Test for difference of means of Mortgage Payments for Vermont and New Hampshire Year 2005

H0: mu_V = mu_NH vs. Ha: mu_V != mu_NH, significance level alpha = 0.05

The TTEST Procedure

Variable: mP05mean

state	Method	N	Mean	Std Dev	Std Err	Minimum	Maximum
New Hampshire		2777	1096.2	27.6650	0.5250	611.1	1097.8
Vermont		1248	793.7	12.7301	0.3604	624.3	794.7
Diff (1-2)	Pooled		302.5	24.0489	0.8196		
Diff (1-2)	Satterthwaite		302.5		0.6368		

state	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
New Hampshire		1096.2	1095.2	1097.2	27.6650	26.9561	28.4124
Vermont		793.7	793.0	794.4	12.7301	12.2496	13.2502
Diff (1-2)	Pooled	302.5	300.9	304.1	24.0489	23.5347	24.5862
Diff (1-2)	Satterthwaite	302.5	301.2	303.7			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	4023	369.07	<.0001
Satterthwaite	Unequal	4021	475.02	<.0001

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	2776	1247	4.72	<.0001

We see that there is enough evidence to assume the variances are not equal, so we consider the Satterthwaite results. Since p-value < 0.0001 < alpha = 0.05 we reject the null hypothesis and conclude that there is a difference between the mean mortgage payments for Vermont between New Hampshire in the year 2005.

95%confidance interval: (301.2, 303.7), we see that zero is not within the confidence interval confirming our conclusion that the mortgage payment means for Vermont and New Hampshire are not equal.

Test for difference of means of Mortgage Payments for Vermont and New Hampshire Year 2010

H0: mu_V = mu_NH vs. Ha: mu_V != mu_NH, significance level alpha = 0.05

The TTEST Procedure

Variable: mP10mean

state	Method	N	Mean	Std Dev	Std Err	Minimum	Maximum
New Hampshire		2810	1333.6	4.0399	0.0762	1210.0	1333.7
Vermont		1323	943.5	2.2315	0.0614	896.7	943.6
Diff (1-2)	Pooled		390.1	3.5625	0.1188		
Diff (1-2)	Satterthwaite		390.1		0.0978		

state	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
New Hampshire		1333.6	1333.4	1333.7	4.0399	3.9370	4.1484
Vermont		943.5	943.3	943.6	2.2315	2.1496	2.3199
Diff (1-2)	Pooled	390.1	389.9	390.3	3.5625	3.4873	3.6410
Diff (1-2)	Satterthwaite	390.1	389.9	390.3			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	4131	3284.09	<.0001
Satterthwaite	Unequal	4031.7	3987.21	<.0001

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	2809	1322	3.28	<.0001

We see that there is enough evidence to assume the variances are not equal, so we consider the Satterthwaite results. Since p-value < 0.0001 < alpha = 0.05 we reject the null hypothesis and conclude that there is a difference between the mean mortgage payments for Vermont between New Hampshire in the year 2010.

95%confidance interval: (389.9, 390.3), we see that zero is not within the confidence interval confirming our conclusion that the mortgage payment means for Vermont and New Hampshire are not equal.

Test for difference of means of Mortgage Payments for Vermont and New Hampshire Year 2015

H0: mu_V = mu_NH vs. Ha: mu_V != mu_NH, significance level alpha = 0.05

The TTEST Procedure

Variable: mP15mean

state	Method	N	Mean	Std Dev	Std Err	Minimum	Maximum
New Hampshire		2566	1306.7	21.5596	0.4256	1015.7	1308.3
Vermont		1255	1025.5	6.1941	0.1748	942.9	1026.0
Diff (1-2)	Pooled		281.2	18.0219	0.6208		
Diff (1-2)	Satterthwaite		281.2		0.4601		

state	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
New Hampshire		1306.7	1305.9	1307.6	21.5596	20.9855	22.1663
Vermont		1025.5	1025.2	1025.9	6.1941	5.9609	6.4464
Diff (1-2)	Pooled	281.2	280.0	282.4	18.0219	17.6267	18.4354
Diff (1-2)	Satterthwaite	281.2	280.3	282.1			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	3819	453.00	<.0001
Satterthwaite	Unequal	3310.9	611.16	<.0001

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	2565	1254	12.12	<.0001

We see that there is enough evidence to assume the variances are not equal, so we consider the Satterthwaite results. Since p-value < 0.0001 < alpha = 0.05 we reject the null hypothesis and conclude that there is a difference between the mean mortgage payments for Vermont between New Hampshire in the year 2015.

95% confidance interval: (280.3, 282.1), we see that zero is not within the confidence interval confirming our conclusion that the mortgage payment means for Vermont and New Hampshire are not equal.

Based on the test results for the three years, I do not believe there is a change in the difference in average mortgage payment between the two states across the three years. I believe this since all three tests resulted in the rejection of the null hypothesis. Also, the majority of mortgages are between 20 - 30 years so we can reasonably assume that most of the mortgage payments in the three datasets did not change significantly enough in 10 years for there to be a change in differences.

Test for difference of proportions of Mortgaged Homes for Vermont and New Hampshire Year 2005

H0: p_V = p_NH vs. Ha: p_V != p_NH, significance level alpha = 0.05

The FREQ Procedure

Frequency
Percent
Row Pct

Table of state by MortgageStatus			
	MortgageStatus		
state	Yes, contract to purchase	Yes, mortgaged/ deed of trust or similar debt	Total
New Hampshire	9 0.22 0.32	2,768 68.77 99.68	2,777 68.99
Vermont	7 0.17 0.56	1,241 30.83 99.44	1,248 31.01
Total	16 0.40	4,009 99.60	4,025 100.00

Statistics for Table of state by MortgageStatus

Statistic	DF	Value	Prob
Chi-Square	1	1.2195	0.2695
Likelihood Ratio Chi-Square	1	1.1493	0.2837
Continuity Adj. Chi-Square	1	0.6948	0.4046
Mantel-Haenszel Chi-Square	1	1.2192	0.2695
Phi Coefficient		-0.0174	
Contingency Coefficient		0.0174	
Cramer's V		-0.0174	

WARNING: 25% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

Test for difference of proportions of Mortgaged Homes for Vermont and New Hampshire Year 2005

H0: p_V = p_NH vs. Ha: p_V != p_NH, significance level alpha = 0.05

The FREQ Procedure

Statistics for Table of state by MortgageStatus

Column 1 Risk Estimates						
	Risk	ASE	95% Confidence Limits		Exact 95% Confidence Limits	
Row 1	0.0032	0.0011	0.0011	0.0054	0.0015	0.0061
Row 2	0.0056	0.0021	0.0015	0.0098	0.0023	0.0115
Total	0.0040	0.0010	0.0020	0.0059	0.0023	0.0064
Difference	-0.0024	0.0024	-0.0070	0.0023		
Difference is (Row 1 - Row 2)						

Column 2 Risk Estimates						
	Risk	ASE	95% Confidence Limits		Exact 95% Confidence Limits	
Row 1	0.9968	0.0011	0.9946	0.9989	0.9939	0.9985
Row 2	0.9944	0.0021	0.9902	0.9985	0.9885	0.9977
Total	0.9960	0.0010	0.9941	0.9980	0.9936	0.9977
Difference	0.0024	0.0024	-0.0023	0.0070		
Difference is (Row 1 - Row 2)						

Sample Size = 4025

Since p-value = 0.2695 > 0.05 we fail to reject the null hypothesis and conclude that there is not a difference between the propotion of mortgaged homes between Vermont and New Hampshire for the year 2005.

95% confidance interval: (-0.0023, 0.0070), we see that zero is within the confidence interval confirming our conclusion that the proportion of mortgaged homes for Vermont and New Hampshire are equal.

Test for difference of proportions of Mortgaged Homes for Vermont and New Hampshire Year 2010

H0: p_V = p_NH vs. Ha: p_V != p_NH, significance level alpha = 0.05

The FREQ Procedure

Frequency
Percent
Row Pct

Table of state by MortgageStatus			
	MortgageStatus		
state	Yes, contract to purchase	Yes, mortgaged/ deed of trust or similar debt	Total
New Hampshire	3 0.07 0.11	2,807 67.92 99.89	2,810 67.99
Vermont	3 0.07 0.23	1,320 31.94 99.77	1,323 32.01
Total	6 0.15	4,127 99.85	4,133 100.00

Statistics for Table of state by MortgageStatus

Statistic	DF	Value	Prob
Chi-Square	1	0.8935	0.3445
Likelihood Ratio Chi-Square	1	0.8331	0.3614
Continuity Adj. Chi-Square	1	0.2574	0.6119
Mantel-Haenszel Chi-Square	1	0.8932	0.3446
Phi Coefficient		-0.0147	
Contingency Coefficient		0.0147	
Cramer's V		-0.0147	

WARNING: 50% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

Test for difference of proportions of Mortgaged Homes for Vermont and New Hampshire Year 2010

H0: p_V = p_NH vs. Ha: p_V != p_NH, significance level alpha = 0.05

The FREQ Procedure

Statistics for Table of state by MortgageStatus

Column 1 Risk Estimates						
	Risk	ASE	95% Confidence Limits		Exact 95% Confidence Limits	
Row 1	0.0011	0.0006	0.0000	0.0023	0.0002	0.0031
Row 2	0.0023	0.0013	0.0000	0.0048	0.0005	0.0066
Total	0.0015	0.0006	0.0003	0.0026	0.0005	0.0032
Difference	-0.0012	0.0014	-0.0040	0.0016		
Difference is (Row 1 - Row 2)						

Column 2 Risk Estimates						
	Risk	ASE	95% Confidence Limits		Exact 95% Confidence Limits	
Row 1	0.9989	0.0006	0.9977	1.0000	0.9969	0.9998
Row 2	0.9977	0.0013	0.9952	1.0000	0.9934	0.9995
Total	0.9985	0.0006	0.9974	0.9997	0.9968	0.9995
Difference	0.0012	0.0014	-0.0016	0.0040		
Difference is (Row 1 - Row 2)						

Sample Size = 4133

Since p-value = 0.3445 > 0.05 we fail to reject the null hypothesis and conclude that there is not a difference between the propotion of mortgaged homes between Vermont and New Hampshire for the year 2010.

95% confidance interval: (-0.0016, 0.0040), we see that zero is within the confidence interval confirming our conclusion that the proportion of mortgaged homes for Vermont and New Hampshire are equal.

Test for difference of proportions of Mortgaged Homes for Vermont and New Hampshire Year 2015

H0: p_V = p_NH vs. Ha: p_V != p_NH, significance level alpha = 0.05

The FREQ Procedure

Frequency
Percent
Row Pct

Table of state by MortgageStatus

state	MortgageStatus: Yes, contract to purchase	MortgageStatus: Yes, mortgaged/ deed of trust or similar debt	Total
New Hampshire	14 0.37 0.55	2,552 66.79 99.45	2,566 67.16
Vermont	7 0.18 0.56	1,248 32.66 99.44	1,255 32.84
Total	21 0.55	3,800 99.45	3,821 100.00

Statistics for Table of state by MortgageStatus

Statistic	DF	Value	Prob
Chi-Square	1	0.0023	0.9619
Likelihood Ratio Chi-Square	1	0.0023	0.9619
Continuity Adj. Chi-Square	1	0.0000	1.0000
Mantel-Haenszel Chi-Square	1	0.0023	0.9619
Phi Coefficient		-0.0008	
Contingency Coefficient		0.0008	
Cramer's V		-0.0008	

Test for difference of proportions of Mortgaged Homes for Vermont and New Hampshire Year 2015

H0: p_V = p_NH vs. Ha: p_V != p_NH, significance level alpha = 0.05

The FREQ Procedure

Statistics for Table of state by MortgageStatus

Column 1 Risk Estimates						
	Risk	ASE	95% Confidence Limits		Exact 95% Confidence Limits	
Row 1	0.0055	0.0015	0.0026	0.0083	0.0030	0.0091
Row 2	0.0056	0.0021	0.0015	0.0097	0.0022	0.0115
Total	0.0055	0.0012	0.0032	0.0078	0.0034	0.0084
Difference	-0.0001	0.0026	-0.0051	0.0049		
Difference is (Row 1 - Row 2)						

Column 2 Risk Estimates						
	Risk	ASE	95% Confidence Limits		Exact 95% Confidence Limits	
Row 1	0.9945	0.0015	0.9917	0.9974	0.9909	0.9970
Row 2	0.9944	0.0021	0.9903	0.9985	0.9885	0.9978
Total	0.9945	0.0012	0.9922	0.9968	0.9916	0.9966
Difference	0.0001	0.0026	-0.0049	0.0051		
Difference is (Row 1 - Row 2)						

Sample Size = 3821

Since p-value = 0.9619 > 0.05 we fail to reject the null hypothesis and conclude that there is not a difference between the propotion of mortgaged homes between Vermont and New Hampshire for the year 2015.

95% confidance interval: (-0.0049, 0.0051), we see that zero is within the confidence interval confirming our conclusion that the proportion of mortgaged homes for Vermont and New Hampshire are equal.

Based on the test results for the three years, I do not believe there is a change in the difference in the proportion of mortgaged homes between the two states across the three years. I believe this since all three tests resulted in failing to reject the null hypotheses. Again, since the majority of mortgages are between 20 - 30 years we can reasonably assume that the proportion of mortgaged homes in the three datasets would not change significantly enough in 10 years for there to be a change in differences.