The Economic Impacts of Bypasses on Communities: An Integrated Approach

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Introduction

Bypasses, which redirect through traffic around populated areas, are common in the State of Indiana and elsewhere. The issue of whether a community should be bypassed often raises concerns from community members, public officials, and other stakeholders. The issue of bypasses can be both divisive and emotional.

Typically, bypasses comprise a portion of a major highway corridor. The construction and opening of a bypass thus constitutes a substantial change to a region's transportation system. A has substantial potential impacts on affected communities, such as changes in travel patterns, opening up new land for economic development, and the diversion of heavy truck traffic from congested city streets. Identifying these impacts and determining the extent to which these impacts are due to the presence of a bypass has posed a challenge to decision-makers and researchers.

This paper describes an integrated approach to documenting and quantifying the impacts of bypasses on small communities. Two similarly-sized communities in Indiana, a subset of twelve communities analyzed in a study by Mills (2007), will be discussed in this paper. One of these communities has had a bypass in place for 40 years, and the other community has been a candidate for a bypass for several years. The socioeconomics impacts on the community with the bypass will be documented in terms of (1) the decisions made by public officials as learned through case study interviews, and (2) the changes in employment in various industry sectors, as quantified by the development of random effects statistical models. The long-term impacts and lessons learned concerning the bypassed community will then be used to offer suggestions on how communities could benefit from a bypass. The integrated approach of combining case studies with advanced statistical methodologies was found to be helpful in painting a clearer picture of how communities with bypasses were impacted.

Literature Review

Branham et al. (1953) analyzed the traffic impacts, safety impacts, land use impacts, land value impacts, and effects on local businesses of the bypass around Kokomo, Indiana. Traffic volumes on the original route through downtown Kokomo not only did not decrease, but were projected to experience congestion worse than before the bypass was opened in 1951. Travel times on the original route actually increased following the bypass's opening.

Furthermore, it was found that most traffic on the Kokomo bypass was local traffic, likely due to "a shortage of north-south streets." The report recommended that "... some method, such as limited access, should be employed to control development along the route so as to insure safer facilities and maximum economic return to the state and to the users of the facility … (Branham et al. 1953). The study also noted that "… the Kokomo Planning Commission is

attempting to control the development and the access points by the use of an intelligent zoning ordinance and a required platting procedure."

Nevertheless, retail and service establishments proliferated along the Kokomo bypass. Congestion has become so severe on the 1951 Kokomo bypass that a limited-access facility, referred to as a "bypass of a bypass," is being built to the east of the current bypass.

Burress (1996) found that only travel-dependent businesses were adversely impacted by the presence of a bypass. Over the long-term, cities and counties with bypasses experienced growth in basic industries, which later brought about "second-round effects" of growth in the retail and service industries. Yeh et al. (1998) found that "bypasses rarely have created adverse economic impacts on communities." The study found that only towns with populations of 2,000 or less were likely to be adversely impacted by the construction of bypasses. A Washington State study (Gillis 1994) found that some bypassed communities "adapted" their downtown to the presence of the bypass, such as by making the central business district (CBD) a tourist destination. The study also recommended strict building design guidelines and restriction of development along highways.

Srinivasan and Kockelman (2000) used a one-way random effects panel data model structure to determine the economic impacts of "relief routes" in Texas, finding that a higher traffic split had a more adverse impact on the bypassed community's economy, although total sales for eating and drinking places increased with increasing traffic split. A Kentucky study (Thompson et al. 2001) found that the CBDs of bypassed communities had a significantly smaller share of retail stores compared to the CBDs of communities without bypasses. It was also found that, of the retail businesses located along bypasses, 90 percent were

new to the area, and only 7.6 percent of all businesses along a bypass had relocated from the CBD.

Babcock and Davalos (2004) used ordinary least squares (OLS) regression to quantify the impact on annual average total employment in bypassed cities in Kansas. Local business owners were also interviewed. Bypasses did not have a statistically significant effect on total employment. However, 76 percent of storeowners and managers interviewed believed that retail sales levels in bypassed cities would have been higher had the bypass not been constructed. Comer and Finchum (2003) used a before-and-after approach to determine whether population or housing demographics of bypassed communities and non-bypassed communities were significantly different. It was found that income levels in non-bypassed communities were higher than in bypassed communities.

Approach to Study

To obtain a complete and accurate picture of a bypassed city's changes over time, interviews were conducted with individuals who were involved in of the community, the county, the region, local industry, and local and downtown businesses. Twelve cities in Indiana were profiled, including Angola and Columbia City. Each of the communities has either had a bypass built for several years or is considered to be a candidate for a bypass. Detailed profiles of all twelve cities can be found in the full research report (Mills 2007). Each city's profile includes the following characteristics:

(1) A general background of the city, including principal industries and noteworthy attractions.

(2) Descriptions of how the city was impacted by the presence of a bypass or what impacts are expected if a bypass were to be built. The descriptions in this

paper are based on comments made by those interviewed, who are identified and quoted in the full research report (Mills 2007).

(3) Policies that have been or will be adopted in response to the bypass's construction.

To establish a statistical link between the presence of a bypass and a notable change in the affected area's economy, two-way random effects panel data models were estimated using county-level employment, payroll, and establishment data for various industry sectors, over a period of 30 years for seven counties. These models accounted for both statewide economic conditions and unobserved heterogeneity. The findings of the statistical models were then compared to the findings from the case study interviews to determine whether the models back up the claims made by public officials.

This project's approach to statistical modeling differs in several ways from previous studies:

(1) Impacts on employment and payroll in specific industry sectors would serve as the main focus of the modeling process.

(2) Sources of such data were published on an annual basis. These data were assembled for an extended time frame to provide a larger number of data points.

(3) In addition to analyzing "absolute" numbers (such as manufacturing employment in a given county), economic data were normalized against state totals to account for external economic factors.

Angola

Background

Angola is located in northeastern Steuben County, approximately 85 miles east of South Bend and 60 miles north of Fort Wayne. The city is host to a number of industries, including metal spinning companies, Powerscreen (a manufacturer of

portable screening equipment for waste reprocessing), and a number of transportation equipment companies. Local attractions include Hamilton Lake and Pokagon State Park.

Principal routes through the city's CBD include US-20, IN-127, and IN-827. Drivers going through the CBD must pass through the traffic circle in the center of town, located at the junction of US-20 and IN-127. Throughout the city, US-20 is a two-lane highway with no center turn lane, with parallel parking on the west side of downtown and angled parking near Monument Circle.

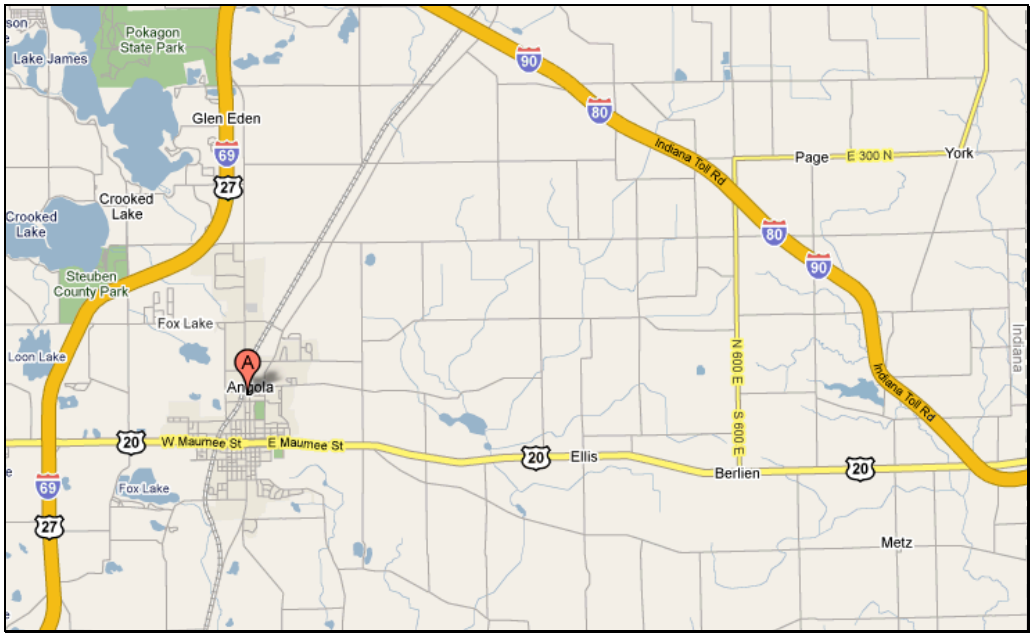

Figure 1 US-20 serves as the main east-west route through Angola, located in northeastern Indiana. In recent years, an increasing number of trucks have been using US-20 as an alternate route to reach southbound I69 or westbound US20, while avoiding tolls on the Indiana Toll Road. (Map from Google Maps).

The Need for a Bypass

A combination of local industry and increasing costs on the Indiana Toll Road (to the north, I80/I90 in Figure 1) had led to an increase in truck traffic on US-20 over the years. Recent counts averaged 1,419 semi-trailers per day, according to a Regional Planning Organization study (Region III-A, 2005). Many of these

trucks carry hazardous materials, according to Mayor Richard Hickman. The trucks travel past the local middle school, the high school, two hospitals, and around the traffic circle in the CBD. The truck traffic poses problems for local residents traveling to the CBD, he said.

Drivers often experience great difficulty when getting in and out of both parallel and angled parking spots. The trucks hinder pedestrian traffic. The local residents have grown accustomed to the semis, but one can tell when "somebody new is in town," Hickman said. The trucks move at a "pretty good clip" and also cause issues for school traffic in the morning, according to Hickman. Additionally, the trucks tear up roads and have damaged the mound in the center of the traffic circle, Hickman said. The noise from the use of jake brakes when slowing down frequently disrupts conversations for residents.

No "tragic" incidents have occurred, but there have been a "series of mishaps" involving semis and automobiles, Hickman said. Hickman noted a recent incident in which two semis collided in front of the hospital and blocked the entrance to the emergency room. Only one semi-related fatality has occurred, he said. Given the situation and the nature of the cargo the trucks carry, the city is one accident away from disaster, he said.

Recent Developments

Discussions for a bypass around Angola began as early as 15 years ago, Hickman said. When Hickman first came into office in 2001, he held two meetings with the public and a private meeting with Congressman Mark Souder. He found that most residents agreed that a bypass was needed, though a few citizens voiced concern about the downtown dying as a result of the bypass's construction. For a study commissioned by INDOT, an Indianapolis-based consulting firm was hired to facilitate a series of meetings to determine the

principal problems caused by the trucks, possible ways of rerouting them, and possible alignments of the bypass.

At a recent meeting between local officials and INDOT, it was learned that, after analyzing the results of the study, the plans for the bypass would not proceed, due to a lack of money. Costs were estimated at approximately $30-40 million, and because US-20 is part of the federal highway system, the bypass could have potentially been built and then have been rejected by the federal government because it was not a "viable bypass." As a result, the alignment of US-20 would remain on the original route (City of Angola 2008). However, the bypass idea is not a "dead issue," according to Hickman.

Currently, Angola is in the middle of a revitalization program to enhance the attractiveness of the downtown, Hickman said. Many of the buildings feature a New England motif, and many of the buildings are quite old. However, even though the bypass has been tabled for the time being, plans are currently underway to lessen the problems caused by the truck traffic. This sentiment is highlighted in the *Angola Downtown Action Agenda 2006*: "The leadership of the community should be commended for their diligent efforts to have a truck route created. However, it should be realized that -- if, for some reason, the truck route does not become a reality -- Downtown Angola can still be enhanced so that it is a thriving business district". (HyettPalma, 2006)

Traffic calming measures have been proposed as an alternative solution, using such measures as police patrols, weigh stations, noise level restrictions, and strict speed limit enforcement. These "non-capital intensive solutions" would aim to reduce the attractiveness of US-20 as a shortcut route for semi-trucks wishing to avoid the Indiana Toll Road (City of Angola 2008).

Should a bypass be built, public officials from Angola need to be adequately prepared to ensure the downtown area remains economically viable while

through traffic is diverted. Angola officials noted that "bypasses have not been kind to historic downtowns," (City of Angola 2008) but the adverse impacts of diverted traffic could be mitigated with the proper land use measures put in place. Columbia City, located 60 miles southwest of Angola, has had a bypass in place for approximately 40 years. The impacts of the bypass on its local economy will now be discussed.

Columbia City

Background

The county seat of Whitley County, Columbia City is located 20 miles west of Fort Wayne and 20 miles east of Warsaw. The city's principal industries include agriculture and manufacturing. Prominent employers in the area include Reelcraft Industries, Inc., UnderSea Sensor Systems, Inc., and Acme Industrial Maintenance & Machine.

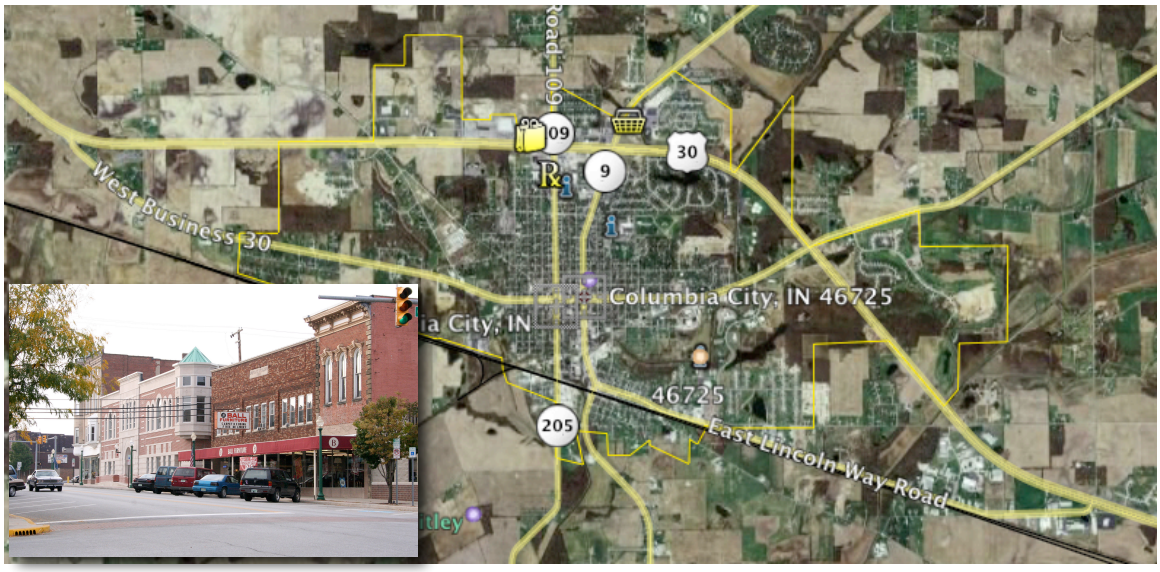

Figure 2 Aerial photo of Columbia City. The original routing of US-30 ran along East Lincoln Way Road and West Business 30 and is currently signed as Business US-30 (Source: Google Earth). (Inset) Photo of downtown Columbia City (Source: http://upload.wikimedia.org/wikipedia/commons/f/f1/Columbia-city-downtown.jpg).

Impacts of the US-30 Bypass

The original routing of US-30 ran south of the current bypass through the CBD of Columbia City. The original routing, now designated Business US-30 (see aerial photo in Figure 2), is a two-lane road through downtown with angled parking. The bypass has had a "two-edged effect" on Columbia City, according to Lowell Teska, President of Whitley County Economic Development Corporation. While the downtown has declined, the bypass has served as a means of attracting additional businesses that are dependent on through traffic. A row of chain restaurants and hotels runs along US-30 on frontage roads. The retail that established a presence in Columbia City may not have located there had they been limited to a downtown location, Teska said.

The relocation of most commercial activity to the bypass resulted in less emphasis placed on maintaining the downtown building stock. Many buildings in the downtown have remained empty over several years, Teska said. As a result, many of the buildings downtown have become rundown and have structural issues. A number of these buildings are privately owned; many of their owners also have properties along the US-30 bypass, and these owners want to invest any spare funds into the locations along US-30 to generate revenue, he said. Businesses that have remained downtown include attorneys, doctors' offices, and restaurants that cater to the downtown lunch crowd.

Public perception of the bypass is primarily positive, due principally to the convenience factor of having stores and restaurants adjacent to each other, Teska said. On the flip side, older residents of the community are not comfortable with having to cross US-30 to get from their homes to stores and services. Most of the city's residences are located south of the bypass, whereas most stores and restaurants are located north of the bypass.

The presence of frontage roads limits the number of curb cuts, and the US-30 bypass has only 4-5 traffic signals, according to Teska. However, traffic on US-30

is usually congested, and it can be "tough" to go through more than one intersection at a time, he added.

Columbia City has grown since the bypass was opened, Teska said, but as a result, there are "two forces working against each other." Manufacturing companies and other local industry appreciate the routing and geometry of the bypass due to decreased travel time and consequently decreased transportation costs, but at the same time, with the city growing toward the bypass, the US-30 bypass is in danger of becoming a part of the downtown, Teska said.

The scenario of US-30 becoming a part of downtown is unlikely, according to Teska, due to several factors. Businesses want visibility along the bypass, driving up land prices (because land owners want a large return on their investment) to the point that only wealthy businesses, which happen to be big-box stores such as Wal-Mart, can afford the land. Smaller businesses are consequently forced to locate 3-4 blocks away from the bypass. The market conditions work to prevent a "mass exodus from the downtown area," Teska said. As a result, the high land prices along the bypass have separated small and large businesses, each of which have a separate customer base, according to Teska. Larger businesses have more immediate access to the bypass, thus giving them a competitive edge over smaller businesses dependent on through traffic.

The bypass has been a factor in Columbia City's growth. A new business district has been created as through traffic and, consequently, the customer base has grown. The city "live[s] bigger than it really is," with services that could have never before been economically justified, Teska said. Before the bypass was built, the city was not large enough to warrant attention from many national chains, Teska said. As the community grew, businesses looking for new markets in which to compete, such as Blockbuster Video, located on the bypass, resulting in similar chain stores, such as Family Video, locating along the bypass. Only the

chain stores can afford the land. The chain video stores are more conveniently located than the old mom-and-pop video stores, and eventually the mom-and-pop video stores are driven out of business.

The bypass has provided "more convenient traffic flow for commercial products" and resulted in the relocation of companies that might have otherwise relocated to a different city. While smaller businesses have been put at a disadvantage or have gone out of business altogether, the bypass has helped expand overall commercial activity in Columbia City, thus creating additional jobs, Teska said.

The pattern of urban sprawl and the pattern of relocated businesses have resulted in the downtown losing its position as a central hub and a central core of activity, causing the city to become an "amorphous blob," Teska said. Residents running errands have to drive to one store on the extreme west side of town and then drive to another store on the extreme east side of town. Urban sprawl has also increased utility costs for residents. Typically, to attract businesses, the city provides a discount on utilities. As a result, the parties who have caused utilities to become more expensive end up paying less than long-time residents, according to Teska.

To ensure continued job growth and to keep younger people in Columbia City, a Tax Increment Financing (TIF) district was established near the US-30 bypass, the largest such TIF district in the state, according to Teska. A business park providing "shovel-ready" building sites was built in this district, attracting businesses such as the Steel Dynamics, Inc. plant, which employs hundreds of people. Recently, additional companies, such as Novae Corporation (trailer manufacturing) and Steel Plus Distribution (steel fabrication) have located to Columbia City (Whitley County EDC 2009). As described earlier, the flip side of these new developments is that, due to incentives provided to attracting

businesses, residents may end up paying increased utility bills and increased taxes.

The case study approach helped to gain insight into the unique characteristics of each community that can never be captured in a numerical model. A number of bypasses in Indiana are more than 30 years old. Analysis of the economic characteristics of these bypassed communities could reveal the long-term economic implications of constructing a bypass. To determine these long-term impacts on a bypassed community's economy, econometric methods were used.

Econometric Analysis – Data Sources Used and Counties Selected for Analysis

Economic data were collected from County Business Patterns (CBP), a publication released by the U.S. Census Bureau on an annual basis beginning in 1964. Previous years were published on an irregular basis, starting in 1946. County Business Patterns provides employment, payroll, and number of establishment data for industry sectors classified by Standard Industrial Classification (SIC) codes. Additional employment data were obtained from the Bureau of Economic Analysis (BEA). In addition to total employment, statistical models for the following industry sectors were estimated: manufacturing, wholesale trade, retail trade, eating and drinking places, healthcare, and sole proprietors. Population data were gathered from *Stats Indiana*, a website that compiles statewide and national figures from the Census Bureau and other data sources.

The timeframe of analysis begins in 1970 and ends in 1997. Restrictions on the timeframe were imposed due to availability of data and the switch from the SIC system to the North American Industrial Classification System (NAICS) in 1998. The two means of classifying industries are significantly different, particularly in the manufacturing sector, making reconciling data using the two different systems difficult and inexact.

Seven counties in Indiana were selected for analysis. All counties contain one small or medium-sized community that has had a bypass constructed in the past 30 years. This was thought to be a sufficient length of time for impacts to be realized. Six of these counties are located in north central Indiana; one county is located in the southern part of the state. Shown below in Table 1 are the counties, along with each county's respective bypassed community and opening dates for each bypass. Columbia City is one of the bypassed communities included in the data set. All of the communities listed in Table 1 are the county seats of their respective counties. Thus, any significant change in each community's employment and payroll levels would likely have a significant impact on the county as a whole.

Table 1 Counties selected for analysis

City	County	Year Opened
Washington	Daviess	1991
Kokomo	Howard	1951
Huntington	Huntington	1964
Warsaw	Kosciusko	1972
Peru	Miami	1979
Wabash	Wabash	1979
Columbia City	Whitley	1968

Modeling Form: Panel Data and Random Effects

Panel data combine both time-series data (in this case, for years 1970-1997) and cross-sectional data (in this case, for seven counties). Panel data are typically analyzed in two ways that account for data heterogeneity: one-way error component models (which account for either cross-sectional effects or time-series effects) or two-way error component models (which account for time-series

effects, or serial correlation, and cross-sectional effects). Both one-way and two-way error component models can be specified under fixed effects or random effects. A full technical explanation of the statistical models used in analysis and the model specifications can be found in the full research report (Mills 2007).

Variables Used in Modeling

Employment, payroll, and establishment data for various industry sectors served as dependent variables. Instead of using absolute numbers (levels), these figures were normalized against the state, yielding a "county-to-state ratio." These figures divide employment or payroll figures against corresponding values for the state overall. For example, the county-to-state ratio of manufacturing employment for Whitley County in 1971 is computed as the ratio of manufacturing employment in the county that year to manufacturing employment in the entire state that same year.

The use of county-to-state ratios has several advantages. Normalizing county figures against the state accounts for external economic factors, such as recessions and overall industry trends, such as the decline of the American auto industry. County-to-state ratios provide insight into how much each county is contributing to the entire state's economy. For example, if Whitley County has a 1 percent manufacturing employment county-to-state ratio in 1971, the county contributes 1 percent to the state's economy with respect to manufacturing employment for that year. Because they normalize out a number of externalities, county-to-state ratios have greater practical meaning than the absolute figures, particularly in the manufacturing sector.

For modeling purposes, the manufacturing sector was chosen as a starting point. Manufacturing employees make up part of what is referred to in the literature as basic workers, or workers who "are employed in industry, commercial, and office facilities whose location selections are based on considerations other than

locally required access," (Brail, 1987). Basic industries, when deciding where to locate, are sensitive to a number of factors outlined by officials interviewed in the previous chapter, such as market and labor access, transportation costs, and the availability of "shovel-ready" sites.

Service employees, in contrast, "are employed in firms which derive income from proximity to basic industry," according to Brail. Examples of service industries include offices and retail trade (which includes eating and drinking places). Accounting for the relationships between basic and service workers, most models for service industries include some aspect of the manufacturing industry as an explanatory variable. The other types of explanatory variables used in analysis are summarized below in Table 2.

Table 2 Explanatory variables used in econometric analysis

Type of Variable	Variables Used
Bypassed county characteristics	County population, ratio of county population to population of county of nearest large city, ratio of county population to distance from county to nearest large city, number of turns in CBD along the original route
Bypass characteristics	Dummy for whether a bypass was present (had been built), distance from bypass to CBD along original route
Bypass age	Dummy variables denoting the age of the bypass, with separate indicators for different "age groups," such as indicators for whether a bypass had been open between 1 and 5 years, between 6 and 10 years, etc.

Through trial and error, it was found that the use of additional indicators representing the bypass's age provided more meaningful results than the use of a continuous linear or nonlinear function representing the number of years the bypass has been open. These age indicators were grouped into different age groups, the size of each age group also determined by trial and error for each model.

To illustrate, consider a county that has had a bypass open for the last 13 years of data stored in the database. Assume this county has three separate bypass age indicators, one indicator for years 1-5, another indicator for years 6-10, and another indicator for years 11-15. The indicator for years 1-5 would be set to 1 for the first 5 years the bypass is open. Thereafter, the indicator would be set equal to 0. For the next 5 years, only the age 6-10 indicator would be set to 1. This indicator would then be set to 0 after those 5 years. For the last 3 years in the database, the age 11-15 indicator would be set to 1. This brief example shows that at most one indicator is "switched on" for a given observation.

Overall Impacts

The statistical models developed for this project have shown that a number of factors affect a bypassed community's economy in terms of employment and payroll in various industry sectors. The key factors are as follows:

Age of the bypass: For certain industry sectors, employment and payroll tended to be adversely impacted for the first 15 years a bypass was open, but recovered and grew in the years thereafter. Other industry sectors did not show a significant change in employment or payroll until the bypass had been open for 20-25 years. For example, while total employment was positively impacted, manufacturing payroll was adversely affected for the first 15 years a bypass was open but then recovered and grew in later years, indicating the presence of a time lag. In short, immediate impacts should generally not be expected once a bypass is open; there will likely be a lag of at least 15 years before any significant change in employment or payroll takes place.

Difficulty of navigating a community's downtown: The difficulty of navigating through the affected community's central business district (CBD) was measured by the number of turns required to follow the bypassed route's original

alignment. The models showed that even with the bypass open, a hard-to-navigate downtown depressed total employment and employment in payroll of retail stores and restaurants, though these impacts were mitigated by the bypass.

Population of affected community and presence of nearby large city: Most industries in bypassed communities were, in general, positively impacted by the presence of a larger city. These impacts were more positive for larger bypassed cities. Similar positive impacts from nearby larger cities have been observed in previous studies (Rephann and Isserman, 1994; Srinivasan and Kockelman, 2001). Bypassed communities with higher populations were more positively impacted by a bypass. Previous studies, however, have found that smaller communities (under 500-2000 population) were more likely to be adversely impacted by a bypass (Wells and Farnworth, 2001; Yeh et al., 1998).

Time-series plots of manufacturing payroll (normalized against the state) for selected counties are shown in Figure 3. Warsaw (Kosciusko County) experienced large growth in manufacturing payroll since the US-30 bypass opened in 1972, whereas Wabash (Wabash County) has seen a decline in manufacturing payroll. These different trends are evidence that a bypass will not always have the expected impact.

Normalizing county-level figures against the state was found to be essential in controlling for external economic factors. These county-to-state ratios also provided insight into how each affected county's contribution to the state's economy was affected by a bypass (see Figure 3).

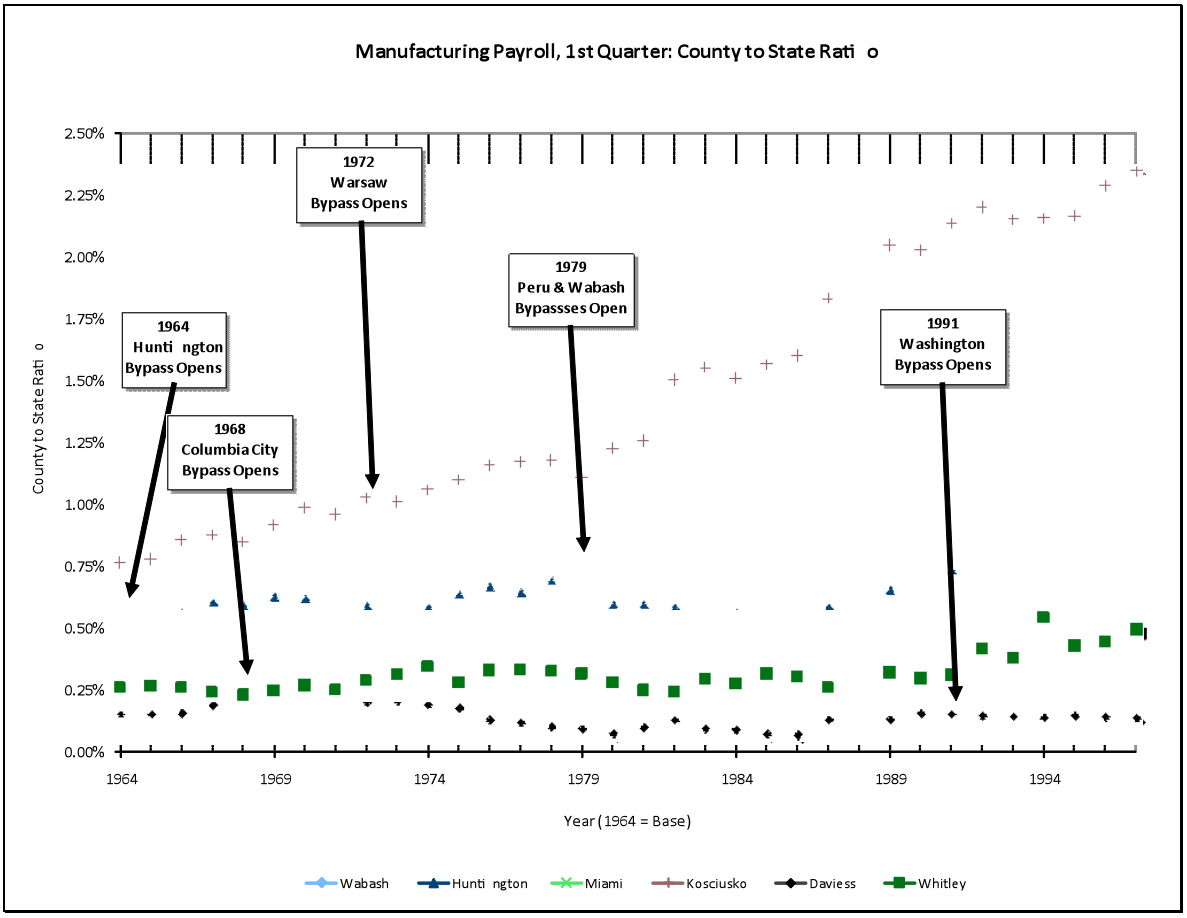

Figure 3 Time-series Plots of Manufacturing Payroll for Selected Counties

Findings of Econometric Analysis

The impacts of bypasses on selected industries' employment and payroll levels are summarized below in Table 3, with "+" denoting generally positive impacts and "–" denoting generally negative impacts. For most industry sectors, impacts differed in the early and later years after a bypass was open.

Table 3 Summary of Bypass Impacts on Various Industry Sectors

Industry	Initial (1-15 years)	Later (16+ Years)
Total Employment (County to State Ratio)	+	+
Proprietors Employment (County to State Ratio)	-	-
Manufacturing Payroll (County to State Ratio)	-	+
Manufacturing Employment (County to State Ratio)	+	+

Manufacturing Employment	+	+
Health Services Annual Earnings (County to State Ratio)	-	+
Retail Trade Employment (County to State Ratio)	+	+
Retail Trade Employment	+	-
Retail Trade Payroll (County to State Ratio)	-	+
Retail Trade No. Establishments (County to State Ratio)	+	+
Eating & Drinking Places Employment (County to State Ratio)	-	+
Eating & Drinking Places Payroll (County to State Ratio)	-	+
Wholesale Trade Employment (County to State Ratio)	+	-
Wholesale Trade Employment	+	-
Wholesale Trade Payroll (County to State Ratio)	+	+

A brief discussion of the impacts on each industry sector is given below.

Total Employment: Total employment in an affected county is positively impacted by the presence of a bypass. Over time, an affected county will contribute more to the state's economy in terms of employment. The presence of a nearby large city also positively impacts total employment.

Manufacturing: Even though the initial impacts on payroll are negative, there will be long-term benefits as the bypass ages. Employment will be positively impacted by the presence of a bypass. A bypass will provide a means of expanding the local manufacturing employment base over time. Growth in "basic" industry can bring about "second-round effects" of growth in retail and service industries as discussed by Burress (1996). Basic workers are workers who "are employed in industry, commercial, and office facilities whose location selections are based on considerations other than locally required access," (Brail, 1987). Basic industries, when deciding where to locate, are sensitive to a number of factors outlined by officials interviewed for this study, such as market and labor access, transportation costs, and the availability of "shovel-ready" sites.

Retail Trade: Employment (relative to the state) benefited from the presence of a bypass, though these benefits were not realized until after the bypass had been open for at least 25 years on average. The presence of a nearby large city also positively impacted retail trade employment (relative to the state). Retail trade payroll (relative to the state), however, is negatively impacted in the short term, though these negative impacts lessen over time. Previous studies have shown that total and per capita sales in affected communities can be adversely impacted by the presence of a bypass (Srinivasan and Kockelman, 2000; Thompson et al., 2001).

Eating & Drinking Places: Both employment and payroll in a county were negatively impacted by the presence of a bypass for the first ten years the bypass was opened. The presence of a bypass, as shown by the models, has long-term, positive benefits and impacts that overshadow these negative impacts.

Negative short-term impacts were also observed by Srinivasan and Kockelman (2000), though the negative impacts were most pronounced for smaller communities (population less than 5000). Their study, which focused primarily on sales, found that total eating & drinking places sales were most adversely impacted in smaller communities but showed little to no change in larger communities (population greater than 10,000).

Sole Proprietors and Partnerships: Proprietors' employment reflects the number of sole proprietorships and partnerships in a given county or city. Such establishments are often family businesses and other smaller business operations. Over time, the impact of a bypass on proprietors' employment becomes more negative. A previous Kentucky study showed that 90 percent of businesses located at or near a bypass were new to the bypassed area (Thompson et al., 2001). Smaller stores on the original route, such as mom-and-pop stores, often

have difficulty competing with their larger counterparts and end up closing down.

Implications: Lessons Learned from Columbia City

Following the opening of the US-30 bypass in the late 1960s, retail and commercial development shifted from downtown Columbia City to the bypass. Over time, vacancy rates downtown increased and landowners who owned buildings both downtown and along the bypass focused primarily on maintaining their more lucrative and profitable properties along the bypass. Buildings downtown fell into a state of disrepair, and programs are currently underway to renovate these buildings. At the same time, the US-30 bypass has opened up land for development, and Columbia City now has the largest TIF district in the state. As recently as early 2009, manufacturing and other companies have continued to locate to Columbia City or expand existing facilities already in place.

The fifteen statistical models confirm what was learned in the case study: The US-30 bypass has helped Columbia City and Whitley County experience large growth in manufacturing, retail trade, and overall employment. While the downtown may have declined over time, total employment, even when normalized against the state, has increased over time. In other words, with the US-30 bypass in place and controlling for the continued growth of nearby Fort Wayne, Columbia City and Whitley County have, over time, contributed more and more to the state's overall economy. In addition, it was learned from the interviews that many residents appreciate the convenience factor of having so many "big box" retail stores located next to each other.

The US-30 bypass of Columbia City, in short, did have a "double-edged" effect on the area. While the bypass opened up new land for economic development, resulting in a significant increase in employment, the downtown area went into a

state of decline as more commercial activity shifted to the bypass. The convenience factor of the bypass attracted big box and chain retail stores, who were able to afford the newly expensive land along the bypass while local store owners were forced to reside in less desirable locations. Additionally, the TIF districts and other tax and utility incentives offered by public officials to attract industry have also increased utility costs for the general population. This "side effect" of attracting industry should not go unnoticed by public officials and the general population.

Public officials in Angola acknowledge the potential for the proposed US-20 bypass to adversely impact its downtown area. Much of the language used in the city's Downtown Revitalization Action Plan echoes what happened to downtown Columbia City (City of Angola 2009):

> History has indicated that bypasses have not been kind to historic downtowns, as former "thru-traffic" customers are rerouted when a bypass is developed. This reduces the exposure of downtown businesses to potential customers and leaves the downtown to compete only as a "destination market" since the "convenience market" has been lost to the new bypass area.

Should the bypass of US-20 be built, public officials and other stakeholders in Angola should take steps to ensure the downtown remains economically viable. Other bypassed communities in the state, such as Wabash and Washington, have refocused their downtown areas to rely less on retail and other commercial activity and more on tourism and entertainment. Land use and access control have been used to limit development and maintain mobility. These and other solutions have been proposed in previous studies (Gillis 1994; Jarrett et al. 2001; Thompson et al. 2001).

A common issue raised by local residents with a bypass in general is whether retail and other businesses will leave the downtown. The attitudes of downtown businesses should be investigated to identify these and any other issues

regarding the downtown's continued vitality. The downtown revitalization efforts of other Indiana communities such as Washington and Wabash (as described in the previous section) should be pointed out to local officials as examples of what could be done to maintain a downtown's economic vitality.

Other general issues should be considered for communities with proposed bypasses. Local officials should be consulted to determine the state of the city or county Comprehensive Plan and the plans for downtown and outlying areas once the bypass is constructed. If a bypass is not warranted, local officials should have a "backup plan" for dealing with increased downtown traffic volumes, particularly if safety is an issue. These actions have been taken by public officials in Angola. The proposed US-20 bypass has been explicitly addressed in the city's updated Downtown Revitalization Action Plan, and alternatives for the bypass, such as traffic calming measures and increased enforcement, have been proposed. Local land use and zoning policies should ensure development does not impede mobility. The views of local businesses and residents should also be considered.

The impacts of bypasses on the downtown areas of these small- and medium-sized communities cannot be easily captured by statistical models, due to aggregation data, a by-product of Census disclosure laws limiting the availability of local, more disaggregate data, and due to the difficulty in identifying and quantifying the decisions made in the past by public officials. Even with these downsides, the statistical models have largely confirmed the claims made by public officials interviewed for this study. Bypasses, generally, have a positive and significant impact on countywide employment and payroll levels. The use of the panel data modeling framework captures unobserved heterogeneity of each county and allows for the use of a larger set of data in statistical analysis. The random-effects specification is particularly advantageous in that the models

could potentially be transferable to other counties with bypasses, though this can only be confirmed with more rigorous testing.

Construction of a bypass will not guarantee economic improvements in a community; rather, a bypass will provide an opportunity for economic growth. "Success" of a bypass depends on a number of factors, such as the presence of a nearby large city, the overall economy, and particularly the actions of affected stakeholders. Each stakeholder should contribute to the planning process in order to strike a balance between development along the bypass and maintenance of the economic vitality of the affected community's downtown. Land use controls should be implemented to ensure mobility along the bypass is not impeded. Local officials should promote the unique assets of the community and the community's strengths and distinctive characteristics. With all affected stakeholders, from the state level to the community level, working together, the benefits a bypass can provide can be maximized and the adverse impacts minimized.

Columbia City has experienced significant growth in employment since the opening of the US-30 bypass, though this growth may have come at the cost of a declining downtown. Angola may be able to handle the problem of heavy truck traffic using the proposed traffic calming measures, but should a bypass be built, public officials should be prepared to implement effective land use policies that can help stimulate growth in employment while maintaining the downtown area's economic vitality. The statistical models have shown that employment will largely be positively impacted by the presence of a bypass. Counties with bypasses, over time, will contribute more to the state's economy. Bypasses, in short, will provide the public with an opportunity to expand the local employment base.

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