Level 2 Alternatives Analysis Report
Task 5.3.2

Regional Economic Impact Analysis

Regional Economic Performance Measures

Introduction

The following economic development performance measures were outlined in the Purpose and Need Paper of the I-69 project. This document describes the performance measures and analysis methodology for those measures shown below in *italics*:

- **Monetary Cost Reductions**
  - Reductions in Business Travel Time (Described in Technical Report 5.3.1)
  - Spending Reductions from Reduced Accidents (Described in Technical Report 5.3.1)
  - Spending Changes from Vehicle Operating Changes (Described in Technical Report 5.3.1)
- **Accessibility Measures**
  - Access to Labor and Consumer Markets (Described in Technical Report 5.3.1)
  - Access to Buyer and Supplier Markets (Described in Technical Report 5.3.1)
- **Long-Term Economic Growth Measures**
  - *Net Change in Employment*
  - *Employment in High-Growth Industries*
  - *Employment in High-Paying Industries*
  - *Real Disposable Income*
  - *Net Change in Farm and Forest Income*
  - Estimated Change in Roadside Business Sales (Described in Technical Report 5.3.3)
- **Social Equity Measures**
  - *Employment to Labor Force Ratio*
  - *Real Disposable Income Per Capita*
  - *Transfer Payments Per Capita*
  - *Working-Age Population*

Documentation concerning the other measures is provided in other technical reports, as noted.

Eight of the nine performance measures described in this report were extracted from the Major Corridor Investment-Benefit Analysis System (MCIBAS). The ninth (Net Change in Farm and Forest income) was determined using a separate analysis, as described below. The MCIBAS[1] has the following components:

1. **Indiana Statewide Traffic Model (ISTM) –** A statewide traffic network simulation model predicts the direct effects of the highway system improvement on traffic levels, speeds, and distances, and develops aggregate measures of systemwide vehicle-miles of travel (VMT) and vehicle-hours of travel (VHT).

2. **NET_BC –** A post-processor program reads ISTM results and translates the predicted traffic changes into estimates of the dollar value of user travel time, travel cost, and safety benefits. It also uses project cost data to produce a traditional user benefit/cost analysis at the statewide level.

3. **Economic Impact Analysis System –** A series of linked models estimates the economic impacts of highway improvement. It has four components, as follows:

    - The *User Benefits* module reads NET_BC results and translates them into direct economic impacts on business operating costs.
    - The *Business Attraction* module incorporates information on the extent to which the project would expand delivery and commuting market areas for businesses along the highway, and estimates the impacts of the project on direct business attraction beyond what would be expected due to user benefits alone.
    - The *Tourism* module incorporates information on shifts in tourism market patterns, and estimates the direct impacts on tourist visitor-days in the region.
    - The *Regional Economic Model, Inc. (REMI) Economic Forecasting and Simulation Model*[2] is run within MCIBAS to estimate the full economic impacts of the highway project. It takes the direct economic impacts as assessed by the preceding three modules, and forecasts the total (direct and secondary) employment, business output, income, and population changes over the life of the highway improvement (30 years, to 2034 in this case).

Summary of Results

Table 1 summarizes the eight performance measures determined by the MCIBAS system for each alternative. These alternatives are ranked by performance measure in Table 2. The results of this economic analysis are discussed in the following sections. The ninth performance measure (Net Change in Farm and Forest Income) is shown in Table 3.

[1] For a detailed description of the MCIBAS, see *Major Corridor Benefit-Investment Analysis System: Model Documentation*, by Cambridge Systematics and Bernardin, Lochmueller and Associates, 1998.

[2] See REMI Policy Insight Users Guide, Version 2.0, for more information.

The MCIBAS econometric modeling was conducted for seven of the route concepts studied in the Level 2 Analysis. This was done because long-term regional economic modeling cannot be done with enough confidence to distinguish between alternative route concepts which are very similar. This is especially true given that the route concepts in Level 2 were just that – route concepts which could be thought of as simple lines connecting points on a map. There were no specific routes or alignments for any of the route concepts. Accordingly, the 19 routes (this includes optional variations) were grouped into like kinds. A single route representative of each group was modeled. The criterion used to aggregate the routes was the similarity of their respective monetary and non-monetary user benefits, and geographic coverage. B-1 was modeled to represent H-1 and L-1; C-1 represented F-1 and G; H-2 represented all of the option 2 routes (B-2, C-2, F-2, L-2), as well as D and N; J represented I and M. Routes A, E, and K were unique, and were therefore modeled individually.

In the Level 3 Analysis, working alignments will be determined for the remaining alternatives. We anticipate that this added level of precision, as well as the dissimilarity of the remaining routes, will permit separate regional economic modeling to be performed on each of the remaining routes.

Table 1. Summary of Economic Performance Measures in 2025
Southwest Indiana Project Study Area

	Performance Measure	Unit	No-Build	Alternative A	B1	C	E	H2	J	K
1.	**Total Employment**	**Thousands of jobs**	**1615.9**	**1617.4**	**1620.1**	**1619.2**	**1618.3**	**1620.7**	**1619.4**	**1620.1**
	-Build	***Thousands of jobs***		***1.5***	***4.2***	***3.3***	***2.4***	***4.8***	***3.5***	***4.2***
2.	Employment in High Growth Industries	Thousands of jobs in 10-Highest	537.7	537.9	538.4	538.2	538.0	538.5	538.3	538.4
		% of total employment	33%	33%	33%	33%	33%	33%	33%	33%
		Thousands of jobs in 20-Highest	844.5	845.3	846.4	846.1	845.6	846.7	846.2	846.4
		% of total employment	52%	52%	52%	52%	52%	52%	52%	52%
3.	**Employment in High Paying Industries**	**Thousands of jobs in 10-Highest**	**127.2**	**127.3**	**127.6**	**127.5**	**127.4**	**127.6**	**127.5**	**127.6**
		% of total employment	**8%**	**8%**	**8%**	**8%**	**8%**	**8%**	**8%**	**8%**
		Thousands of jobs in 20-Highest	**298.3**	**298.9**	**299.8**	**299.6**	**299.3**	**300.0**	**299.8**	**299.8**
		% of total employment	**18%**	**18%**	**19%**	**19%**	**18%**	**19%**	**19%**	**19%**
4.	Net Change in Real Disposable Income	Millions of 2001$		$56.3	$160.3	$128.6	$91.2	$181.1	$138.9	$157.3
5.	**Change in Ratio of Employment-to-Labor Force**	**% point change**		**0.00**	**0.02**	**0.01**	**0.01**	**0.02**	**0.01**	**0.02**
6.	Change in Real Disposable Income Per Capita	Thousands of 2001$		$0.00	-$0.01	-$0.01	$0.00	-$0.01	$0.00	-$0.01
7.	**Change in Transfer Payments per Capita**	**2001$**		**-$4**	**-$10**	**-$8**	**-$6**	**-$11**	**-$8**	**-$10**
8.	Change in Young Working-Age Population	Thousands of People		0.9	2.6	2.0	1.5	2.9	2.2	2.5

Table 2. Rank of Economic Performance Measures in 2025
Southwest Indiana Project Study Area

	Performance Measure	Unit	Alternative						
			A	B1	C	E	H2	J	K
1.	**Employment**	**Thousands of jobs**	**7**	**2**	**5**	**6**	**1**	**4**	**3**
2.	Employment in High Growth Industries	Thousands of jobs in 10-Highest	7	3	5	6	1	4	2
		% of total employment	1	6	3	2	7	4	5
		Thousands of jobs in 20-Highest	7	3	5	6	1	4	2
		% of total employment	1	7	4	3	6	2	5
3.	**Employment in High Paying Industries**	**Thousands of jobs in 10-Highest**	**7**	**3**	**5**	**6**	**2**	**4**	**1**
		% of total employment	**7**	**3**	**6**	**4**	**5**	**2**	**1**
		Thousands of jobs in 20-Highest	**7**	**3**	**5**	**6**	**1**	**4**	**2**
		% of total employment	**7**	**4**	**5**	**6**	**2**	**1**	**3**
4.	Net Change in Real Disposable Income	Millions of 2001$	7	2	5	6	1	4	3
5.	**Change in Ratio of Employment-to-Labor Force**	**% point change**	**7**	**3**	**4**	**5**	**1**	**6**	**2**
6.	Change in Real Disposable Income Per Capita	Thousands of 2001$	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7.	**Change in Transfer Payments per Capita**	**2001$**	**7**	**2**	**5**	**6**	**1**	**4**	**3**
8.	Change in Young Working Age Population	Thousands of People	7	2	5	6	1	4	3

Table 3. Lost Farm and Forest Income, by Alternative

	Lost Acreage					
	Farmland		Forest		Lost Income	
Alternative	Minimum	Maximum	Minimum	Maximum	Farming	Forest
A	2,500	3,300	210	290	$ 300,000	$ 4,500
B1	4,500	6,100	1,090	1,470	$ 344,000	$ 10,300
B2	4,500	6,100	960	1,300	$ 421,000	$ 8,300
C1	4,800	6,400	790	1,070	$ 489,000	$ 3,800
C2	4,900	6,700	810	1,090	$ 583,000	$ 3,600
D	3,800	5,200	940	1,270	$ 409,000	$ 12,400
E	4,200	5,600	910	1,230	$ 411,000	$ 10,700
F1	4,200	5,600	1,010	1,370	$ 321,000	$ 8,400
F2	3,800	5,200	890	1,210	$ 365,000	$ 6,900
G	3,900	5,300	1,250	1,690	$ 281,000	$ 9,500
H1	3,600	4,800	1,000	1,360	$ 264,000	$ 9,800
H2	3,600	4,800	880	1,180	$ 331,000	$ 7,900
I	3,900	5,300	600	820	$ 294,000	$ 4,100
J	4,600	6,200	720	980	$ 363,000	$ 4,600
K	3,800	5,200	1,620	2,190	$ 268,000	$ 15,200
L1	3,100	4,300	1,080	1,460	$ 219,000	$ 9,500
L2	3,100	4,300	940	1,280	$ 277,000	$ 7,800
M	3,000	4,000	1,240	1,680	$ 219,000	$ 10,200
N	2,500	3,300	1,140	1,540	$ 214,000	$ 10,400

Long-Term Economic Growth Measures

Four of the six performance measures dealing with long-term economic growth were obtained from REMI output. A fifth measure, Net Change in Farm and Forest Income, was determined in a separate analysis, as described below. The sixth measure, Estimated Change in Roadside Business Sales, was determined by a separate analysis, as described in Task Report 5.3.3. To run the REMI simulation, the I-69 study area was divided into five regions consisting of one or more counties:

1. Indianapolis and western and southern suburbs (Hendricks, Johnson, Marion, and Morgan counties);
2. Bloomington (Monroe County);
3. Greater Terre Haute (Vigo and Clay counties);
4. Greater Evansville (Gibson, Posey, Vanderburgh, and Warrick counties); and
5. Rural Southwest Indiana (Brown, Crawford, Daviess, Dubois, Greene, Knox, Lawrence, Martin, Orange, Owen, Perry, Pike, Putnam, Spencer, and Sullivan counties).

Four additional regions covered the remainder of the U.S.:

1. The rest of Indiana outside the study area;
2. Illinois;
3. Kentucky; and
4. The rest of the U.S.

Results were reported for Southwest Indiana, Regions 1 through 5. In the Level 3 analysis which will lead up to the Draft Environmental Impact Statement, analysis of impacts on the entire state of Indiana also will be performed.

REMI input data sets were obtained from the results of the user benefits, business attraction, and tourism modules of the Economic Impact Analysis System (EIAS).[3] After running the REMI simulations for each alternative, the following performance measures were produced for each REMI region. The results for the entire Southwest Indiana study area are summarized in Table 1.

[3] For additional information regarding the EIAS modules, see *Major Corridor Benefit-Investment Analysis System: Model Documentation Part III (EIAS)*, by Cambridge Systematics and Bernardin, Lochmueller and Associates, 1998.

Total Employment

Total employment is a direct output variable from REMI. The no-build, or baseline, forecast predicts that employment in Southwest Indiana will grow from 1,387,000 jobs in 2001 to 1,616,000 jobs in 2025, an increase of almost 230,000 jobs. Depending on the route alternative chosen, an additional 1,500 to 5,000 jobs are forecast in 2025 as a result of the construction of I-69. Alternatives H2, B1 and K are expected to have the largest employment impact, with between 4,000 and 5,000 more jobs than the No-Build Alternative. Alternative A is forecast to have the smallest employment impact, adding 1,500 more jobs than the No-Build Alternative.

Employment in High-Growth Industries

REMI output contains the increase in employment in many individual industries. High-growth industries were defined as the 10 and 20 fastest growing industries, as projected for 1998 to 2020 at the U.S. level by the REMI national forecast:[4]

1. Miscellaneous business services;
2. Miscellaneous professional services;
3. Local and interurban transportation;
4. Medical;
5. Auto repair and services;
6. Other transportation;
7. Hotels;
8. Agriculture, forestry, and fishing services;
9. Non-profit organizations;
10. Furniture;
11. Amusement and recreation;
12. Education;
13. Insurance;

[4] For comparison purposes to the Purpose and Need statement, social services and engineering and management services are included within miscellaneous professional services; museums and botanical and zoological gardens and membership organizations are included within non-profit organizations.

14. Eating and drinking;

15. Rest of transportation equipment;

16. Personal service and repair;

17. Machines and computers;

18. Fabricated metals;

19. Public utilities; and

20. Printing.

This measure was presented as the forecast of employment in the 10 highest and 20 highest-growth industries, as well as the share of total employment in these two categories. In 2001, 356,000 jobs (or 26 percent of all jobs) were in the 10 highest-growth industries and 575,000 jobs (43 percent) were in the 20 highest-growth industries in the study area. By 2025, approximately 538,000 jobs (33 percent) are forecast to be in the 10 highest-growth industries and 844,500 jobs (52 percent) are forecast to be in the 20 highest-growth industries in the no-build scenario. Alternatives H2, K, and B1 each are forecast to generate about 2,000 more jobs in the 20 highest-growth industries than the No-Build Alternative, while Alternatives A and E each are forecast to generate about 1,000 more jobs in the 20 highest-growth industries.

Employment in High-Paying Industries

High-paying industries were defined as the 10 and 20 highest annual wage industries in Southwest Indiana in 1998 (the last year of historical data in the REMI model). The 10 and 20 highest paying industries are:

1. Chemicals;

2. Petroleum products;

3. Railroad;

4. Motor vehicle manufacturing;

5. Primary metals;

6. Public utilities;

7. Rest of transportation equipment;

8. Instruments;

9. Machines and computers;

10. Insurance;
11. Paper products;
12. Mining;
13. Wholesale trade;
14. Electrical equipment;
15. Food products;
16. Printing;
17. Communications;
18. Fabricated metals;
19. Banking; and
20. Stone, clay, and glass.

This measure was presented as the forecast of employment in the 10 highest and 20 highest-paying industries, as well as the share of total employment in these two categories. The 10 highest-paying industries employed 115,000 workers in 2001 (eight percent of the total work force), while the 20 highest-paying industries employed 290,000 workers (21 percent). In the baseline forecast for 2025, the 10 highest-paying industries are forecast to employ 127,000 workers, and the 20 highest-paying industries are forecast to employ 298,000 workers. If one of the build alternatives is selected, between 600 and 1,700 additional jobs are forecast to be created in the 20 highest-paying industries in the entire study area. Alternatives A, C, and E is forecast to generate the fewest high-paying jobs, while Alternatives H2, K, B1, and J are expected to create the greatest number of high-paying jobs over and above those added in the No-Build forecast.

Real Disposable Income

Forecast changes in real disposable personal income are direct outputs from the REMI model. Income measures are forecast in nominal (inflation-adjusted) dollars, and REMI simultaneously forecasts a personal consumer expenditures (PCE) price index that is used to convert values from nominal to real dollars. The model has a tendency to overstate the price-index impact, which in turn artificially suppresses the magnitude of the change in real disposable personal income.

An adjusted simulation-level personal consumer expenditures (PCE) price index was created by halving the change in the price index forecast by the REMI simulation. This adjusted PCE-price index was used to convert disposable personal income values from nominal to real dollars.

Compared to the No-Build Alternative, the forecast additional real disposable income resulting from construction of I-69 ranges from $56 million for Alternative A to $181 million for Alternative H2 in 2025.

Net Change in Farm and Forest Income

Farming and forestry are important components of the economy in Southwest Indiana. To the extent that different route concepts have a greater or lesser effect upon these industries, they affect a significant part of the existing economy in Southwest Indiana.

To estimate the effect of each alternative upon the farm and forest economy, the Geographic Information System (GIS) which was compiled for this study was applied to a possible range of land area corresponding to each route concept. Given the imprecise nature of these route concepts, the farm land and forest land required for each alternative is estimated as a range, as shown in Table 3. The GIS has a layer which shows land use and land cover for the study area. The following land uses were considered as farm land and forest land, respectively:

Farm Land	**Forest Land**
Pasture/hay	Deciduous Forest
Row crops	Evergreen Forest
Small grains	Mixed Forest
	Woody Wetlands

To determine the lost farm and forest income associated with the acreage losses, county data from the 1997 United States Department of Agriculture was used. Table 4 gives the average income per farm acre and forest acre for each county in the study area through which one or more alternatives pass. The components of farm income include net cash returns, government payments (directly to farm operators), other farm-related income (customwork and rental of farmland), direct sales to consumers, and Commodity Credit Corporation loans. Forest income is directly reported as a single total for each county. The estimate of lost farm and forest income by alternative was made by determining the average farm and forest income per acre for each alternative, and applying that average to the midpoints of the ranges of possible farmland and forestland lost. This average income per acre for each alternative was determined by taking the weighted average of income per acre for each county through which each alternative passed. The income per acre for each county was weighted by the proportion of each alternative which was located in that county. Table 5 gives the weighted average farm and forest income per acre calculated for each alternative.

Table 4 . Average Income Per Farm and Forest Acre, by County

	Average Income Per	
County	**Farm Acre**	**Forest Acre**
Brown	$ 20	$ 10
Daviess	$ 82	$ 10
Gibson	$ 98	$ 7
Greene	$ 53	$ 3
Johnson	$ 112	$ -
Knox	$ 134	$ 2
Lawrence	$ 29	$ 1
Marion	$ 564	$ -
Martin	$ 70	$ 7
Monroe	$ 21	$ 21
Morgan	$ 81	$ 2
Owen	$ 40	$ 7
Pike	$ 55	$ -
Sullivan	$ 83	$ 53
Vigo	$ 72	$ 2

Table 5. Average Lost Farm and Forest Income Per Acre, by Alternative

	Lost Farm	Lost Forest
Alternative	**Income/Acre**	**Income/Acre**
A	$ 103.45	$ 18.00
B1	$ 64.91	$ 8.05
B2	$ 79.43	$ 7.35
C1	$ 87.32	$ 4.09
C2	$ 100.52	$ 3.79
D	$ 90.89	$ 11.27
E	$ 83.88	$ 10.00
F1	$ 65.51	$ 7.06
F2	$ 81.11	$ 6.57
G	$ 61.09	$ 6.46
H1	$ 62.86	$ 8.31
H2	$ 78.81	$ 7.67
I	$ 63.91	$ 5.77
J	$ 67.22	$ 5.41
K	$ 59.56	$ 8.00
L1	$ 59.19	$ 7.48
L2	$ 74.86	$ 7.03
M	$ 62.57	$ 6.99
N	$ 73.79	$ 7.76

Social Equity Measures

Measures of social equity were developed to demonstrate the potential for the proposed highway to help the Southwest Indiana region improve its socioeconomic condition relative to the rest of Indiana and the U.S. Social equity measures are direct outputs from the REMI model.

Ratio of Employment-to-Labor Force

The employment-to-labor force ratio was calculated using the REMI baseline forecasts of residence-adjusted employment and total labor force and the corresponding simulation results. The employment-to-labor force ratio was forecast to be 0.02 percentage points higher in 2025 for Alternatives H2, K, and B1 and 0.01 percentage points higher in 2025 for Alternatives C, E, and J, compared to the level forecast for the No-Build Alternative. These small differences indicate that the employment-to-labor force ratio forecasts for all alternatives were not significantly different from the forecast for the No-Build Alternative.

Real Disposable Income per Capita

Forecast changes in real disposable personal income are direct outputs from the REMI model. Income measures are forecast in nominal (inflation-adjusted) dollars, and REMI simultaneously forecasts a personal consumer expenditures (PCE) price index that is used to convert values from nominal to real dollars. The model has a tendency to overstate the price-index impact, which in turn artificially suppresses the magnitude of the change in real disposable personal income.

An adjusted simulation-level personal consumer expenditures (PCE) price index was created by halving the change in the price index forecast by the REMI simulation. This adjusted PCE-price index was used to convert disposable personal income values from nominal to real dollars.

As noted above, each alternative results in increases in employment and personal income. The REMI model also takes into account the tendency of individuals to relocate to or to remain in an area (when they otherwise would have moved out) to take advantage of enhanced economic opportunities. When this population growth is taken into account, we find that the real disposable income per capita for the build alternatives does not differ significantly from the 2025 forecast for the no build alternative. This does indicate that there is a significant growth in the labor force, especially for younger workers.

Transfer Payments per Capita

The change in transfer payments is primarily the result of increasing the ratio of employment to population (and lowering government assistance income). To estimate the change in transfer payments per capita, the REMI

baseline forecasts of population and transfer payments were extracted and compared to the simulation-level population and transfer payment data for each REMI region.

All of the build alternatives results in smaller transfer payments per capita than the no-build alternative. Compared to the no-build alternative, Alternative H2 results in the largest decrease in transfer payments per capita ($11), followed by a $10 decrease for B1 and K, a $8 decrease for C and J, a $6 decrease for E, and a $4 decrease for A.

Young Working-Age Population

Retaining and attracting younger workers is a desired economic outcome for the region. Young working-age population was defined as those age 20 to 44. Changes in population for each gender (male and female) by five-year cohorts (20 to 24, 25 to 29, 30 to 34, 35 to 39, and 40 to 44) are output results from the REMI economic migration estimate. The REMI impact results were summed across gender and age cohorts to calculate the total change in working-age population.

It is estimated that 755,000 people ages 20 to 44 will live in the study area in 2025 if the No-Build Alternative is chosen. An additional 900 to 2,900 young people will choose to live in Southwest Indiana if one of the build alternatives is chosen. Alternatives H2 attracts the greatest number of young workers (2,900), while Alternative A attracts the fewest (900 workers).