



VERMONT BUSINESS ROUNDTABLE

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Population  
and  
Employment  
Forecast  
1988

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## Vermont Business Roundtable

Established in 1987, The Vermont Business Roundtable is a non-partisan organization dedicated to helping Vermont achieve long-term public policy objectives worthy of its citizens. Composed of the principal officers of 150 Vermont companies representing geographical diversity and all major sectors of the economy, the Roundtable is committed to achieving prosperity and preserving Vermont's unique quality of life.

## Vermont Business Roundtable

### POPULATION AND EMPLOYMENT FORECAST - 1988

#### EXECUTIVE SUMMARY

##### INTRODUCTION

The Vermont Business Roundtable has completed the initial phase of its development of a population and employment forecast for Vermont. The forecast is the first such economic forecast ever developed specifically for the Vermont economy by the private sector.

The report contains a review of the economic trends in Vermont from 1960 to 1986 as well as a description of the specific Vermont economic model employed to develop the forecast for the period 1986 through the year 2007. The forecast was developed by the Wharton Econometric Forecasting Associates of Philadelphia, Pennsylvania, in close cooperation with Vermont economist Malcolm Severance and members of the Roundtable. Particular features of the report include the following:

- A 20-year population and employment forecast for the period of 1987 to 2007 based on the projected performance of the national economy and on historical data spanning more than 20 years and including more than 600 variables.
- A review of economic trends in Vermont from 1960 to 1986.
- A summary appendix containing an historical perspective of the Vermont economy and population from 1790 to the present that is intended to provide the reader with a view of the changing forces that have affected how Vermonters have made their living over the years.

##### PRELIMINARY FINDINGS

The report requires a great deal of consideration by Vermont Business Roundtable members before the Roundtable will be in a position to draw conclusions and develop policy recommendations with respect to matters covered in the report. However, certain conclusions can be drawn from the report at this time.

- Between now and the end of the century total employment in Vermont will increase by 75,000 or an average of nearly 6,000 jobs per year. This is somewhat lower than the most recent 10-year period which experienced an increase of 6,500 jobs per year.
- Manufacturing will grow during the period of the 20-year forecast but will add only 8,000 additional workers. This

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modest increase will result in a smaller percent of the total work force engaged in manufacturing as the 20-year period unfolds. The percent of the work force involved in manufacturing will drop from 20.6 percent in 1987 to 16.7 percent in the year 2000.

- Real income per person in Vermont will continue to increase, projected at 30+ percent over the 20-year span in the Baseline model. This increase may be at a slightly lower rate than that experienced by the national economy as a result of the shift in employment mix.
- The population of the state will rise from 541,000 recorded in 1986 to 620,000 at the turn of the century and to about 660,000 by the year 2007.
- Population growth will continue to expand as the economy provides jobs that offer the opportunity for Vermonters to stay in Vermont to seek employment. The economic growth that is forecast will attract an equal number of new Vermonters.
- Alternative scenarios on the baseline economic forecast, which tested the sensitivity of the forecast to downward as well as upward pressures, did not change the overall direction significantly. Generally, slightly slower growth would provide lower per capita incomes and slightly faster growth would provide higher per capita incomes.
- As a result of the shift in employment mix it is likely that the Vermont economy will generate real increases in personal income at a somewhat slower pace than the regional and national economies. Increasing growth in the manufacturing sector would improve personal income beyond the baseline forecast.

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### INITIAL RECOMMENDATIONS

#### Further study of the service and trade sectors.

The report also identifies areas where additional research should be directed. The study points out that Vermont does not know enough about its fastest growing sectors. For example, service employment as a proportion of total Vermont employment will rise more rapidly than any other sector during the 20-year period of the forecast. Fully 30 percent of the total Vermont employment will be engaged in service activities in the year 2007. Wholesale and retail trade will also rise in importance during the forecast period resulting in more than 25 percent of total Vermont employment by the year 2007.

Given the wide range in the quality of jobs that are encompassed in the rapidly growing categories of service, wholesale and trade as well as the growing importance of these sectors within Vermont during the next 20 years, a careful and detailed analysis of these sectors should be undertaken promptly.

#### Further study of business climate.

"Business climate" may be defined as the result of social, political and economic forces that interact to define the growth and development of business within the state. For purposes of future planning, the business climate must be considered. What the climate is today in comparison with other areas of the northeast is subject to speculation. A study that reviews location theory and assesses Vermont's strengths and weaknesses most likely to prevail in the 21st century would provide insights for policy decisions.

#### An evaluation process is required in order to fully evaluate the report.

Members of the Roundtable will hold a one-day work session to evaluate the report in January 1989. At this retreat, various aspects of the report will be analyzed and discussed by the Roundtable members. Recommendations for public policy initiatives will be developed at that meeting for later submission to the public and to public officials.



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### POPULATION AND EMPLOYMENT FORECAST

#### INTRODUCTION

This paper reports the findings of an econometric forecast of population and employment for the State of Vermont based on economic performance since the 1960s. Consideration is given to the forces expected to prevail at the national level over the forecast period. The forecast provides annual data for a wide range of economic activities for the years 1987 to 2007.

The report is intended to be used as a basis for subsequent policy analyses and design. As such, it is important to recognize that the forecast is based on a set of specific assumptions. The forecast serves as a basic analysis that can be modified by applying any combination of "what if?" predictions.

Although long-range forecasts are subject to significant degrees of error, they do give insights into the direction of movement -- the magnitudes of change likely to occur and the degree to which variables within the system are interrelated. Moreover, an analysis of the results of the forecast of the Vermont economy provides a basis for making broad comparisons among the economies of Vermont, the New England region, and the United States.

The report contains a review of the economic trends in Vermont from 1960 to 1986, a description of the economic model employed and its assumptions, and a forecast and resulting analyses. The appendix contains an historical perspective of Vermont from 1790 to the present to give the reader a view of the changing forces that have dictated both the direction and magnitude of change over the years.

#### SUMMARY OF ECONOMIC TRENDS, 1960 TO 1986

The economic history of Vermont divides itself into three distinct periods. The first period, extending from colonial times to the mid-19th century, was characterized by very rapid growth, followed by moderate growth. The period from 1850 to 1960 was one of considerable economic change but very little population growth. These two periods are detailed in Appendix A.

The third period, from 1960 to the present, is characterized by a dramatic escalation in the rate of population growth, a rate equal to or exceeding that of the country as a whole and that of the New England region. For the purposes of this paper, the population growth will be described as a manifestation of economic

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development as evidenced by such measures as Gross State Product (GSP) or levels of employment.

Gross State Product, which is analogous to Gross National Product (GNP), is the market value of all final goods and services produced in the state in any given year. It provides a rough measure of economic activity for the year and, when compared with the GSP for other years, an indication of the rate of economic growth of the region. Table 1 shows the GSP figures for Vermont, selected other states in New England, the New England region, and the United States for the period of 1963 to 1986.

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Table 1

### Gross State Product in 1982 Dollars (000,000): 1963 to 1986

Year ----	VT --	N.H. ----	Maine -----	N.E. ----	U.S. ----
1963	3,205	5,098	7,309	104,717	1,863,146
1986	7,585	17,073	15,056	217,026	3,681,144
% Change	137%	235%	106%	107%	98%

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(Source: All the GSP data is from the new series produced by the Department of Commerce, the product of several years of work. It is viewed as a definitive source of basic data about the economies of the respective states and regions. The data are yearly and covers the period 1963 through 1986. It is available on diskettes.)

The numbers are expressed in constant dollars, meaning that they have been adjusted for price level changes. The Vermont economy has grown 137 percent over the period, demonstrating significantly higher performance than the 98 percent growth of the U.S. as a whole and the 107 percent rate for New England. New Hampshire has the fastest growth rate of any state in New England.

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Table 2

**Percentage Changes in Gross State Product (GSP) by  
Sector 1963 to 1986**

Sector -----	VT --	N.H. ----	N.E. ----	U.S. ----
Agriculture	48%	54%	50%	49%
Mining	-5	40	150	15
Construction	25	93	-4	-5
Manufacturing	234	372	121	104
Transportation Communications Public Utilities	145	187	123	128
Wholesale/ Retail Trade	156	277	144	146
Finance Insurance Real Estate	174	264	127	134
Services	146	261	163	160
Government	60	73	37	59
Total:	137	234	107	98

What has triggered the growth rate in the Vermont economy over the last 25 years? Table 2 illustrates how some sectors grow faster than others and influence the performance of related areas of activity. It details the growth of various sectors of the economy from 1963 to 1986 for Vermont, New Hampshire, New England and the United States using GSP data. Vermont's manufacturing sector demonstrates the most dramatic increase, 234 percent compared with a national increase of 104 percent during that period.

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Not only is the increase in manufacturing significant in itself; it also represents an export activity wherein all the product sold outside the state results in an influx of funds into the state.

Finance, insurance and real estate also demonstrated substantial growth, bettering the U.S. increase by 40 percentage points and showing a 174 percent increase over the period. The lowest growth sectors of the Vermont economy over the period were agriculture, construction and mining.

The service sector also displays growth during the 1963 to 1986 period. This sector spans a wide range of activities as evidenced in Table 3. The table shows the relative importance of each part of the service sector expressed in terms of the proportion of the GSP attributed to services as a whole. In 1986 health services clearly contributed nearly a third of the GSP generated by the service industry. Hotels and business services were the only other two activities contributing more than 10 percent to the total service generated GSP.

It is also important to note that from 1963 through 1986, health, business services and hotels had the greatest absolute increases in their contribution to GSP.

Unfortunately, "tourism" does not appear as a separate classification under the service umbrella. Thus, it is impossible to determine how important tourism is as part of services in general.

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Table 3

## The Service Sector Changes in GSP From 1963 to 1986 in 1982 Dollars (000,000)

	1963		1986		Change From 1963 to 1986	
	Level -----	% of Total -----	Level -----	% of Total -----	Amount -----	Percent -----
Health Services	128	28.5%	351	31.8%	223	174%
Hotels & Other Lodging	57	13.0	141	12.9	84	+147
Business Services	24	5.4	139	12.6	115	479
Education	40	8.9	86	7.8	46	115
Misc. Professional	14	3.1	82	7.4	68	485
Auto Repair	19	4.2	63	5.7	44	231
Social Services	30	6.7	61	5.5	31	103
Legal Services	29	6.5	53	4.8	24	83
Personal Services	29	6.5	53	4.8	24	82
Amusements and Recreation	21	4.7	33	3.0	12	57
Private Household	40	8.9	23	2.1	-17	-42
Misc. Repair	17	3.8	13	1.2	-4	-24
Motion Pictures	3	0.7	5	0.5	2	67
<b>Total:</b>	<b>449</b>	<b>100</b>	<b>1103</b>	<b>100</b>	<b>654</b>	<b>146%</b>



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Table 4

### Vermont Dairy Industry Changes 1977 to 1987

Items: -----	1977 ----	1987 ----	%Change -----
No. of Farms	3,468	2,637	-32%
No. of Cows	190,000	174,000	-8
Cows Per Farm	55	66	+20
Milk-Billion Lbs.	2.1	2.4	+14
Average Per Cow	11,050	13,790	+25
\$ Sale of Milk, Millions	212	317	+50
Ave. Price/100 Lbs.	\$10.10	\$13.20	+31
Consumer Price Index			+88

A special comment about Vermont agriculture is appropriate because of the dynamic changes occurring within this sector. In 1950 there were over 11,000 farms in Vermont. As Table 4 shows, by 1977 that number was less than 3,500 and in 1987 just over 2,600. From 1950 to 1987 milk production increased from 1.3 billion pounds per year to 2.4 billion pounds per year.

Table 4 shows almost a 15 percent increase between 1977 and 1987, while the number of cows has decreased 8 percent and milk production per cow has increased 25 percent. Another interesting statistic is that between 1950 and 1987 the milk production per farm per day increased seven-fold. However dramatic the productivity increases in agriculture have been, farm income as a percent of personal income in Vermont in 1986 barely exceeded 1 percent.

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Table 5

Proportion of GSP for Each Sector: 1963 and 1986  
Vermont, New England, United States

Sector -----	1963			1986		
	VT --	N.E. ----	U.S. ----	VT --	N.E. ----	U.S. ----
Agriculture	6.3%	1.5%	3.6%	3.9%	1.1%	2.7%
Mining	0.7	0.1	5.5	0.3	0.1	3.2
Construction	11.4	9.9	9.5	6.0	4.6	4.6
Manufacturing	18.5	25.5	21.3	26.1	27.2	22.1
Transportation Communications Public Utilities	7.3	6.5	7.7	7.6	7.0	8.9
Wholesale/ Retail Trade	15.1	15.0	14.7	16.2	17.7	17.5
Finance Insurance Real Estate	14.4	14.7	12.7	16.6	16.1	15.0
Services	14.0	13.5	11.7	14.5	17.4	15.4
Government	12.4	13.3	13.3	8.7	8.8	10.7

It is also helpful to know the relative importance of the major sectors of the economy. Table 5 illustrates the proportion of the GSP coming from each of these sectors for both 1963 and 1986. Note that manufacturing again has increased its share of GSP from 18.5 percent in 1963 to 26.1 percent in 1986, a performance that takes it from below the U.S. level in 1963 to considerably above the U.S. level in 1986. In 1986 manufacturing also produced by far the largest single share of GSP, while agriculture, construction and mining are each barely one-half their 1963 levels.

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Table 6

Non-Agricultural Employment  
Percent Changed: 1963 to 1986

Sector -----	VT --	N.E. ----	U.S. ----
Manufacturing	42%	-1%	12%
Wholesale/ Retail Trade	152	96	99
Government	124	63	75
Services	200	167	178
Transportation Communications Public Utilities	39	30	34
Finance Insurance Real Estate	175	118	120
Construction	150	71	62
Total:	112	63	74

(Source: Department of Labor, Bureau of Labor Statistics, Employment and Earnings. Also Statistical Abstract of the U.S., various years.)

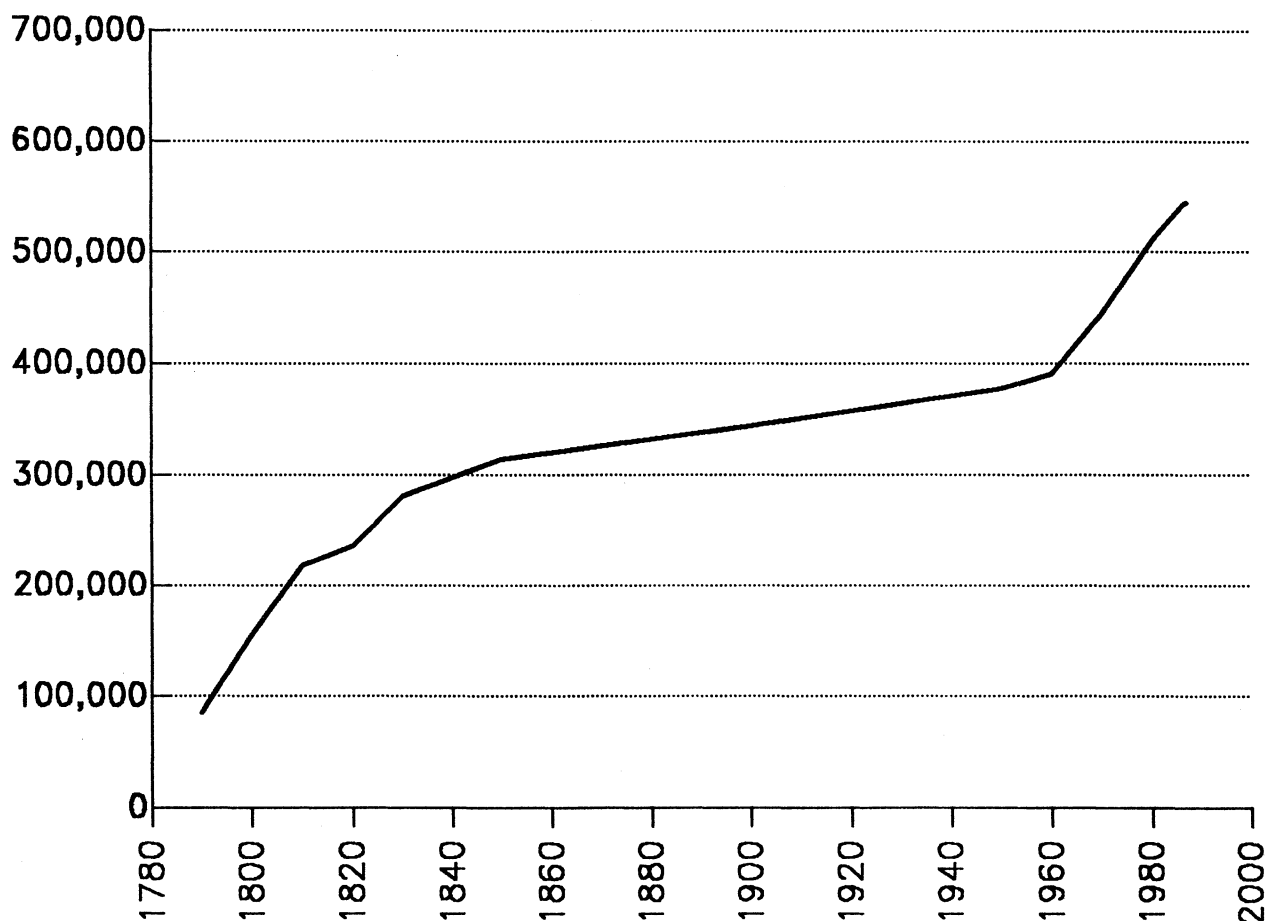
Employment: The level of employment is another measure of the general level of economic activity. Table 6 shows changes in employment over the period of 1963 to 1986 by major sectors, comparing Vermont with New England and the U.S. In nearly every sector Vermont has experienced a higher rate of employment increase than either the New England region or the U.S. Again, this is particularly evident in the manufacturing sector where Vermont's employment grew by 42 percent as compared with the 12

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percent growth for the U.S. and the 1 percent loss by the New England region. Also, while manufacturing employment rose 42 percent during the period, GSP from manufacturing, cited earlier, grew 234 percent during the same period. This phenomenon is attributed to productivity increases and to changes in the product mix.

Population: Beginning with the decade of the 1960s, Vermont's population growth has been dramatic in comparison with the previous 100 years, as the accompanying chart illustrates.

**Chart #1**  
**VERMONT POPULATION**  
**(1790-1987)**



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A review of the data illustrated in Table 7 shows that during the decades of the sixties and the seventies, the rate of growth in Vermont's population exceeded that of New England and the U.S. In the 1980s the population growth rate in Vermont was nearly double the New England rate but slightly behind the increase at the national level.

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Table 7

Population Growth: 1960 - 1985  
Percent Change

	1960-1970 -----	1970-1980 -----	1980-1986 -----
U.S.	13.4%	11.4%	7.4%
N.E.	12.7	4.2	4.0
ME	2.3	13.2	5.5
NH	21.6	24.8	14.8
VT	14.1	15.0	7.2
MA	10.5	0.8	2.1
CT	19.6	2.5	3.3
RI	10.6	-0.3	4.1

---

(Source: U.S. Bureau of the Census, Census of Population 1960, 1970 and 1980. Current Population Reports, series P35, #957. Also, Statistical Abstract of U.S., various years.)

During the 1960s Vermont added more to its population than during all the previous decades of the 20th century combined. Vermont also shifted from having a net out-migration to experiencing a net in-migration of people, as shown in Table 8.

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Table 8

Net In-Migration into Vermont During Previous Year  
1961 to 1970

Year ----	Net In-Migration -----
1961	-2529
1962	-647
1963	-24
1964	-555
1965	557
1966	2164
1967	2855
1968	6424
1968	5938
1970	3585
Total	17,768

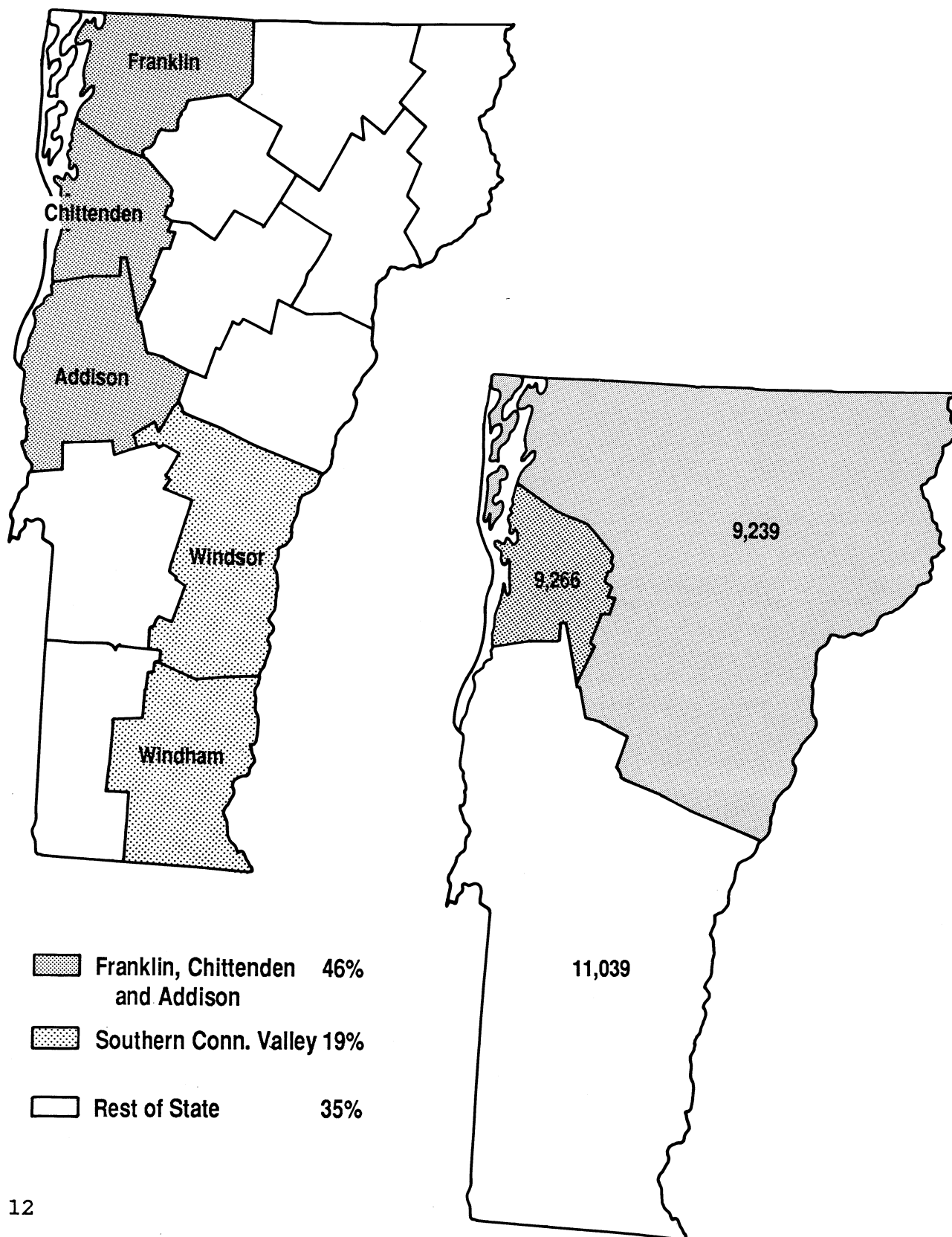
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(Source: The Vermont Economy, 1950-1970, A Study of Regional Growth, by Hamilton W. Helmer, a Ph.D. thesis, Yale University, 1978.)

A closer study of migration patterns reveals that Vermont's young people (age 25-34) continued to leave the state during the decade as had been the pattern for many decades. However, in-migration made up for most of the out-migration in that age group. In the 1970s net in-migration accounted for over one-half of the 67,000 people added to the population that decade. The U.S. Census Office estimates a net in-migration of over 10,000 between 1980 and 1986.

### VERMONT POPULATION GROWTH 1980-86

Total Growth - 29,544



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Where in Vermont has this population growth occurred? The pattern since 1980 is a continuation of recent history. As one can see from Chart #2, Chittenden County accounted for nearly a third of all the increase in Vermont since 1980. Also, it takes the population growth of the other eight northern Vermont counties to match the growth of Chittenden County. Another perspective is provided when we see that the three Champlain Valley counties and the two lower Connecticut River Valley counties account for 65 percent of the increase in Vermont since 1980 with the remaining counties having 35 percent.

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Table 9

Per Capita Personal Income in 1982 Dollars

	1960 ----	1970 ----	1980 ----	1986 ----	% Change -----
Area:					
U.S.	6,481	9,063	11,427	12,852	98%
N.E.	7,089	9,994	12,145	15,045	112
ME	5,378	7,617	9,475	11,219	112
NH	6,270	8,702	11,278	13,945	122
VT	5,387	8,063	9,882	11,699	117
MA	7,185	10,098	12,226	15,532	116
RI	6,489	9,060	10,963	12,777	97
CT	8,206	11,266	13,952	17,178	109

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(Source: U.S. Bureau of Economic Analyses, Survey of Current Business, August issues. Also, Statistical Abstract of U.S., various years.)



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Income: Finally, it is important to observe the recent growth of personal income in Vermont. Table 9 compares the growth rate for Vermont with that of the other states in New England, the New England region as a whole, and the U.S. Note that personal income in Vermont has increased at a higher rate than that in any other state except New Hampshire. Incomes are expressed in constant dollars; i.e., the changes recorded are in "real" terms.

Another way of assessing changes in per capita personal income in Vermont during this period is to relate it as a proportion of that realized in the country as a whole. In 1960 the per capita personal income in Vermont was 83 percent of the national, and by 1986, that ratio had risen to 91 percent as Table 10 shows.

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Table 10

Per Capita Personal Income as a  
(U.S. = 100%)  
Percent of the U.S. Average

State/U.S. -----	1960 ----	1970 ----	1980 ----	1986 ----
VT	83%	89%	87%	91%
NH	97	96	99	109
ME	83	84	83	87
MA	111	114	107	121
RI	100	100	96	99
CT	127	124	122	134

---

In 1960 Vermont and Maine shared (among the New England states) the bottom rung of the ratios with the U.S. experience. In 1986 Maine continues to have the lowest ratio, and Vermont, even with its eight-point advance, trails the performance of much of the rest of New England and is nine points behind the U.S. average. Historically, Connecticut has enjoyed the highest per capita

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income in New England and often in the U.S. However, during the period of 1960 to 1986, New Hampshire has been the pacesetter among the New England states.

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Table 11

Per Capita Personal Income as a  
Percent of the N.E. Average  
(N.E. = 100%)

State/N.E. -----	1960 ----	1970 ----	1980 ----	1986 ----
VT	76%	81%	81%	78%
NH	88	88	93	92
ME	76	77	78	75
MA	101	102	101	103
RI	91	91	90	85
CT	115	113	115	114

---

However favorable Vermont's performance appears, when we compare the per capita personal income growth in Vermont over the 1960 to 1986 period with that of the region, the results are not as impressive. This is true because New England has grown faster during this period than the country as a whole. Vermont's performance is compared to a moving target at the national level as well as with a very fast-moving target in New England, as shown in Table 11. Again, New Hampshire is the pacesetter, Vermont has advanced marginally with Massachusetts, and Rhode Island has dropped considerably.

1960 to 1986 Summary: The Vermont economic experience during the past 25 years has been positive: Vermonters, on average, have increased their standard of living and have done so at a somewhat faster rate than that of either the country as a whole or the New England region. A major force behind this advancement has been the

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growth of manufacturing. This sector has grown most dramatically and currently makes the largest contribution to GSP. While in 1986 there were more people employed in the retail trade and service industries, the average wages and salaries were higher in manufacturing, solidifying the relative importance of manufacturing in the economy.

What has caused the changes in Vermont? The question must be answered by observing multiple forces converging over time rather than seeking a single answer. As compared with the mass-production industries that dominated the early part of the century, high-technology industries dictated a completely different set of criteria essential for successful operation.

The raw materials for the new industries are modest in bulk and weight, and the final product is both high in value and easily shipped. The availability of an educated and able work force, the presence of institutions of higher education, the availability of good transportation services, and proximity to the interstate highway system are likely among the many considerations in determining the location of firms in recent years. The presence of other amenities under the rubric of "quality of life" have doubtless played their part, making less-populated areas attractive, especially when compared with metropolitan areas in terms of crime rate and congestion. The list of factors is doubtless a long one and those mentioned are not meant to be exhaustive. Moreover, the relative weight given any one criterion will likely vary among firms making location decisions.

### THE FORECAST

Wharton Econometric Forecasting Associates (WEFA) produced a model to forecast the performance of the Vermont economy from 1987 to 2007. The model includes two major parts - one which reflects the national economy, while the other addresses economic forces within Vermont.

Any geographical region of the country, or any state, is influenced economically far more by what happened in the aggregate economy than by what may be initiated, or what is taking place, within the area. Hence the performance of the aggregate economy must have a dominant influence in any forecast and thus in any model, especially one covering a considerable time span.

The performance of the national economy from 1987 to 2007 is based on historical data spanning more than 20 years. This includes data on over 600 variables from birth rates and labor participation rates to employment and output levels in all the sectors of the economy as identified by the Standard Industrial Classification (SIC) codes used by the Department of Commerce. Additionally, performance is conditioned by a set of assumptions involving broad

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aggregate forces such as population growth rates, productivity increases and inflation rates. The assumptions in this model are listed below.

The recent experience of the Vermont economy provides the basic input to reflect what is happening locally. In this respect, yearly data dating back into the 1960s are provided on such things as employment levels by industry, personal income, population growth, housing starts, and unemployment rates plus a host of others.

Assembling the data from the national economy with that from the state in model form results in a "top down/bottom up" model. The result is a set of mathematical expressions that define the interrelationships of the many variables and reflect their recent performance. The model for Vermont has produced a forecast showing what is likely to happen in the Vermont economy over the next 20 years.

The specific assumptions about the forces that will influence the performance of the national economy over the forecast period of 1987 to 2007 were the following:

1. Population will continue to expand at a compound rate of 0.9 percent per year. This assumption reflects projected fertility rates, life expectancies, and immigration policies.
2. Technological change will result in productivity increases of 1.7 percent per year from 1987-1997 and then drop to 1.5 percent per year until 2007. These rates reflect the higher productivity increases realized in the 1980s but are significantly less than the rates that prevailed in the early post-World War II era.
3. Deficits at the federal level will decline gradually from 170 billion dollars per year to a balanced budget by 2002 and a surplus of 40 billion in 2007.
4. Growth in consumption will slow down to an increase of 1.6 percent per year through 1990 and then rise to above 2 percent per year after 1992. This assumption recognizes the current high level of consumer debt, the likelihood of higher taxes and the continuation of relatively high interest rates.
5. There will be a gradual reduction in the trade deficit to a balance by 2005. This assumption reflects very recent trends and an expectation that the significance of the trade deficit will prompt appropriate policies that will gradually eliminate it.

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6. Prices will continue to rise at an average annual rate of 5 percent. Within that framework, it is also assumed that energy prices, oil in particular, will continue to fall until 1995 and then rise faster than prices in general (7 percent) until 2007.
7. Interest rates will remain stable at slightly less than the present levels. This assumption is based on the fact that the present long-term "real" rate of interest - interest rate less inflation - is historically high and will likely moderate over time.

For more detail of the Wharton model, see Appendix II.

### BASELINE FORECAST

Using recent historical data on the Vermont economy and similar data for the United States, a long-range forecast was prepared recognizing the assumptions outlined above. The result is the Baseline Forecast, which is a combination of inputs and assumptions. What follows are the revelations provided by this forecast.

### Employment

Between now and the end of the century, total employment in Vermont will increase by 76,200, or an average of nearly 6000 per year. This is a magnitude of change somewhat lower than the most recent 10-year period which experienced an increase of 6,500 per year.

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Table 12

## Baseline Forecast Employment (in Thousands)

Sector: -----	1987 ----	%Tot ----	2000 ----	Change <sup>1</sup> -----	2007 ----	Change <sup>2</sup> -----	%Tot ----
Mfg.	49.5	20.6	54.1	4.6	57.1	7.6	16.7
Trade	55.3	23.0	78.4	23.1	89.5	34.2	26.0
Govt.	39.7	17.0	44.8	5.1	46.3	6.6	14.0
Svc.	58.1	24.0	86.4	28.3	102.3	44.2	30.0
Trans. Comm. Util.	10.2	4.0	10.8	0.6	11.4	1.2	3.3
Finance Ins. R.E.	11.9	5.0	16.3	4.4	19.2	7.3	5.6
Const.	15.3	6.0	14.6	-0.7	14.5	-0.8	4.2
Mining	0.5	0.2	0.6	0.1	0.7	0.2	0.2
Non-Ag.	240.4	100.0	306.1	65.7	341.0	100.6	100.0
Total	284.4	---	360.6	76.2	394.3	109.9	---
<sup>1</sup> 1987-2000		<sup>2</sup> 1987-2007					

Between the years 2000 and 2007 the level of employment will increase another 35,000 or an annual increase of 5,000 jobs. Table 12 provides the details of employment changes.

What sectors of the economy are expected to show the increases in employment? Clearly, growth rates will not be uniform among the major sectors of the economy.

The largest increase in employment will occur in the area of services, which will account for nearly 45,000 of the increase in jobs over the forecast period. As documented earlier in this

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report, the service sector includes a wide range of economic activities from the highly-trained professional to the inexperienced and untrained new entrant into the work force. As one would expect, this represents a wide range of income levels. Further study of this sector will be necessary to quantify its impact on the economy.

Manufacturing will continue to employ more people over the period, adding nearly 8,000 workers. However, this modest increase will result in a somewhat smaller percent of the work force engaged in manufacturing as the 20-year period unfolds. This experience continues a national trend in place for many years. In 1987 Vermont employment in manufacturing as a percent of the work force slightly exceeded the national proportion. The forecast maintains that slightly higher ratio.

Finance and real estate and government are the other two sectors adding sizable employment, (over 7,000 and well over 6,000 respectively). Proprietors and agricultural employment account for the difference between total employment and total non-agricultural as found in Table 12. Nearly 10,000 more people will be employed in these two categories by the year 2007 as compared with 1987. The table also indicates that different sectors are projected to grow at different rates during the period. Consequently, there is some shift in the proportion of total employment engaged in each sector.

Service employment as a proportion of the total rises the most over the 20-year span - some six percentage points - and has 30 percent of the total employment engaged in these activities in 2007. Wholesale and retail trade also rises as a proportion - three percentage points - which results in over one quarter of the total employment by 2007. Finance, insurance and real estate gains marginally as a proportion.

The proportions which drop significantly over the period are manufacturing and government, with minor changes in construction and transportation/communication. As noted earlier, the number of jobs in manufacturing will increase by over 7,000. However, the percent of the work force in manufacturing will drop from 20.6 percent in 1987 to 16.7 percent in the year 2007, a drop consistent with that forecast for the U.S. economy over the same period. Although the level of employment in government service at all levels will also rise, the proportion of workers in the field will fall from 17 percent to 14 percent over the period.

The agricultural sector does not appear as a separate listing in the output of the baseline model, thus there is not a specific prediction relative to Vermont agriculture. However, employment in agriculture is part of the difference between "total" employment and "non-ag" employment. Also included in this differential are the self-employed. Over the forecast period, this

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group increases in number by just over 9,000, but they become a smaller part of the total labor force. Agricultural economists predict that there will be fewer Vermont farms year by year, that those that remain will become larger, and that total agricultural production will rise.

The Bureau of Economic Analysis (BEA) in the U.S. Department of Commerce has recently published a long-range forecast for the U.S. economy. (BEA Regional Projections, U.S. Department of Commerce, Bureau of Economic Analyses, 1985). By analyzing that data on employment and comparing them with the Wharton forecast, we see that the proportion of employment in the respective sectors of the economy is very similar in the two forecasts. Vermont, as we might expect, has a somewhat larger proportion in services and in wholesale and retail trade. (The BEA forecast model took a different approach as compared with Wharton. First, the U.S. economy was projected and the total of each forecasted item was disaggregated to the respective states based on recent experience in that state. Hence, the uniqueness of the economy of any state is only marginally captured, resulting in a much wider margin of error in the forecast for a state as opposed to that for the country as a whole.)



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### Population

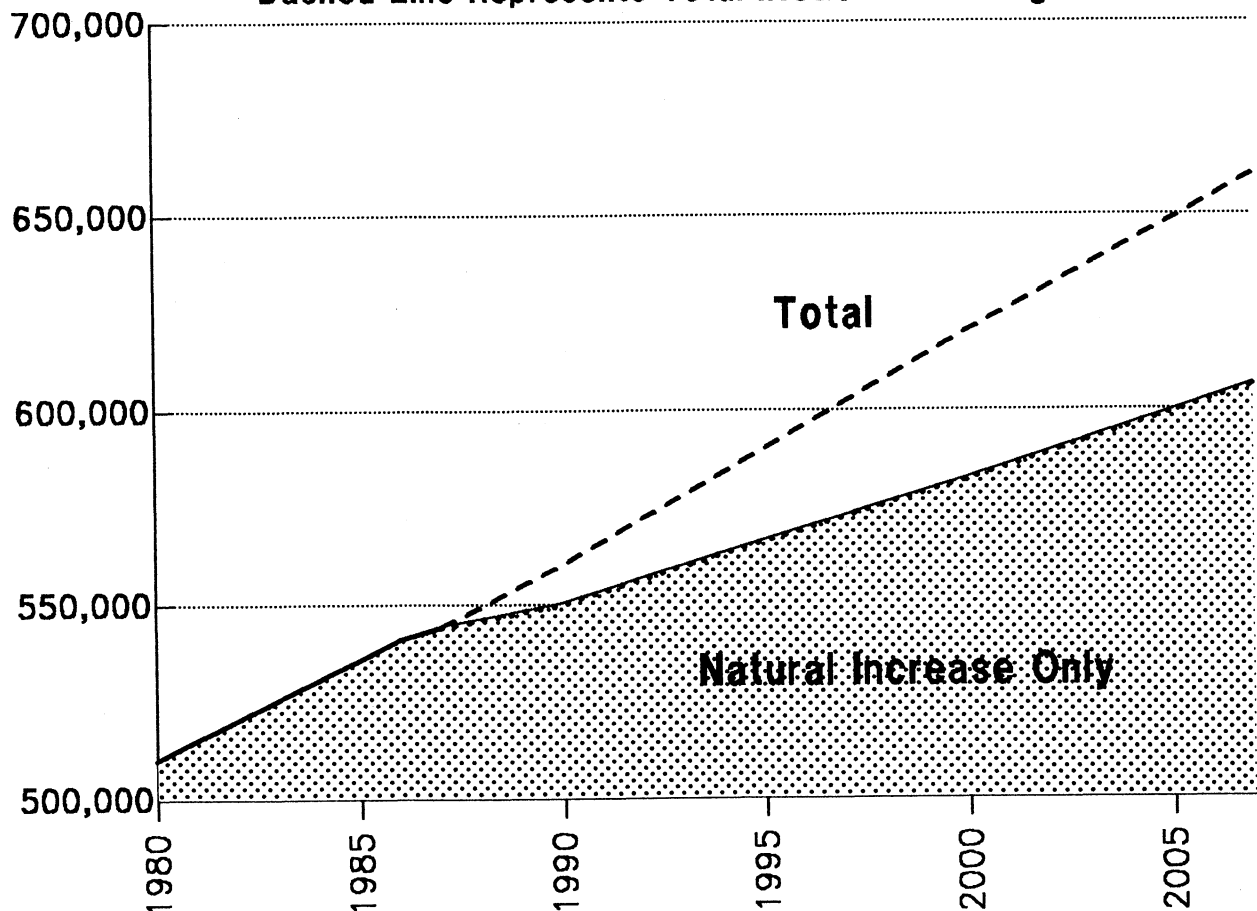
The model forecasts that the population of Vermont will increase from 544,000 (estimated) in 1987 to 620,000 by 2000 and to 660,000 by 2007.

Chart #3

### VERMONT POPULATION

(1980-2007 Including Forecast)

Dashed Line Represents Total INCLUDING In-Migration



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Table 13

## Source of Population Increase

Year ----	Pop. (000) -----	Total Inc. -----	Natural Inc. -----	In-Migration -----
1986	541			
86-90	560	19,000	9,000	10,000
90-00	620	60,000	32,600	27,400
00-07	660	40,000	23,050	16,950
	Totals:	119,000	64,650	54,350
	% of Total:		54%	46%

The increase in population is a combination of natural growth (births minus deaths) and net migration. Table 13 summarizes the source of the population increase. According to the forecast, if net migration over the 20-year period is zero, there will be 65,000 more people living in Vermont by the year 2007. With Vermont likely continuing its experience of net in-migration, clearly the population increase will exceed 65,000.

If Vermont's population over the 20-year period increases at the 0.9 percent level assumed for the U.S. economy, there will be a population level of 647,000. The forecast is projecting the population of the state to grow slightly faster than the national average -- a track record it has recently followed.

The BEA forecast of population for Vermont has 619,200 by 2000 and for the year 2005 a total of 646,500; our forecast for that same year is 650,000.

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### Personal Income

Total personal income rises dramatically over the 20-year period from \$7.72 billion in 1987 to \$30 billion in 2007. What drives this figure is a larger economy plus an assumption that prices rise 5 percent per year.

A better measure of personal well-being for Vermont and Vermonters is income in constant dollars: the model forecasts per capita disposable income in 1982 dollars. That income rises from \$10,100 in 1987 to \$11,940 in the year 2000 and to \$13,170 by 2007. Thus, "real" income on a per capita basis rises +30 percent over the period.

Again, these numbers mean more when placed in context with what is happening nationally. The assumptions of the model included an increase in productivity of 1.7 percent per year for the first ten years and of 1.5 percent for the second ten years. Productivity increases result in increases in real income. The increase in real per capita income in Vermont over the 20-year period is a compound annual increase of 1.33 percent, somewhat less than what would be expected given the assumptions made.

Why would this be the case? The answer is probably found in the kinds of jobs created in Vermont over the period. As pointed out above, the greatest growth in jobs in the state over the period is projected to be in services and in wholesale and retail trade. On the bases of past and present experience, wages and salaries earned in trade and in parts of the service industries are less than the earnings realized in the professions and in manufacturing. Hence, the growth of the trade and service sectors compromises the growth of real income over the period.

### MODIFICATIONS TO THE BASELINE FORECAST

The baseline model depicts what is most likely to happen in the Vermont economy given recent history and the assumptions that have been made. It is only natural to question what would happen if forces that influence economic activity were somewhat different and thus would generate different results. How would the Vermont economy look over the forecast period if:

1. There would be a somewhat slower pace of economic change (Modification #1).
2. There would be a somewhat faster pace of economic change (Modification #2).
3. The manufacturing sector would expand faster than the "most likely" forecast (Modification #3).

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These questions were raised to determine both the direction and the degree of influence on sectors of the Vermont economy for each of the alternatives listed above. Of course a number of other alternatives are possible.

What would happen if the professional sector of the service industry grew faster than the rest of the economy, or we experienced disproportionate growth in finance/insurance/real estate, or the trade sector grew more slowly than the baseline forecast predicts? Other modifications might be based on changing one or more of the assumptions made relative to the national economy.

As mentioned earlier, any forecast is conditioned in a significant way by what happens at the national level. Changes in public policy can modify the impact of many of the forces operating at the national level that influence the level of economic activity. Similarly, at the state level, public policies can alter the cost of doing business in the state, making any given geographic area either more or less attractive as a place to do business.

The level of state and local taxes immediately comes to mind. However, high taxes are not necessarily a detriment if the results are highly valued services such as a quality education system, good health services and excellent roads and highways. At the other extreme, if high taxes finance heavy administrative expenditures or generous transfer spending, a definite negative impact exists.<sup>1</sup>

Also it has been observed that the strength and orientation of political and social institutions can influence economic growth and development. The strength of special interest groups, the regulatory environment and the effectiveness of the legislature and local governmental administration can have an impact. (See Mancur Olson, The Rise and Decline of Nations: Economic Growth, Stagflation, and Social Rigidities, Yale University Press, New Haven, 1982, and "Maintaining a Healthy Business Climate: A Broader Perspective on the Rates of Economic Growth and of Unemployment in the Southern and Southwestern States," and Energy and the Southwest Economy, Federal Reserve Bank of Dallas, 1987, pages 271-304.)

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<sup>1</sup>For a discussion of these issues, see Stephen P. A. Brown "New Directions for Economic Growth: Redesigning Fiscal Policies in Louisiana, New Mexico, and Texas," Economic Review, Federal Reserve Bank of Dallas, July, 1987, Pages 13-20, and L. Jay Helms, "The Effect of State and Local Taxes on Economic Growth: A Time Series - Cross Section Approach", The Review of Economics and Statistics, November, 1985, Pages 574-582.

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What impact do these three modifications have on the Vermont economy over the forecast period?

### Employment

Table 14 shows total non-agricultural employment for selected years for the baseline forecast and each of the three modifications.

---

Table 14

#### Employment in Thousands

Year: -----	Baseline -----	Mod #1 -----	Mod #2 -----	Mod #3 -----
1987	240	240	240	240
1990	248	243	251	250
2000	306	298	310	315
2007	341	332	346	352

---

These alternatives indicate non-agricultural employment is projected to rise from the 1987 level of 240,000 to a level within the range of 332,000 to 352,000. The pattern of employment among the sectors of the economy remain very constant regardless of which modification is considered. Over 90 percent of the 20,000 employment level difference is found in three sectors: manufacturing, trade, and services.

### Population

Growth of population interacts with employment levels; therefore, the expansion of the work force and non-agricultural employment will correlate with population changes. Table 15 compares population changes among the baseline model and the three modifications.

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Table 15

Population in Thousands

Year: -----	Baseline -----	Mod #1 -----	Mod #2 -----	Mod #3 -----
1986	541	541	541	541
1990	560	560	560	566
2000	620	620	630	630
2007	660	650	670	670

---

Again the alternatives indicate that the population will rise from 541,000 in 1986 to between 650,000 and 670,000 by the year 2007. The difference between the high and the low is realized by differences in net in-migration.

### Personal Income

Per capita personal income differs among the models. Table 16 shows these differences:

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Table 16

### Real Per Capita Disposable Income in 1982 Dollars

---

Year: -----	Baseline -----	Mod #1 -----	Mod #2 -----	Mod #3 -----
1987	10,100	10,100	10,100	10,100
1990	10,120	9,820	10,270	10,170
2000	11,940	11,650	12,050	12,280
2007	13,170	12,950	13,250	13,500

---

For the year 2007, real per capita income (adjusted for inflation) ranges between a low of \$12,950 and a high of \$13,500, or a difference of \$550.

These differences, though appearing modest if not quite small, are misleading. The growth in real income in modification #1 is 28.2 percent over the period. In modification #3 it is 33.7 percent. If we apply these rates to the median family income in the Northeast in 1986 of \$32,160, the difference in 2007 is \$1,768. That is, if modification #3 were to be achieved, the median family income in Vermont in 2007 would be \$1,768 higher than if modification #1 prevailed.

The extra \$1,768 per year in real income would allow the family to buy a home at \$94,000 versus one at \$80,000, financed over a twenty-year period at 10 percent. Alternatively, it would finance the ownership of a medium-priced second automobile or many other combinations of consumable goods.

The \$550 difference is also misleading in terms of the impact on the economy as a whole. Having every man, woman, and child with the equivalent of \$550 extra to spend results in \$630 million of extra spending. Moreover, disposable income is income after taxes, which means that state government, which relies heavily on personal income taxes and sales taxes, would have healthy extra tax revenues.

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### SUMMARY AND RECOMMENDATIONS

The major observations of the study are:

1. The economy of Vermont will continue to be influenced primarily by what happens in the national and international economies.
2. The population of the state will rise from the 541,000 recorded in 1986 to over 600,000 at the turn of the century and to between 650,000 and 670,000 by the year 2007.
3. Employment gains will be significant over the period with over two-thirds of the gains occurring in trade and in services, somewhat changing the employment mix.
4. Manufacturing employment will increase over the next 20 years but at a magnitude that will result in a smaller proportion of the work force employed in this sector if the baseline model is realized. This pattern reflects the predicted national trend.
5. Providing greater emphasis on manufacturing as Vermont develops will result in higher paying jobs generating more spendable income and a higher standard of living as well as higher tax revenues.
6. Real income per person in Vermont will continue to increase, projected at 30+ percent over the 20-year span in the baseline model. This increase may be at a slightly lower rate than that experienced by the national economy as a result of the shift in employment mix.
7. A lower level of baseline activity than that forecast by the baseline model will hamper the growth in personal incomes and Vermont will lose ground relative to national trends.
8. Total spendable income in constant dollars in the hands of Vermonters will rise to an annual level by the year 2007 of at least \$3 billion dollars higher than the \$5.4 billion level of 1987, or a rise of 55 percent. If manufacturing were to increase more than that predicted by the baseline model, that increase in total spendable income would be \$3.6 billion, or an increase of 65 percent.

The model used to develop the forecast is relatively limited in its data output. It would be helpful if data were available so that comparisons could be made with other states in New England, with New England as a region, and with the national economy. At the very



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minimum, the performance of the national economy over the forecast period would provide a bench mark comparison. Also, all forecasts are based in part on recent history and perceived trends over the forecast period. The economy is dynamic and changing dramatically. Consequently, it is recommended that the forecast be updated in two to five years.

The model does not separately identify tourism or education as subsets of the service industry. Both of these areas are so-called "export" industries. They attract large amounts of dollars from outside the state in the purchase of those services in Vermont. Obviously, both sectors are important ingredients of the Vermont economy and deserve more careful analysis and study.

Ideally, a model would provide levels of employment in agriculture and the numbers of farm and non-farm proprietors. This model does not contain that detail, so one can only assume the current trends in agriculture will likely continue.

As Vermont thinks about and plans for its future, the business climate within the state needs to be carefully considered. Just what that climate is today and how it compares with other areas in New England and the Northeast is subject to some speculation. A study that would review the literature on location theory and assess the strengths and weaknesses of Vermont in the context of the economy likely to prevail in the 21st century would provide valuable insights for policy decisions.

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### APPENDIX I

#### Historical Perspective: 1790 to 1960

When one is addressing the events of Vermont's economic history during the period of 1790 to 1960, it is important to look at three general areas:

1. What has happened to population?
2. What were the dominant economic activities during the period?
3. What were the major forces that caused the changes?

This period was characterized by dramatic population growth from 1790-1810, a slower growth rate for the next 20 years, and then an extremely slow population growth for 120 years -- far less than the nation as a whole.

The state's first census in 1790 indicates a population of 85,425, which grew to 100,999 in 1792 and topped 200,000 by 1807. By 1845 the population reached 300,000, but it took 120 years to reach a population of 400,000 in the early 1960s.

#### The Period 1790 to 1850

The level of population of any area is a function of the "natural rate" of births versus deaths, plus any migration. The very rapid expansion of population in Vermont from 1790-1810 was due to massive in-migration primarily from southern New England, especially Connecticut. Most of the settlers were less than 30 years old and the birth rate was high.

Lewis Stillwill reports in his book *Migration from Vermont* that "John Toplin of Berlin and Samual Word of Halifax had 21 children each. Abich Edgerton of Pawlet died at the age of 85 leaving 109 descendants." U.S. census reports indicate that 51 percent of Vermont's population in 1800 and 1810 consisted of children younger than 16. In 1810, two-thirds of the population's members had not reached their 27th birthday and fewer than 10 percent were over 45.

The 20-year span following 1790 was a boom period with tremendous optimism in the possibilities of the virgin wilderness. It was a period of exploitation of the forests, the land, and the wildlife. The forests were cleared and burned to produce potash for export, the forest humus of the cleared land was soon dissipated in

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successive crops of wheat, and the abundant wildlife was used up in supplementing the meager rations grown on the land.

Vermont's boom came early and was short-lived. The Embargo of 1808 and the War of 1812 closed the Canadian market for Vermont products; the summer flood of 1811 washed out two-thirds of the grist mills in Rutland and Windsor counties; and the State bank failed in 1811, unsettling financial arrangements. The epidemic of "spotted fever" in 1813 took more than 6,000 lives, and several inches of snow in June and a freeze that destroyed the crops occurred during the summer of 1816. As a result, optimism was greatly muted, confidence in the future migration virtually ceased, and out-migration began to occur.

Between 1810 and 1820 the population increased by 8.3 percent, while the U.S. population expanded by one-third, testimony that many of Vermont's young children of the settlers of the 1890s went West to New York and beyond, seeking better farmland and a more accommodating environment. The out-migration continued in the decade of the 1820s and peaked in the 1830s and 1840s, offsetting the Canadian and Irish in-migration of the latter decade.

Vermont's economic activity in this span of 50 years to 1840 changed dramatically in response to forces both internal and external. Clearing forested land and farming at a subsistence level resulted in the residents' consuming everything they produced. Wheat was an early crop: yields were high, it was a staple, it stored well and there was a potential market. However, it had to be ground into flour and it had to be hauled to the nearest grist mill, which may have been miles away over virtually nonexistent roads.

Cattle provided their own transportation as herds were driven to the Boston market. Privately owned turnpikes were in existence at the turn of the century, and stagecoach service connected eastern Vermont with Boston and Hartford.

Vermont's minor rivers provided little capability for navigation, but the Connecticut River and Lake Champlain were used extensively. Even these were limited until the canals were constructed around the rapids at Bellows Falls (1802) and at Wilder (1811) and the Champlain Canal was built connecting the lake at Whitehall with the Hudson at Troy (1822).

The water connection to New York City significantly reduced freight charges and opened up western Vermont to expanding economic opportunity. Farm products had new markets, Vermont's forests provided the materials for boats built in Vermont shipyards, and Burlington became a lumber port. The success of the Champlain Canal resulted in abortive efforts to plan and construct a network within the state. Clearly the search was for cheap and efficient transport systems to move Vermont products to market.

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Non-agricultural activity was also under way during this period. Stillwell tells us that more mines were opened in the western part of the state and that furnaces and forges were set up to provide kettles, nails and other hardware. Mill sites on the rivers and streams were developed to power gristmills, sawmills and any other contraption that could replace human effort with water power. Imagination and an enterprising spirit resulted in the invention of many tools to ease the drudgery of day-to-day tasks. These tools were often produced in the local blacksmith shop and sold to friends and neighbors.

As the sheep herds grew, during the 1820s and 1830s, Vermonters harnessed water power to drive the looms and developed the first textile factories.

Vermont's climate and terrain made it a natural for raising sheep. The local breeding of Merino sheep began early in the nineteenth century, and it is reported that a half-million sheep were grazing the Vermont hillsides in the mid 1820s. With a high protective tariff and a growing market for wool in the textile centers of southern New England, Vermont agriculture became dominated by sheep raising, although dairying was not ignored as long as a ready market existed for butter and cheese.

Ironically, the transformation of Vermont agriculture from wheat (crops) to sheep (grazing) increased the size of farms and decreased and need for manpower. As high birth rates continued to swell the population, Vermont's young people had little choice but to seek economic opportunity elsewhere, and they did so in New York and the Midwest. The peak of the sheep-raising industry was reached in the 1840s. However, the elimination of the protective tariff during that decade, aggravated by growing competition from the West, resulted in the gradual decline of the industry over the next 60 years.

When reflecting on the economic history of Vermont from 1790 to 1850 in terms of the essential ingredients of economic growth outlined earlier, one notes that only some of the essential ingredients were present. Yes, Vermont had abundant virgin land and forests, but little in mineral resources. Yes, Vermont had a young, vigorous and optimistic population. However, growth during the early years was hampered by the lack of effective transportation systems to connect Vermont with markets for its goods. Eventually canals were built, and later the railroads, and economic growth occurred in the areas these transportation systems served.

By any twentieth-century standard, tools and equipment were primitive, and muscle power accomplished most of the work. Technological change and innovation were in their formative stages, and the capital necessary to finance new and different ways of doing things was not available until the standard of

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living rose above subsistence levels. Remember that the boom years result from the huge in-migration of young, optimistic people and exploitation of the forests, soils and wildlife. When economic opportunity and optimism faded, coupled with the lure of the West, net out-migration accelerated, and Vermont settled into a pattern of very modest growth.

### The Period 1850 to 1960

The decline in wool production coincided with the increase in dairying activity that focused on the production of butter and cheese. Whereas it was relatively easy to convert from sheep to dairy cattle, the hillside farmlands suitable for sheep were not ideal for cattle. During the period from 1850 to 1950, the dairying industry gradually evolved (with the rise of refrigeration) from producing lesser-valued butter and cheese to supplying local and more distant markets with fluid milk, a more valuable product. Moreover, most of the hillside farms disappeared and the industry became increasingly concentrated in the Champlain Valley Basin.

Railroad development occurred relatively late in Vermont; it did not become a reality until 1848. The railroad developers were more interested in producing rail networks among population centers and expanding into the West than they were in serving Vermont's relatively small population. The economic justification of the investment had to rest on freight carried through the state, as opposed to passenger and freight generated within.

A network of railroad lines did appear early in the 1850s, but few roads were economically viable because of inadequate freight and passenger business and, ultimately, the convenience of the automobile. However, the railroads provided an easy way for Vermonters to leave for the West: Stillwell tells us that by 1856, one could buy a through ticket to Chicago for \$20.00 and that the traveling time was only 44 hours.

The railroads also opened Vermont to vacationers who sought mineral springs and believed that the treatments offered at these spas either improved or restored health. Meeks reports in his book **Time and Change in Vermont** that as many as 32 springs in Vermont sported hotel accommodations and that some boasted "bowling alleys, croquet lawns, bottling works, and livery stables." Virtually all were served by a nearby railroad.

The mineral springs boom peaked and faded after the Civil War as a better understanding of health dawned and as competition increased for what we call today the "vacationer's dollar." Meeks also reports that during this same period the railroads provided

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access to Vermont's many mountain-top houses, ideal spots to enjoy the scenery and escape the sultry summer heat of coastal cities.

Industrial activity in Vermont from 1850 to 1960 grew on the same base established in earlier years. It was concentrated in textiles, machine tools, scales, and wooden and stone products.

The textile industry mirrored the growth and decline of sheep raising and then was revived with the demand for woolens during the Civil War. Meeks reports the existence of 60 textile mills in the state in 1870; the number of mills gradually declined but the surviving mills grew larger. The mills imported the raw materials - cotton and wool - and maintained their competitive position largely on the basis on low wage rates. Employment in textile production reached a peak in 1920 and then entered a decline that culminated with the closing of the American Woolen Mill in Winooski in 1953 and the loss of 850 jobs.

Jones and Lamson, Fellows Gearshaper, Cone Automatic, and Bryant Chucking Grinder were among Vermont's well-known machine tool firms still operating in 1960; their histories extend back to the 1850s. Rotary pumps, interchangeable parts, rifle-firing mechanisms, rifles, turret latches, new cutting tools, new ways of cutting gears - all were important in the upper Connecticut Valley's dominance of the machine tool industry by the twentieth century. Likewise, Fairbanks of St. Johnsbury and Howe of Rutland dominated the scale industry. Both firms were founded on inventions devised by Vermonsters in the 1830s.

Natural resources in the form of forest, granite and marble provided the raw materials for other industrial activity. Building materials, monuments, furniture, spindles, plywood, implement handles and hockey sticks are examples of the diversity of products produced in Vermont.

From 1850 to 1960, while the population of New England grew to be almost four times as large and the U.S. population almost eight times as large as the 1850 base, the population of Vermont grew from 315,000 to 390,000 -- an increase of only 24 percent. Within Vermont there was a considerable shift in population toward more urban centers, where economic opportunity was greater and incomes somewhat higher. Moreover, many Vermonsters who left the rural areas simply departed the state as well. During this 90-year period, Vermont's greatest export was its young people, particularly those in the age group 20-29. If Vermont's population had grown at the same rate as that of the rest of New England, the 1850 population of 315,000 would have swelled to 1,209,000 by 1960. If it had kept pace with the national average, there would have been over 2,417,000 people living in Vermont by 1960!

Looking at Vermont from 1850 to 1960 in light of the essentials for economic growth again is revealing. Natural resources were

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meager, consisting essentially of marble, granite and slate. Forests were largely depleted and the amount of productive land that made efficient agriculture possible was limited.

As the country developed toward the South and West, Vermont's location "out of the mainstream" isolated it from the livelier markets. Relatively cheap labor in the South resulted in the loss of Vermont's textile industry. Virtually none was left by 1960.

The state's labor force was reasonably well educated, healthy, and industrious - a plus. In the country as a whole, innovation and technological change were rapid during the period. However, Vermont's location and resources did not make the area attractive for the mass-production industries developing at the time. The machine tool industry was important to Vermont, but its presence here is an historical accident. The inventions were conceived by Vermonters: their inventive minds stimulated and attracted others who developed the industry. And Vermont was as economically viable as virtually any other geographical location for the machine tool industry because of the high value of the finished product relative to the costs of raw materials and shipping.

The development of the state's transportation system had a positive impact on Vermont agriculture by making it possible to supply the markets to the south with highly valued fluid milk. It also made Vermont more accessible for tourists. The decade of the 1950s saw the first construction of the interstate highway system in Vermont, but it was not completed until the 1960s. Certainly it has been a major influence on the growth and development of the state over the past 25 years.

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### APPENDIX II

There are three major components in the area model developed by Wharton, namely: the export economy, the local economy and the demographic sector.

The export economy includes those activities that serve a national or broad regional market. These activities are manufacturing, agriculture, mining, and the federal government.

Manufacturing is the predominant activity for most states. Wharton covers employment levels in 20 industries. These employment levels are a function of the level of employment in that industry nationally, the industry mix in the state, the inter-industry demand within the State, and the relative cost of doing business within the state.

Agriculture employment has a declining trend for proprietors, while wage earner employment is trendless and volatile.

Mining employment is derived from measures of output.

The federal government is financed from outside forces and is forecast on national trends and budget appropriations.

The local economy is composed of construction, transportation, communications and public utilities, finance insurance and real estate, wholesale and retail trade, services, and State and local government. Wharton forecasts employment in all six areas. Considerations are given to:

1. Relative wage costs.
2. National conditions, such as credit costs and availability, that influence construction and durable goods demand, the trend toward larger service sectors, energy costs, and the like.
3. Business cycle timing captures the lag effect between activity level and employment.

The demographic sector - births, deaths, and net migration. State data is used because of the variation in fertility rates. Also states differ in life expectancy at birth and in the age/sex structure resulting in somewhat different death rates. Migration is assumed to be driven by employment opportunities.

Data is available in each of these three areas outlined above for each geographic area being modeled. Hence, the local aspect of the



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model of Vermont reflects whatever uniqueness may exist in the local economy.

The resulting model generates:

1. Personal income in constant dollars for major sectors of the economy plus proprietors income, property income, and transfer payments.
2. Employment levels in each of the major sectors of the economy, the total employed, the labor force and unemployment rate.
3. Wage rates in manufacturing and other key areas of the economy.
4. Miscellaneous information such as housing starts, auto registrations, manufacturing share of employment, labor force participation rate, and per capita income.

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### EMPLOYMENT AND POPULATION STUDY AND FORECAST - 1988

#### Study Committee

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##### Committee Members:

Richard G. Brandenburg, Ph.D., University of Vermont  
F. Ray Keyser, Jr., Central Vermont Public Service Corporation  
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#### Research Staff

##### Study Director:

Malcolm F. Severance, Ph.D.

##### Research Assistant:

William J. Hoffman

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VERMONT BUSINESS ROUNDTABLE

Courthouse Plaza

199 Main Street

Burlington, Vermont 05401

(802) 865-0410

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