

REMI Analysis Utilizing UER Property Losses to Determine Economic Impacts on Clark County's Scenarios

Prepared by

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The Center for Business and Economic Research

Prepared for

Clark County Comprehensive Planning

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Economic impacts work through backward and forward linkages. Backward linkages have been referred to as indirect effects and follow from the basics of production activities. For example, an expansionary change calls for increased inputs, thereby adding additional activity to the original direct change. On the other hand, the indirect effects associated with an initial adversity will further affect conditions negatively. In short, initial effects do not fully reflect final economic impacts. Forward linkages also may create effects. For example, the sale of goods and services increases incomes, thereby inducing additional expenditures. Rising employment and wages create opportunities for additional consumer spending, thus, measuring the full impacts of an event calls for an accounting of direct, indirect, and induced effects.

A full accounting of economic impacts can be reached through modeling forward and backward linkage, the degree of respending of dollars within an economy, and spending leakages. Input-output and econometric models have proved useful in accomplishing this task for studying the full impacts of changes in regional economies.

Clark County asked the Center for Business and Economic Research (CBER) at UNLV to estimate the full-employment, income, and expenditure effects resulting from estimated direct effects for three scenarios associated with the transportation of nuclear waste through Clark County. This report details estimates of these alternative scenarios using a modeling scheme developed by Regional Economic Models, Inc (REMI) and calibrated to local conditions by CBER. The initial impacts, reductions to specific property values, used in this analysis were developed and estimated by Urban Environmental Resource, LLC (UER) in conjunction with lenders and appraisers within Clark County. We have taken these estimates as prepared by UER and developed estimates for leading economic indicators.

Each of the three scenarios have possible outcomes, ranging from a minimum to a maximum, altogether resulting in six separate direct impacts that we modeled. The three scenarios are as follows:

1. Scenario I -- The identification of nuclear waste transported through Clark County.
2. Scenario II -- The occurrence of an accident without a nuclear spill within Clark County.
3. Scenario III-- The occurrence of an accident with a nuclear spill in Clark County.

The minimum and maximum estimates reflect separate valuation efforts from lenders and appraisers. The valuations comprise estimates associated with residential property losses, commercial and industrial property losses, and the permanent loss in gaming revenue (revenue from the region's major industry).

These initial impacts were transformed for estimation with the REMI model. The loss of residential property values is transformed to an economic flow through consumer spending. A loss of wealth (residential property) is estimated to cut the level of spending by 4 percent per year. This wealth-to-spending adjustment follows a long-established relationship associated with the wealth impact on consumer spending. The loss of business activity from a loss of commercial and industrial property and gaming revenue is estimated from ratios of the number of employees per dollar of property value (estimated from the historical data associated with the REMI model) and the number of employees in hotel and gaming (as reported by the Nevada state government) and gaming revenue for Clark County reported by Nevada's Gaming Control Board.

The full impacts are measured by the differences in the level of employment, income, population, and expenditures without the identified options (identified as the baseline) and with

the impacts of an option (identified as a simulation). The specifics associated with this analysis as they relate to the use of the REMI model are specified in George Treyz's book, Regional Economic Modeling: A Systematic Approach to Economic Forecasting and Policy Analysis.

The relationship between impact analysis with REMI and the other two major model schemes (identified as IMPLAN and RIMS) as they relate to Clark County has been discussed in a series of academic publications by Rickman and Schwer. A summary of the key issues relating to impact analysis for Clark County, Nevada, is in Rickman and Schwer's paper, "A Comparison of the Multipliers of IMPLAN, REMI, and RIMSII: Benchmarking Ready-made Models for Comparison," The Annals of Regional Science, (1995) 29: 363-374.

Model Inputs

The model inputs, the loss of consumer spending and the loss of jobs, were introduced in six separate sets of estimates, that is, six separate simulations (three scenarios with two sets of estimates). The job and spending losses were introduced beginning in 2010 and additionally for each year until 2035. Consumer-spending estimates were introduced in terms of inflation-adjusted dollar amounts, what economists refer to as constant dollars. In measuring income and expenditure impacts the distinction between current-dollar measures (unadjusted for inflation) and constant dollars (adjusted for inflation) is important. In addition, the adjustment for inflation can be made with a number of deflators, for example, the GDP deflator or CPI deflator. Deflators were also developed for local areas. The model estimates values in constant 1992 dollars. Values in current dollars will be greater; therefore, these estimates are extremely conservative.

Estimates for lenders and appraisers were made for these options and are shown in Table 1.

Table 1

Property Impacts on Clark County in 2001\$

Scenario 1	Appraisers	Lenders
Residential	\$161,875,121	\$85,248,577
Commercial	4,935,088	4,936,336
Industrial	<u>3,331,370</u>	<u>7,485,860</u>
Sub-total	170,141,579	97,670,773
Gaming Revenue	<u>172,106,274</u>	<u>136,300,947</u>
TOTAL	342,247,853	233,971,720
Scenario 2	Appraisers	Lenders
Residential	\$411,415,310	\$270,425,245
Commercial	11,885,595	26,648,041
Industrial	<u>9,688,140</u>	<u>19,087,447</u>
Sub-total	432,989,045	316,160,733
Gaming Revenue	<u>451,327,642</u>	<u>300,885,093</u>
TOTAL	884,316,687	617,045,826
Scenario 3	Appraisers	Lenders
Residential	\$2,171,118,617	\$2,176,536,502
Commercial	75,128,562	246,432,903
Industrial	<u>67,362,912</u>	<u>126,670,956</u>
Sub-total	2,313,610,091	2,549,640,361
Gaming Revenue	<u>992,920,810</u>	<u>752,212,735</u>
TOTAL	\$3,306,530,901	\$3,301,853,096

Source: UER

An increasing number of possible scenarios also brings a range of additional estimates. Whereas these additional options are of note, their introduction does not appreciably help policy makers understand the impacts better. As a result, the redundancy of alternative options was reduced to selecting the largest and smallest initial impacts for each scenario. In so doing, each scenario has only one estimate by lenders (minimum estimate) and one estimate by appraisers (maximum estimate). The direct impacts provided by UER, shown in Table 1, were translated into impacts described above, and for purposes of analysis are shown in Table 2 on an annual basis.

Table 2

Model Inputs

Scenario 1		
Lender	Translation Ratio	Annual Impact in Lost Spending in Current Dollars or Number of Job Losses
Consumer Spending	4% of loss	\$2,848,672.64
Jobs Lost	1 job/\$36,323	111.1436280043
Gaming Jobs Lost	1 job/\$40,606	3356.670122642
Appraiser		
Consumer Spending	4% of loss	\$7,693,369.96
Jobs Lost	1 job/\$36,323	934.9605208821
Gaming Jobs Lost	1 job/\$40,606	4238.444417081
Scenario 2		
Lender		
Consumer Spending	4% of loss	\$9,044,336.32
Jobs Lost	1 job/\$36,323	272.8530132423
Gaming Jobs Lost	1 job/\$40,606	7409.867827415
Appraiser		
Consumer Spending	4% of loss	\$19,501,827.88
Jobs Lost	1 job/\$36,323	2462.484958048
Gaming Jobs Lost	1 job/\$40,606	11114.80180269
Scenario 3		
Lender		
Consumer Spending	4% of loss	\$73,776,357.52
Jobs Lost	1 job/\$36,323	2862.522644055
Gaming Jobs Lost	1 job/\$40,606	18524.6696301
Appraiser		
Consumer Spending	4% of loss	\$102,464,069.24
Jobs Lost	1 job/\$36,323	13821.90785453
Gaming Jobs Lost	1 job/\$40,606	24452.56390681

The information provided by UER does not directly relate to the set of variables of the model which we may change.

As such, we translated the loss of residential property value to reduced consumer spending through the wealth effect. The lost commercial and industrial property translated to job losses using a fixed ratio between capital and labor through production, one job loss per \$36,223 of property value lost. In addition, we distributed the jobs losses proportional to the percentage of jobs in each two digit industry. Lastly, we estimated the impact of the losses to hotels and casinos using a fixed ratio of gaming revenue per worker. Using gaming revenue and employment data, we estimate the ratio as one job for each \$40,606 of gaming revenue.

Model Outputs

REMI, an eclectic model combining an input-output structure and econometric relationships, enables the estimation of a long list of impacts. Again, wishing to focus on the most important impacts, we have limited our output evaluation to the four most often used measures—employment, income, expenditures, and population. With respect to income and expenditures, however, we show cumulative effects. We show both the short-term effects (the losses for a given year) and longer-term effects (the cumulative impacts over 25 years). Employment impacts can be cumulated and shown on a job-year basis; but, we did not do so, thereby avoiding possible confusion of interpretation between jobs and job-years measures. The detailed output from the models (which could be used to measure impacts across a host of measures) is appended. The output for the select measures is shown in Table 3.

Table 3

Economic Impacts on Clark County's Scenarios

	Job Losses(1)	Population Losses (1)	Cumulative Economic Losses: 2010-2035 (in 1992 Dollars)	
			Spending (2)	Income (3)
Scenario 1				
Lender	5,393	11,294	\$5,663,400,000	\$4,700,200,000
Appraiser	7,426	12,707	\$8,490,300,000	\$5,819,100,000
Scenario 2				
Lender	11,193	19,573	\$11,852,400,000	\$8,856,500,000
Appraiser	19,522	33,419	\$22,333,300,000	\$15,300,400,000
Scenario 3				
Lender	31,305	53,984	\$35,131,000,000	\$24,611,600,000
Appraiser	54,429	90,718	\$68,116,000,000	\$42,128,000,000

- Notes (1). (Average Annual)
 (2). (Gross Regional Product)
 (3). (Disposable Personal Income)

Findings

The minimum impacts are associated with the lender estimates of Scenario I (trucks utilizing the transportation system of Clark County) and are as follows:

1. Job loss of 5,393 jobs.
2. Expenditure loss of \$185 million per year, on average, in 1992 dollars and a cumulation loss of \$5.6 billion in 1992 dollars.
3. Personal income loss of \$282 million per year, on average, in 1992 dollars.
4. Real disposable income loss (accounting for taxes and inflation) of \$136 million per year, on average, in 1992 dollars and a cumulative 25-year loss of \$4.7 billion in constant 1992 dollars.
5. A population loss of 11,294 persons.

The minimum impact estimates are decidedly less onerous than the impacts expected under Scenario 3 (an accident occurs involving the release of radioactive materials along Clark County roads). The maximum impacts are as follows:

1. Employment loss of 54,429 jobs.
2. Average annual expenditure loss of \$1.4 billion and a 25-year cumulative loss of \$68.1 billion.
3. Personal income loss of \$776 million per year.
4. Real disposable income loss of \$686 million per year and a 25-year cumulative loss of \$42.1 billion in constant dollars.
5. A population loss of 90,718 persons.

Conclusion

The transportation of nuclear waste without an accident of spillage of radioactive material through a large urban community will have adverse impacts on a community such as Las Vegas which depends on travel and tourism for its economic livelihood. The maximum economic impact of a transportation accident, based upon current available information is devastating to any community, especially one which depends upon travel and tourism as its economic engine. The loss of 54,429 jobs and 90,718 people is of grave concern to this community and greatly exceeds the adverse, but temporary impacts of the September 11, 2001 terrorist attacks on travel and tourism..



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