 years. The general form of the different equations for each category of economic measure is given in Treyz (1993), but when using the model, users are not given access to either the estimated coefficients or the statistical properties of the estimated relationships.

Economic impacts are generally composed of direct, indirect, and induced impacts. These terms have specific meaning and refer to whether an analyst views the changes in the Project's output or costs as being exogenous to an economy or generated from within the economy. By convention, direct effects are an exogenous change in economic activity, such as the introduction of new investment into the economy, or the start-up of industrial enterprises funded from outside the region. An analyst derives indirect effects from changes in outputs that are, in turn, the intermediate industry responses to the direct effects. Induced effects are those generated through changes in output linked to personal consumption. The REMI model derives them from the changes in personal incomes that are generated from the direct and indirect effects, starting with changes in aggregate wages, rents, royalties, profits, etc.

The REMI model also includes one other impact measure, termed the "full effect." This includes direct, indirect, and induced effects as well as those linked to changes in demographic characteristics produced by internal migration. These are shifts in population in response to job opportunities, which alter the location of consumption. We estimate and use the "full" effects in our analysis here.

APPENDIX TABLES A.1-A.3

Appendix Table A.1: Operating Impacts Only (Assuming \$19 million increase in FAHC net medical services revenue .)

INDICATOR/TIME PERIOD	History	Forecast								GROWTH
	2000	2001	2002	2003	2004	2005	2006	2007	2008	RATE (%)
Total Employment (000)	405.7	411.3	408.5	411.3	416.0	420.5	425.1	429.9	434.4	0.86
Construction	26.7	28.2	27.5	26.9	26.9	27.0	27.1	27.3	27.5	0.37
Manufacturing	53.4	51.4	49.4	48.9	48.8	48.7	48.7	48.6	48.5	-1.20
Trade	80.7	82.1	81.0	81.7	82.3	83.0	83.6	84.2	84.5	0.58
Services	136.4	139.9	140.7	143.5	147.0	150.0	153.2	156.5	159.7	1.99
Medical Services	32.4	33.9	34.7	35.6	36.8	37.7	38.8	39.8	40.9	2.94
Misc. Business Services	17.6	17.9	17.6	18.1	18.8	19.4	20.1	20.8	21.5	2.54
Misc. Professional Services	18.3	18.3	18.1	18.4	18.7	19.1	19.5	19.9	20.3	1.27
Personal Income (\$, bil.)	16.4	17.4	18.0	18.9	19.9	21.0	22.1	23.3	24.5	5.15
Wage Rate (annual, per employee)	22.2	22.9	23.7	24.8	25.8	26.8	27.8	28.9	30.0	3.81
Real Disposable Income (\$ 96, bil)	12.0	12.6	13.0	13.4	13.8	14.3	14.7	15.2	15.6	3.36
Price Index (PCE, 1992=100)	117.2	118.7	120.1	122.7	125.4	128.2	130.9	133.8	136.8	1.95
Real Gross State Product (\$1996, bil.)	21.1	21.5	22.0	22.8	23.6	24.4	25.2	26.1	26.9	3.09
Real Output (\$1996, bil.)	34.9	35.2	35.9	37.3	38.7	40.2	41.7	43.2	44.7	3.15
Population (000)	609.7	615.1	618.2	620.6	623.0	625.3	627.8	630.6	633.6	0.48
Economic Migrants (000)	2.4	2.5	1.0	0.4	0.5	0.5	0.6	0.8	1.0	-10.43
Difference from Baseline Forecast										
Total Employment (000)	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.3	0.01
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.01
Manufacturing	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
Trade	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
Services	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.01
Medical Services	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.04
Misc. Business Services	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.02
Misc. Professional Services	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.01
Personal Income (\$, bil.)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.01
Wage Rate (annual, per employee)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
Disposable Income	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.01
Price Index (PCE, 1992=100)	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.01
Real Gross State Product (\$1996, bil.)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.01
Real Output (\$1996, bil.)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.01
Population (000)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.00
Economic Migrants (000)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.41

Source: Nicolas Rockler, Economist. Forecast from the REMI Model.

Appendix Table A.2: Operating Impacts Only (Assuming \$38 million increase in FAHC net medical services revenue .)

INDICATOR/TIME PERIOD	History	Forecast								GROWTH
	2000	2001	2002	2003	2004	2005	2006	2007	2008	RATE (%)
Total Employment (000)	405.7	411.3	408.5	411.3	416.0	420.5	425.6	430.4	434.9	0.87
Construction	26.7	28.2	27.5	26.9	26.9	27.0	27.2	27.4	27.6	0.39
Manufacturing	53.4	51.4	49.4	48.9	48.8	48.7	48.7	48.6	48.5	-1.20
Trade	80.7	82.1	81.0	81.7	82.3	83.0	83.7	84.2	84.6	0.59
Services	136.4	139.9	140.7	143.5	147.0	150.0	153.6	156.9	160.1	2.02
Medical Services	32.4	33.9	34.7	35.6	36.8	37.7	39.0	40.1	41.2	3.02
Misc. Business Services	17.6	17.9	17.6	18.1	18.8	19.4	20.1	20.8	21.5	2.56
Misc. Professional Services	18.3	18.3	18.1	18.4	18.7	19.1	19.5	19.9	20.3	1.28
Personal Income (\$, bil.)	16.4	17.4	18.0	18.9	19.9	21.0	22.1	23.3	24.5	5.17
Wage Rate (annual, per employee)	22.2	22.9	23.7	24.8	25.8	26.8	27.8	28.9	30.0	3.81
Real Disposable Income (\$ 96, bil)	12.0	12.6	13.0	13.4	13.8	14.3	14.7	15.2	15.6	3.37
Price Index (PCE, 1992=100))	117.2	118.7	120.1	122.7	125.4	128.2	130.9	133.9	136.8	1.95
Real Gross State Product (\$1996, bil.)	21.1	21.5	22.0	22.8	23.6	24.4	25.3	26.1	26.9	3.10
Real Output (\$1996, bil.)	34.9	35.2	35.9	37.3	38.7	40.2	41.7	43.2	44.7	3.16
Population (000)	609.7	615.1	618.2	620.6	623.0	625.3	627.9	630.8	633.9	0.49
Economic Migrants (000)	2.4	2.5	1.0	0.4	0.5	0.5	0.7	0.9	1.1	-9.59
Difference from Baseline Forecast										
Total Employment (000)	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.8	0.8	0.02
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.03
Manufacturing	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
Trade	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.01
Services	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.5	0.04
Medical Services	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.4	0.4	0.12
Misc. Business Services	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.04
Misc. Professional Services	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.02
Personal Income (\$, bil.)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.02
Wage Rate (annual, per employee)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.01
Disposable Income	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.02
Price Index (PCE, 1992=100))	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.01
Real Gross State Product (\$1996, bil.)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.02
Real Output (\$1996, bil.)	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.02
Population (000)	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.4	0.01
Economic Migrants (000)	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.1	1.25

Source: Nicolas Rockler, Economist. Forecast from the REMI Model.

Appendix Table A3: Construction Impacts Only

INDICATOR/TIME PERIOD	History	Forecast								GROWTH
	2000	2001	2002	2003	2004	2005	2006	2007	2008	RATE (%)
Total Employment (000)	405.7	411.4	409.3	412.0	416.5	421.2	424.8	428.7	433.2	0.82
Construction	26.7	28.2	27.7	27.0	27.0	27.2	27.1	27.1	27.3	0.28
Manufacturing	53.4	51.4	49.5	49.0	48.9	48.9	48.6	48.6	48.5	-1.22
Trade	80.7	82.1	81.1	81.8	82.4	83.2	83.6	83.9	84.3	0.55
Services	136.4	140.0	140.9	143.7	147.2	150.2	153.1	155.9	159.2	1.94
Medical Services	32.4	33.9	34.7	35.6	36.8	37.7	38.7	39.7	40.8	2.90
Misc. Business Services	17.6	17.9	17.7	18.1	18.8	19.5	20.1	20.5	21.2	2.37
Misc. Professional Services	18.3	18.3	18.2	18.4	18.8	19.1	19.5	19.8	20.2	1.22
Personal Income (\$, bil.)	16.4	17.4	18.0	18.9	20.0	21.0	22.1	23.2	24.5	5.13
Wage Rate (annual, per employee)	22.2	22.9	23.8	24.9	25.8	26.8	27.8	28.8	29.9	3.79
Real Disposable Income (\$ 96, bil)	12.0	12.6	13.1	13.4	13.9	14.3	14.7	15.1	15.6	3.34
Price Index (PCE, 1992=100)	117.2	118.7	120.1	122.7	125.4	128.2	131.0	133.9	136.9	1.95
Real Gross State Product (\$1996, bil.)	21.1	21.5	22.0	22.8	23.6	24.4	25.2	26.0	26.8	3.05
Real Output (\$1996, bil.)	34.9	35.2	36.0	37.4	38.8	40.2	41.6	43.0	44.5	3.11
Population (000)	609.7	615.1	618.4	620.9	623.3	625.7	628.1	630.6	633.4	0.48
Economic Migrants (000)	2.4	2.5	1.1	0.5	0.5	0.6	0.5	0.6	0.8	-12.80
Difference from Baseline Forecast										
Total Employment (000)	0.0	0.1	0.7	0.7	0.6	0.7	-0.1	-1.0	-0.9	-0.03
Construction	0.0	0.0	0.2	0.2	0.2	0.2	0.0	-0.2	-0.2	-0.09
Manufacturing	0.0	0.0	0.1	0.1	0.1	0.1	0.0	-0.1	-0.1	-0.01
Trade	0.0	0.0	0.2	0.2	0.1	0.2	0.0	-0.2	-0.2	-0.03
Services	0.0	0.0	0.2	0.2	0.2	0.2	0.0	-0.5	-0.4	-0.03
Medical Services	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
Misc. Business Services	0.0	0.0	0.1	0.1	0.1	0.1	0.0	-0.3	-0.3	-0.16
Misc. Professional Services	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.04
Personal Income (\$, bil.)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.02
Wage Rate (annual, per employee)	0.0	0.0	0.1	0.1	0.0	0.1	0.0	0.0	0.0	-0.01
Disposable Income	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.02
Price Index (PCE, 1992=100)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
Real Gross State Product (\$1996, bil.)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.03
Real Output (\$1996, bil.)	0.0	0.0	0.1	0.1	0.1	0.1	0.0	-0.1	-0.1	-0.03
Population (000)	0.0	0.0	0.1	0.2	0.3	0.4	0.3	0.1	0.0	0.00
Economic Migrants (000)	0.0	0.0	0.1	0.1	0.1	0.1	-0.1	-0.2	-0.2	-1.96

Source: Nicolas Rockler, Economist. Forecast from the REMI Model.

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