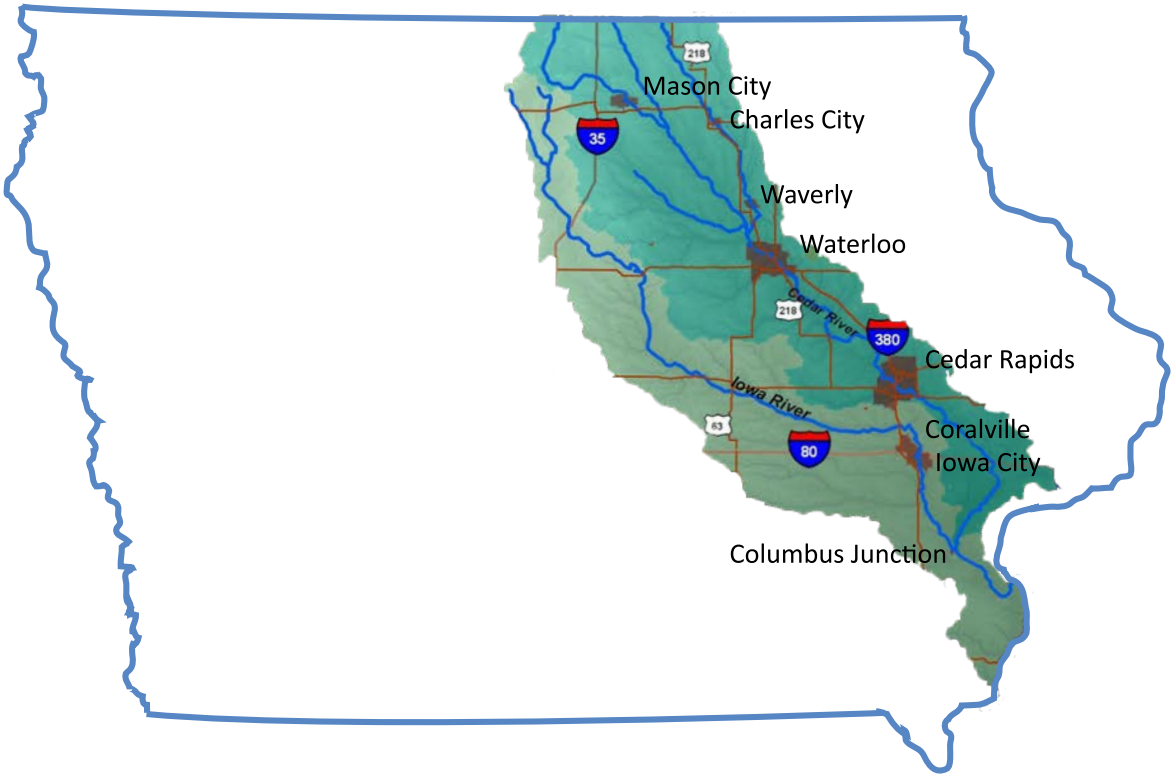
Housing Needs Assessment After a Local Disaster

A Final Report on
Housing Recovery Research Conducted in Eight Iowa Cities
Two Years Following the Iowa Floods of 2008

Part One: Economic Impact Evaluation of a Natural Disaster



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Community and Economic Development

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Overview

Iowa State University and Iowa State University Extension and Outreach Community and Economic Development (CED) received a contract from the Iowa Department of Economic Development (IDED) to develop a methodology to assess housing needs following natural disasters.

The primary components of this research project are analyses of the economic impact the 2008 Iowa floods and the impact of the national recession on the speed of recovery; assessment of quantitative statistical data measuring the loss of housing and the types of replacement housing needed to meet expected community growth levels; geographic information systems (GIS) mapping of planning scenarios; and development of a template for regional planning agencies and community leaders to use addressing future disasters.

The research project was augmented with two forms of qualitative research—focus groups and key informant interviews, as well as quantitative research in the form of an online survey. The data from focus groups and key informant interviews provide context and meaning to the statistical data in that they tell the story, in the participants' own words, of their communities' experiences during the flood, in the days immediately following the flood, and in the long months of recovery. These data gathering methods also provided information about participants' interactions with the variety of agencies and programs that these communities had at their disposal to undertake the work of long-term recovery. The online survey was used to capture additional input from stakeholders who were unable to participate in any of the city-based focus group sessions or who had stated a preference to receive an electronic survey rather than being interviewed individually.

IDED, the Iowa Finance Authority (IFA) and the Rebuild Iowa Office (RIO) selected eight Iowa cities of various sizes and types to gain an understanding of how program implementation differed by the size and type of community being served and to identify the unique challenges these communities have encountered in their recent experiences with the loss of housing due to a natural disaster. The cities chosen were Cedar Rapids, Charles City, Columbus Junction, Coralville, Iowa City, Mason City, Waterloo and Waverly.

This report summarizes findings from an economic impact analysis of the 2008 floods on each of the study communities, as well as the effect of the national recession on recovery efforts. The report also offers guidelines for conducting economic analysis of a natural disaster—particularly in terms of housing and housing needs—based on overall results of the community analyses.

Economic Impact Evaluation of a Natural Disaster

Introduction

In the event of a flood or other natural disaster, community officials will soon be called upon to estimate the impact of the event on the region's economy and its households. This report provides some guidelines for conducting an economic analysis of a natural disaster, with an emphasis on issues related to housing and housing needs. Detailed economic analyses of the study communities are included as appendices to this document.

Methodology

There exist multiple alternative approaches for measuring the economic consequences of a natural disaster. The approaches are not interchangeable, and depending upon the particular circumstances and needs of the community, not all of them may be suitable. This report describes three types of post-disaster economic assessment: (1) compilation of damages, losses and costs; (2) trend analysis of local and regional economic indicators; and (3) estimation of economic impacts using statistical models. Examples from the eight study communities illustrate some of the challenges associated with each assessment framework.

Regardless of the selected approach, any post-disaster economic assessment should begin with a clear definition of disaster-related economic terms. Consistent usage of terms such as *losses* and *costs* can facilitate data collection and analysis efforts. Toward this end, the National Research Council (NRC) has developed guidelines for characterizing the economic and other consequences of a disaster. The NRC guidelines distinguish among four different disaster-related accounting measures: damages, losses, costs and impacts. Damages measure the disaster in physical terms. Losses quantify damages and disruptions in dollar values. Costs measure the amount of losses that

Table 1. Disaster accounting measures	
Damages	Physical outcomes of the events: houses destroyed, miles of roads damaged, number of bridges washed out, acres of cropland flooded or eroded, households affected and businesses disrupted, as examples.
Losses	Estimates of the market or financial value of damages or disruption to area households, businesses and governments. Losses may be direct or indirect.
	• Direct losses describe the value of destroyed or damaged homes, lost personal belongings, business machinery or inventory, and other assets. Direct loss estimates should measure the fair market value of the lost or damaged items, not the replacement cost of those items.
	• Indirect losses include incomes derived from businesses that were affected, lost wages to displaced workers, and increased costs to households, commuters, or firms due to displacement or disruption. Some of these indirect consequences can be extremely difficult to measure and may be best estimated using economic impact models.
Costs	Payments to repair damages and/or compensate persons, firms, or public entities for losses. Costs include all payments by insurers, to the extent that the natural disaster losses were insured; payments by the public at large through state and federal disaster assistance programs; and payments and costs associated with the disaster-assistance activities of private, nonprofit organizations or charities. Emergency response, overtime pay and other municipal expenses associated with the disaster would also be considered costs.
Economic Impacts	Net changes in the region's ongoing productivity. Economic impacts are generally described either in terms of jobs or regional value added, which includes labor income, returns to area proprietors and payments to government. Impact assessments can measure short-term disruptions as well as permanent alterations in the size and configuration of the area economy. Economic impacts may include both negative and positive elements.
Other Impacts	Other direct or indirect consequences of the disaster, including nonmarket as well as market effects. Examples include changes in area commuting patterns, environmental impacts, psychological effects on individuals and others.
Source: The Impacts of Natural Disasters: A Framework for Loss Estimation (1999), National Research Council	

are compensated. Economic impacts describe economy-wide changes in regional productivity as a consequence of the disaster. Other, nonmonetary impacts include environmental consequences and psychological effects on individuals. Table 1 contains a summary of these disaster-related accounting measures.

Compilations of Damages, Losses and Costs

Damage and loss estimates serve as the earliest sources of post-disaster economic data. These declarations generally describe the quantities and values of lost assets such as homes and personal belongings, business inventories and capital equipment, and public infrastructure. The damage and loss estimates are used primarily for seeking federal and state disaster declarations and assistance.

Tabulations of the costs associated with recovery provide another early source of post-disaster economic data. Disaster cost data may be easily standardized for comparison across communities or key economic sectors. For example, table 2 shows the per capita dollar amounts of federal and state disaster assistance appropriated to the seven study counties after the 2008 disasters. The table reveals wide variation across the disaster-affected counties in assistance to households, businesses and the public sector.

Among the study counties, Linn County had the highest disaster-related costs as measured by total appropriations for assistance. Total per capita disaster appropriations to Linn County were more than four times the statewide average. Appropriations to Johnson County and Louisa County were also high, at more than three times the statewide per capita average. Disaster costs in Floyd County and Cerro Gordo County were below the statewide average on a per capita basis. Readers should note that the dollar amounts reflect appropriations as of April 2011 and may not match amounts that have actually been spent to date.

Public infrastructure costs represented the greatest category of spending after the 2008 disasters, accounting for more than half of all nonagricultural appropriations in Iowa. Repairing damage to the state's infrastructure required an average of $657 in federal and state appropriations per resident. Housing-related costs averaged $471 per person across the state. The study counties varied in their relative amounts and distributions of disaster assistance by category. Louisa County had the highest per capita housing-related costs. Linn County far exceeded the other study counties in business-related costs. Johnson County was the worst in terms of damage to public infrastructure.

Limitations of Damage, Loss and Cost Compilations for Economic Analysis

Compilations of damages, losses and costs have several important limitations for economic analysis. First, the nature of disaster reporting may lead to overdescription of some consequences and underdescription of others.

- Direct losses may be underreported because not all households and businesses directly affected by a disaster seek assistance.
- Indirect losses may be underestimated because they are so difficult to measure. Most post-disaster data collection efforts target individuals and businesses with direct losses. Few communities have the time or resources to survey the general population in order to identify entities that might have been indirectly affected by the disaster.
- The incentive to maximize possible federal and state disaster assistance may lead to inflated declarations of losses in areas that are reimbursable. Distorted estimates could also result from insufficient data, pressure to produce estimates rapidly and confusion about what to count.

A second important limitation of loss and cost compilations is that their scope is limited to households and other entities that were adversely affected by the disaster. When estimating the economic consequences of

Table 2. Per capita appropriations ($) for 2008 disaster assistance by category (excluding agriculture) in selected counties, as of April 2011

Study area	Housing	Business	Public infrastructure	Other	Total
Black Hawk County	875	134	687	24	1,721
Bremer County	599	55	1,066	23	1,743
Cerro Gordo County	380	28	608	19	1,034
Floyd County	228	27	495	11	761
Johnson County	561	133	3,892	278	4,864
Linn County	2,110	610	2,620	123	5,464
Louisa County	2,280	144	1,622	301	4,347
State of Iowa	471	75	657	55	1,258

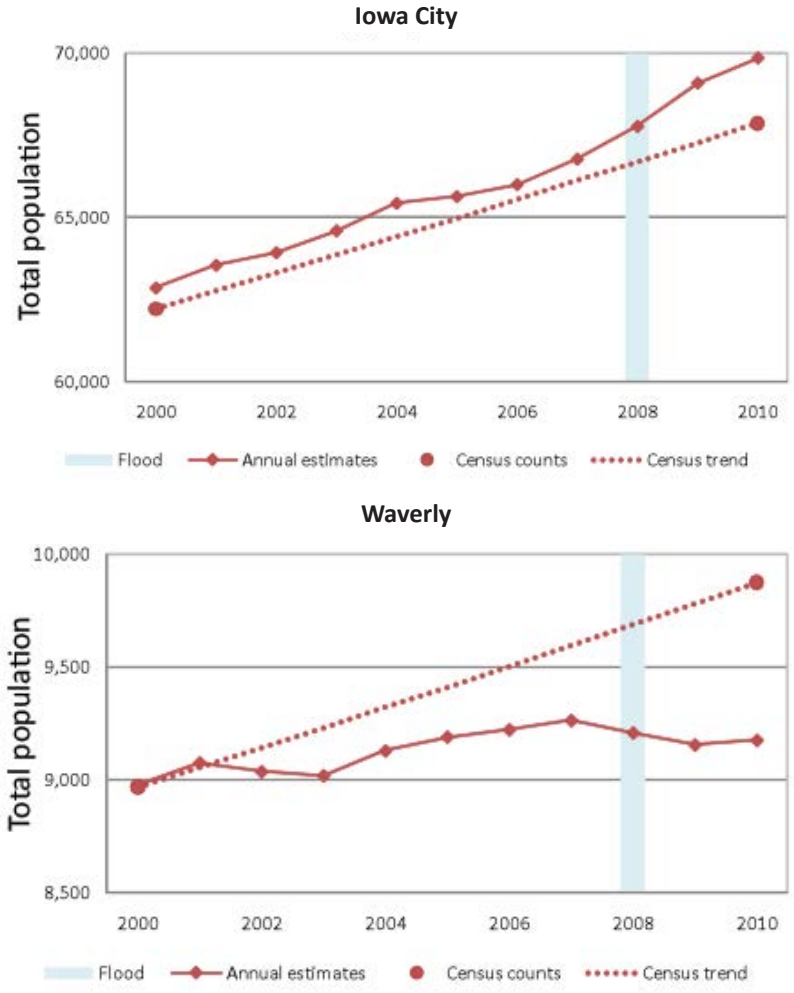
Source: Rebuild Iowa Office

a disaster, it is also important to consider any offsetting gains and regional shifts in economic activity.

- Disaster assistance payments and rebuilding activity can stimulate the local economy, which may offset some of the activity lost as a consequence of the disaster. In particular, household and business spending to replace or rebuild lost assets can provide a temporary boost to the local economy, to the extent that it can capture that spending.
- When economic activity merely shifts from one location to another within the region, there may not be a measurable economic impact associated with that shift. For example, some local establishments may see increased sales as they capture business lost by disaster-affected firms.

For these reasons, the loss and cost estimates compiled in the immediate aftermath of a disaster are not readily amenable to assessments of the disaster's longer-term economic implications.

Figure 1. Population trends in Iowa City and Waverly



Trend Analysis of Secondary Economic Indicators

At some point in the disaster recovery process, local officials will begin to consider the long-term consequences of the event on their local economy. Trend analysis of secondary economic indicators may provide valuable insights about the disaster within the broader context of regional economic performance. Particularly useful for post-disaster housing needs assessments are indicators related to local population size, household income and spending, and local employment. Trends in these indicators may be analyzed using a variety of methods ranging from formalized statistical procedures to simple, descriptive methods.

Time series analysis is a formalized statistical method of trend analysis that allows for a determination of causality. Time series analysis might be used, for example, to determine if a natural disaster caused an increase in local unemployment that cannot be explained by ordinary seasonal variations or other factors. Time series analysis requires a large number of observations collected at regular frequencies such as monthly, quarterly, or annually, with a recommended minimum of 40 observations over time. Unfortunately for cities and counties, there are very few data series collected at a sufficient frequency to perform time series analysis at the local level.

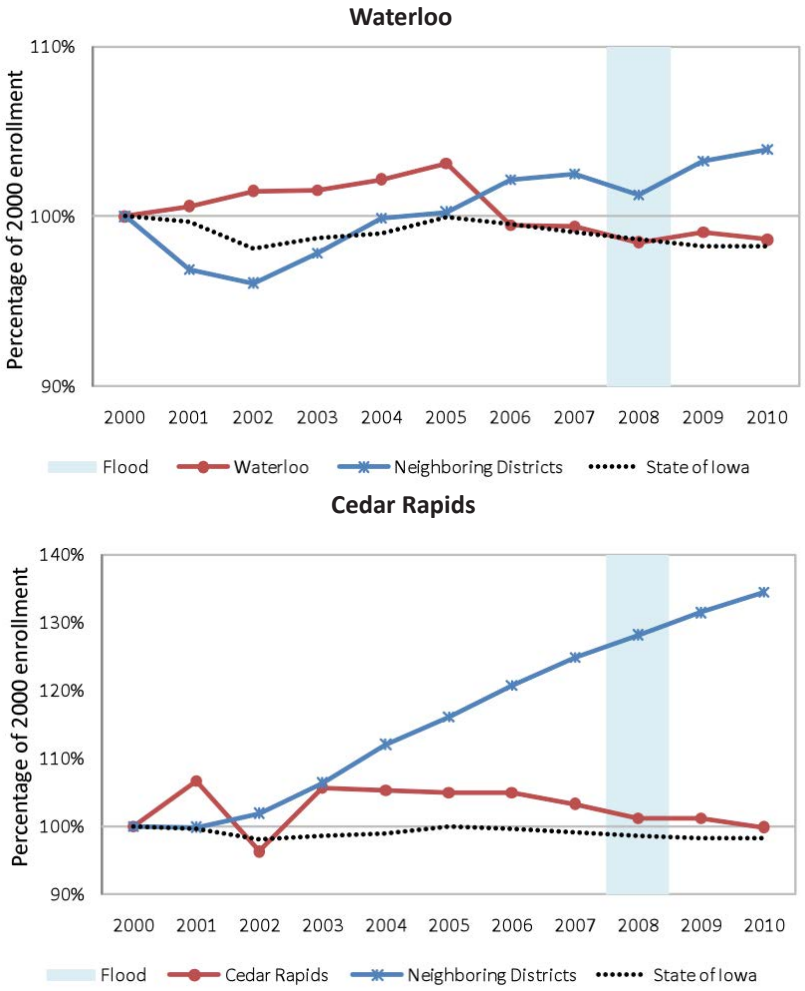
Where time series analysis is not practical or possible, more basic methods of descriptive trend analysis must suffice. Graphical analysis and simple percentage change calculations can indicate the timing and magnitude change in a given indicator, although neither method can establish causality. For example, a city's population trend line might show a slight population decline after a natural disaster. Without conducting statistical testing, one should not conclusively state that the flood caused the decline as it may have been caused by many other random or nonrandom factors.

Descriptive trend analysis can be enhanced with the use of peer group comparisons. If a city or county's trend deviates strongly from the performance of its peers, the differences are likely explained by unique local circumstances. Peer

group comparisons can be made using data for similarly sized cities or counties or averages for the state as a whole. Peer group analysis requires that the indicators to be studied be collected in a consistent manner across all of the comparison areas.

Following are descriptions of data sources that local officials may find most useful for analyzing economic trends before and after a natural disaster. Examples from the study communities will illustrate some of the strengths and limitations of each indicator for disaster analysis. Most of the examples show paired comparisons of various study communities in order to highlight some of the differences in their post-flood experiences. For a more detailed analysis of all indicators for each study city, refer to the appendices to this report.

Figure 2. Enrollment trends in the Waterloo and Cedar Rapids areas



Population

The US Census Bureau produces annual estimates of the population in counties and cities as of July 1 of each year. The data are typically produced with a nine-month lag, with data for July released in March of the following year. The Census Bureau first derives county-level estimates using a combination of vital records (births and deaths) and estimates of in-migration and out-migration that are determined from individual tax returns filed with the Internal Revenue Service. The county-level population estimates are then allocated to the city level based on each city's estimated share of housing units in the county.

The US Census Bureau occasionally revises its estimates for prior years, but no attempts are made to reconcile the series with the decennial census that occurs at the end of the decade. Figure 1 illustrates how the annual population estimates may overestimate or underestimate the actual population change that occurs in a city over the course of a decade. In Iowa City, the annual estimates proved to be slightly too optimistic, suggesting stronger growth than was actually realized. In Waverly, the annual estimates series was too pessimistic. The 2010 Census results for Waverly revealed much stronger population growth than expected for that city.

Despite their limitations in predicting the total population in a given year, the annual estimates are useful for gauging changes in the pace of growth throughout the decade. In figure 1 for example, there are indications that population growth in Iowa City accelerated during the latter part of the decade, despite the 2008 flood.[1] The estimates for Waverly suggest that most of its growth occurred during the middle part of the decade, with growth already slowing by July of 2008. Neither city showed evidence of major population loss subsequent to the 2008 disasters.

Public School Enrollment

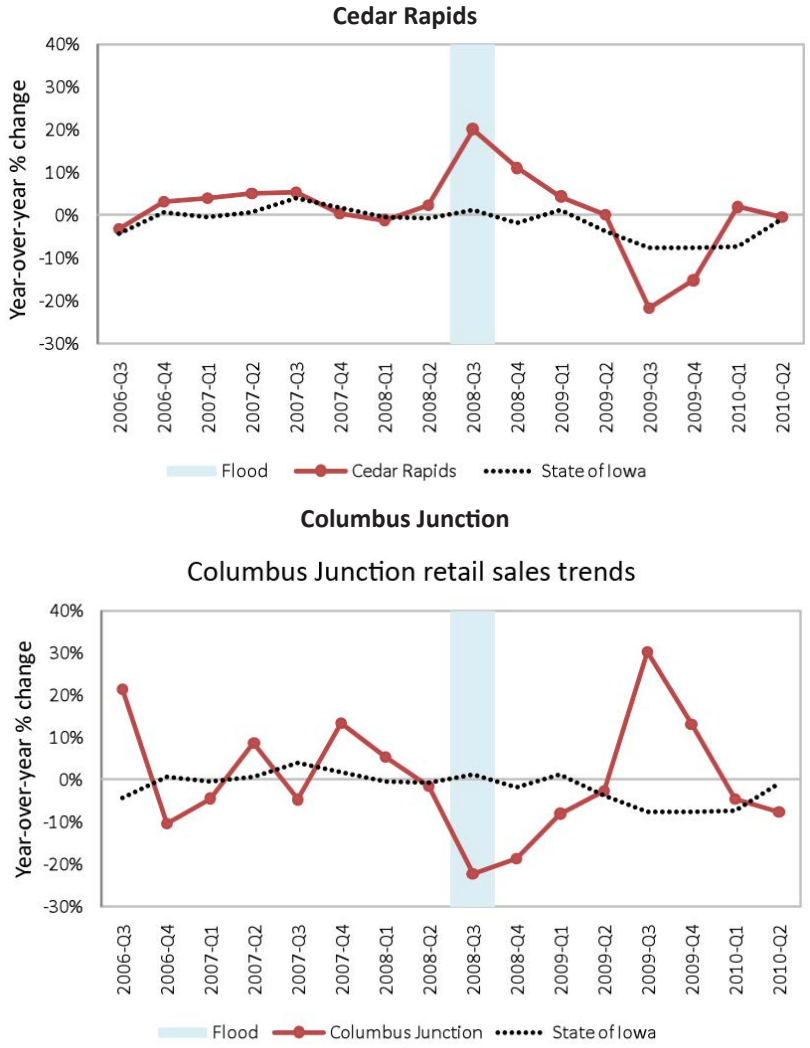
The Iowa Department of Education produces two data series describing enrollment in public schools. The certified enrollment series is used for apportioning state educational aid. The second series, called the Basic Educational Data Survey (BEDS), is a physical count of students conducted in the fall of each year. The BEDS data are more suitable than certified enrollment figures for tracking changes in the actual number of pupils in a school or school district over time.

[1] In figure 1 and subsequent graphs in this section, the 2008 flood period is indicated with a shaded blue line.

Figure 2 illustrates trends in BEDS enrollment data for school districts in and near Waterloo and Cedar Rapids. Enrollment for each year is expressed in percentage terms compared to the 2000 academic year. One series in each chart displays enrollment trends for the study city school district, a second series shows enrollment trends for neighboring districts within five miles, and a third series shows the statewide enrollment trend. This simple analysis can be used to detect if area enrollment levels deviated strongly from their longer-term trends or from the statewide norm.

Neither of the examples shown in figure 2 suggests major, flood-induced disruptions to regional enrollment patterns. A slight 2008–2009 enrollment decline in the Waterloo district appears consistent with longer-term declines that were in evidence since 2005. Enrollment in the school districts neighboring Waterloo had been increasing since 2002 and dipped only slightly in the 2008–2009 academic year. Enrollment in Cedar Rapids public schools has been slowly declining since 2003, in stark contrast to the rapid growth experienced by neighboring districts. The enrollment growth in those nearby districts was consistent with longer-term suburban population growth trends. There is no strong evidence that Cedar Rapids enrollment shifts to those outlying districts accelerated as a result of the floods.

Figure 3. Retail sales trends in Cedar Rapids and Columbus Junction



Taxable Retail Sales

The Iowa Department of Revenue publishes quarterly sales tax reports based on business tax returns for retail sales that are subject to the statewide sales tax. These data may be used to monitor changes in the level of retail sales activity in a city or county over time. Analysis of the quarterly data must take into account the highly seasonal nature of retail activity. In addition to the seasonal fluctuations, the retail sales data vary due to business cycle fluctuations as well as administrative anomalies in data reporting. These variations can make it difficult to isolate the effects of a particular economic event in a particular community.

Figure 3 illustrates taxable sales activity in Cedar Rapids and Columbus Junction for the year preceding and the year after the 2008 floods. The charts illustrate the percentage change in quarterly sales compared to the same quarter in the previous year.

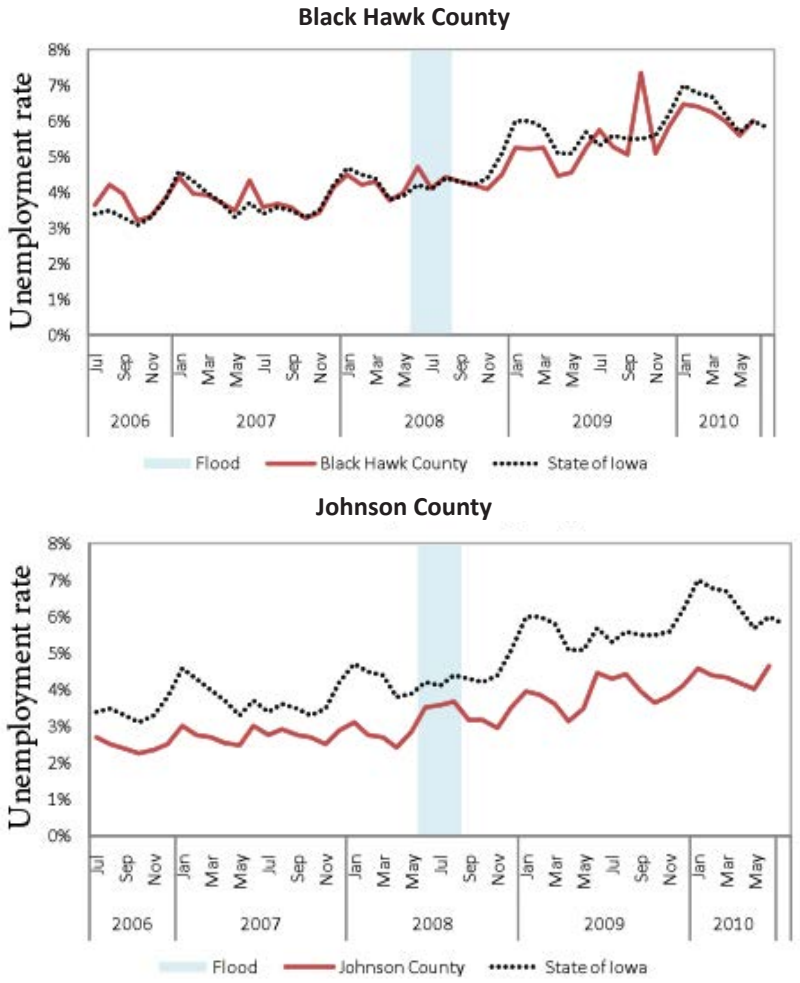
Retail activity in Linn County appeared to spike in the third quarter of 2008, suggesting that post-flood recovery and rebuilding efforts may have provided a temporary boost to the local retail sector. Retail sales in Louisa County, however, declined in the third quarter of 2008. This is not surprising given the differences in size of the Linn County and Louisa County retail sectors. Any flood recovery-related spending by Louisa County firms and households was likely to have leaked to neighboring counties with stronger, more developed retail sectors.

Unemployment

The US Bureau of Labor Statistics (BLS) publishes monthly estimates of unemployment, employment, labor force and unemployment rates for all counties. These Local Area Unemployment Statistics (LAUS) are based on a combination of actual unemployment insurance claims and model-based estimates of unemployment among persons who are not participating in unemployment insurance programs. Preliminary data are released monthly for the previous month. The unemployment series is subject to backward revision as new economic information is obtained to recalibrate the estimation models.

Figure 4 shows the monthly unemployment rates in the 24 months before and after the 2008 summer floods for Black Hawk and Johnson Counties. The unemployment rate in Black Hawk County tracked closely with the statewide average during the pre-flood period. The county experienced a slight uptick in its June 2008 unemployment rate, although the magnitude and the duration of the increase were small. Since the floods, the unemployment rate in Black Hawk County has generally remained below the statewide average.

Figure 4. Unemployment rate 24 months before and after the 2008 floods for Black Hawk and Johnson Counties



Unemployment in Johnson County was well below the statewide average during the entire period illustrated. A strong seasonal pattern is apparent in Johnson County's unemployment, with peaks typically occurring in January and July of each year. Although unemployment in Johnson County did increase during the flood period, the increase does not appear inconsistent with the regular seasonal increase that would have been expected.

Employment

The US BLS produces quarterly data showing the wage and salary employment of workers who are covered by state unemployment insurance programs. The BLS series is called the Quarterly Census of Employment and Wages (QCEW). Unlike the Census Bureau's population data and the BLS unemployment data, which are model-based estimates, the QCEW data are an actual count of jobs. QCEW data for a particular quarter are typically released about six months after the end of that quarter. The data are produced at the county and state levels only, and are not available for individual cities. Available data items include employment for each month in the quarter, total wages paid for the quarter and the number of business establishments reporting data for that quarter.

Figure 5 illustrates monthly employment levels in Cerro Gordo and Floyd Counties before and after the 2008 floods. The employment values for each month are expressed in percentage terms compared to the same month in the prior year, effectively smoothing out the seasonal variation in the data. Employment trends for the state of Iowa are included for comparison.

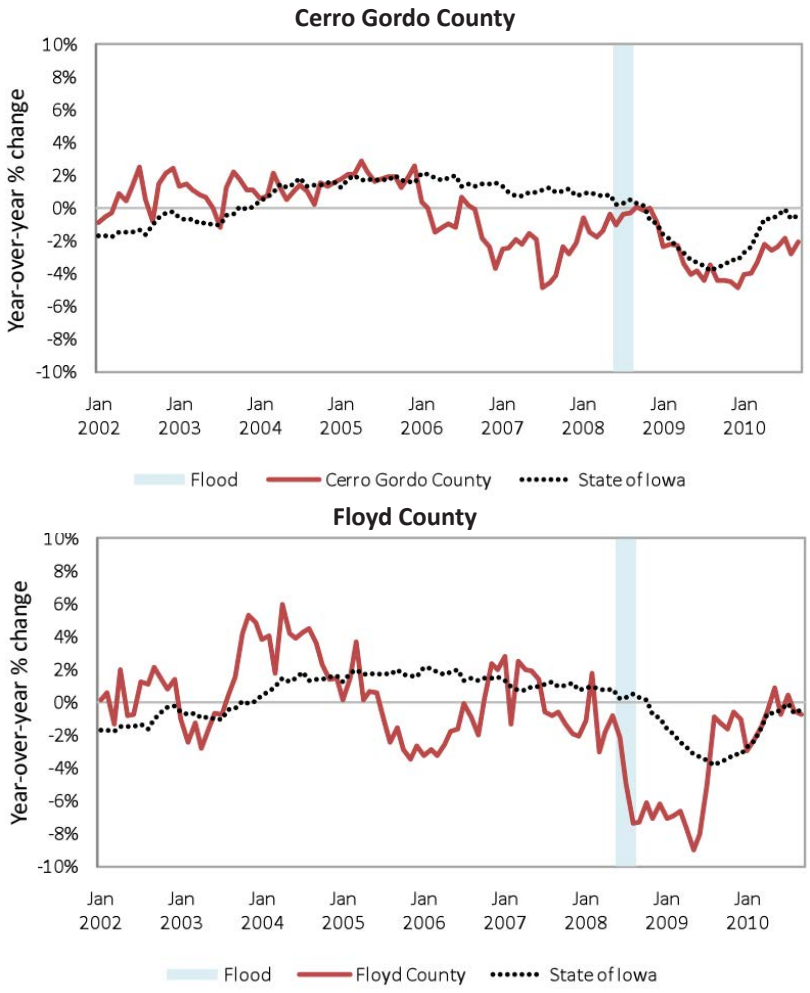
Employment levels in Cerro Gordo County had been declining for nearly two years before the 2008 floods, as evidenced by year-over-year percentage declines that began in 2006. The county's employment situation appeared to be improving by June 2008. Employment declines accelerated again in October 2008, well after the summer floods, and in a manner consistent with the statewide pattern. These patterns of decline are more

suggestive of recessionary effects than flood-related effects.

The patterns of employment decline in Floyd County differ markedly from those in Cerro Gordo County. Rapid employment declines in Floyd County do appear to coincide with the period of flooding, although it is impossible to assign causality from this analysis. Charles City lost more than two hundred jobs after layoffs by Winnebago Industries during the first week of August in 2008, which likely explains much of the employment decline for the period. In any event, employment trends in Floyd County appear to have improved during 2009.

The basic trend analysis in Figure 5 illustrates the difficulty in ascribing causality to specific economic events, especially during strong business cycle expansions or contractions such as the 2008 recession. A method called competitive shift-share analysis can be used to help sort out the effects of local versus statewide or national business cycles.

Figure 5. Employment trends in Cerro Gordo and Floyd Counties



Competitive shift-share analysis deconstructs job gains or losses into three explanatory components: statewide (or national) growth, industry mix and local competitive share. The statewide growth component provides an expected value for employment growth based on the average performance of all nonfarm industries across the state. Industry mix accounts for local concentrations of employment in sectors that, at the statewide level, outperformed or underperformed the nonfarm industry average. The competitive share component measures the performance of local firms in comparison to other firms in the same industries in other counties.

Figure 6 demonstrates a shift-share analysis of nonfarm employment change for Bremer and Louisa Counties for 2007–2009. Both counties experienced net losses in nonfarm employment for the period, with Bremer County losing 254 jobs and Louisa County losing 385 jobs. A deconstruction of the job losses reveals differences in how the two counties fared during a period influenced by flooding and recession. In Bremer County, the strong competitive performance of local firms and a slightly favorable mix of industries helped to offset some of the employment declines caused by the recession. In Louisa County, the mix of industries and the relatively weak performance of local firms compounded rather than offset the job losses caused by a downturn in the state's economy.

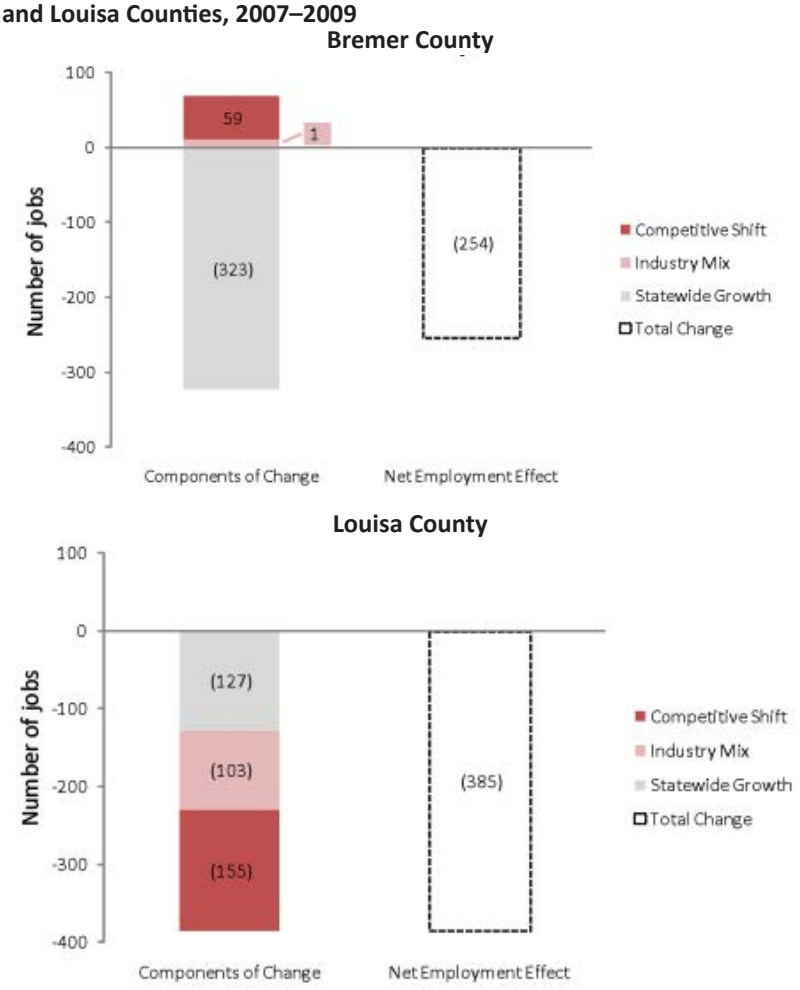
If the disasters materially affected the study communities' economies, then the local competitive shift component should be negative as in the case of Louisa County. The results of the shift-share analysis provide mixed evidence for the impacts of the 2008 disasters on the study areas. Only three among the seven counties in the study group had negative competitive employment shifts from 2007 to 2009: Louisa, Floyd and Cerro Gordo. The four metropolitan counties of Black Hawk, Bremer, Johnson and Linn all experienced positive competitive shifts for the period. Size was clearly an important factor in the economic performance of the study counties after the floods; however, it is not possible to determine if the floods had a stronger impact in the nonmetro counties or if the impact was simply masked by other economic forces in the metropolitan areas.

Area Commuting Patterns

The US Census Bureau and the US BLS have partnered in a program that produces highly detailed data on local employment and commuting patterns. The Local Employment Dynamics (LED) program provides annual data describing the place of work and place of employment for workers who are covered by unemployment insurance programs. LED data represent a combination of administrative data and synthetic values that closely approximate actual commuting patterns. The synthetic values are created to protect the confidentiality of individual workers and businesses.

LED data can be used to understand many characteristics of local commuting flows, including the magnitude of specific origin-destination flows, the average distance traveled by area workers, and the aggregate numbers of in-commuters to and out-commuters from a particular community. This type of information can be useful in assessing local housing needs because it indicates the likelihood of area workers living in or commuting to a particular community. To illustrate, table 3 compares the pre-flood and pre-recession likelihood of in-commuting and out-commuting for the cities of Cedar Rapids and Mason City.

Figure 6. Shift-share analysis of nonfarm employment change for Bremer and Louisa Counties, 2007–2009



Cedar Rapids and Mason City both drew more than half of their local workforce from outside their own borders in 2007. In-commuters accounted for about 59% of Cedar Rapids workers and 53% of workers in Mason City. Out-commuting rates reveal stronger differences between the two study communities. Residents of Cedar Rapids had a 58% probability of working within their city, while 42% commuted to some other city for work. In Mason City, 65% of working residents were employed within their city and just 35% commuted elsewhere.

LED data also allow us to explore the spatial dynamics of a city's labor force over time. Because the LED data are based on simulated values and administrative records that are subject to reporting anomalies, changes in specific place-to-place commuting flows from one year to the next should be interpreted with a

Table 3. Comparison of pre-flood and pre-recession likelihood of in- and out-commuting for Cedar Rapids and Mason City

	Workers	% of workers		Workers	% of workers
Employed in Cedar Rapids	91,032	100.0%	Employed in Mason City	20,071	100.0%
Living in Cedar Rapids	37,432	41.1%	Living in Mason City	9,447	47.1%
In-commuters	53,600	58.9%	In-commuters	10,624	52.9%
Residing in Cedar Rapids	64,111	100.0%	Residing in Mason City	14,528	100.0%
Working in Cedar Rapids	37,432	58.4%	Working in Mason City	9,447	65.0%
Out-commuters	26,679	41.6%	Out-commuters	5,081	35.0%

Table 4. Changes in local employment, commuting flows and local workforce size, 2007–2009					
	Working in the city (residing anywhere)	In-commuting	Working and residing in the city	Out-commuting	Residing in the city (working anywhere)
Cedar Rapids	5,266	3,260	2,006	266	2,272
Charles City	(345)	(303)	(42)	16	(26)
Columbus Junction	44	30	14	(7)	7
Coralville	(416)	(523)	107	205	312
Iowa City	(1,657)	(2,000)	343	660	1,003
Mason City	(686)	105	(791)	(256)	(1,047)
Waterloo	(805)	33	(838)	401	(437)
Waverly	(45)	46	(91)	43	(48)

Table 5. Housing data from the 2005–2009 American Community Survey		
	Cedar Rapids	Columbus Junction
Total housing units	58,025–59,163	799–965
Owner-occupied housing units	36,737–38,151	455–607
Median value ($)	$121,503–$123,217	$73,406–$81,379
Units valued under $100,000 (%)	28.7%–31.7%	37.0%–91.4%
Cost-burdened owners (%) – units with a mortgage	14.3%–16.9%	0.9%–9.1%
Cost-burdened owners (%) – units without a mortgage	8.7%–12.3%	0%–9.4%
Homeowner vacancy rate	1.5%–2.9%	0%–6.4%
Renter-occupied housing units	16,118–17,566	161–293
Median rent ($)	$606–$626	$423–$551
Cost-burdened renters (%)	30.6%–35.8%	26.3%–60.3%
Rental vacancy rate	6.0%–9.4%	9.4%–30.8%

high degree of caution. That caution noted, the following example illustrates how LED data might be used to analyze changes in area commuting patterns after a natural disaster or other local economic shock. Table 4 shows changes in local employment, in-commuting flows, out-commuting flows and local workforce size from 2007 to 2009 for all eight study communities.

Housing Units and Housing Need

The US Census Bureau publishes county-level estimates of housing units on an annual basis. Additions to the local housing stock are estimated as three separate components: permitted construction based on building permit data, estimates of unpermitted construction and mobile home shipments. Housing unit losses are estimated using a fixed factor rate determined from a national housing survey. The fixed factor losses include estimates for housing units lost to disasters, although they are not specific to a particular event and represent the average expected loss from disasters rather than actual, localized losses of housing units from disasters. As such, the annual housing unit estimates for a given county are not likely to accurately describe actual changes in the local housing stock after a natural disaster. Local, rather than secondary, sources will likely prove to be the most reliable for measuring the total number of housing units in the community.

Local officials must turn to a relatively new source of data for detailed characteristics of housing and housing need in their communities. The US Census Bureau now conducts a rolling, multiyear survey of households called the American Community Survey (ACS). The ACS has replaced the decennial census long-form questionnaire as the primary mechanism for collecting socioeconomic data in counties and smaller geographic areas. The ACS includes information about the local housing stock and housing needs such as median age and value of homes, median rents, other owner and renter costs, income

characteristics of owners and renters, and so on. Table 5 shows just a few of the ACS data items that might be used for a local housing needs assessment.

The first ACS small-area data set released in October 2010 describes average characteristics during the period from 2005 to 2009. As the ACS sample includes pooled observations from the pre-flood and post-flood period, they cannot be used to discern changes in local housing conditions before and after the 2008 floods.

Data accuracy is perhaps the most important limitation of using ACS data for small-area housing analysis. ACS users must contend with substantial sampling and nonsampling error, as the data are based on a sample survey rather than a complete count, or census. The Census Bureau reports all ACS data with associated margins of error (MOEs) at the 90% level of confidence so that users can gauge the reliability of the estimates. The MOEs may be used to construct a range of possible values for a given variable. The ranges for a given measure can be very wide, especially in less populated areas. As shown in table 5, the confidence intervals for housing measures in Cedar Rapids are narrower than those for the much smaller city of Columbus Junction.

In the future, cities and counties will use ACS data to fulfill many of the data requirements for preparing their consolidated housing plans and many other planning documents. Localities with fewer than 20,000 residents will have access to annually updated ACS data sets that reflect a rolling five-year data collection period. In order to make comparisons of changes over time, the Census Bureau recommends that nonoverlapping time periods be used for analysis. This will limit the utility of the data set for trend analysis in small areas. For example, to evaluate changes in the local housing stock before and after a natural disaster occurring in 2011, a community would use the 2006–2010 ACS data set for the "before" period and would need to wait five more years for an "after" data set describing the 2011–2015 period.

Limitations of Secondary Data Sources for Post-disaster Analysis

There are five key challenges in using secondary data sources to measure the economic consequences of a natural disaster.

1. There is a substantial time lag between the collection and the publication of data measuring local employment, income, population and related measures.
2. The availability of data for small areas such as neighborhoods or cities is quite limited, with much of the data produced only at the county level or higher.
3. Many economic measures are produced only on an annual or quarterly basis. Depending on the magnitude of the event, any short-term effects may have dissipated before the next measurement period occurs.
4. A natural disaster may affect only a fraction of a region's economy, making it very difficult to isolate its effects from the fluctuations associated with ordinary or extraordinary business cycles.
5. Sampling and other types of error associated with survey data might obscure any real changes in the indicators being measured.

Due in part to the data issues mentioned above, analysis of secondary economic data may not reveal evidence of economic disruption of the magnitude expected by community members who experienced the disaster. In most cases, the secondary indicators described in this study failed to identify measurable, lasting changes in area population, employment, or incomes resulting from the 2008 floods. Even where changes appeared to be significant, one cannot conclude that the floods were the causal factor without performing more rigorous statistical procedures.

The appendices to this study provides a more detailed analysis of secondary indicators for the eight study communities.

Economic Modeling

The application of economic modeling techniques provides another option for estimating the long-term economic implications of a natural disaster. Economic models rely upon sets of statistically determined relationships among economic measures of interest. They allow users to simulate a variety of disaster and recovery scenarios to explore their potential impacts on households and other sectors in a region.

The use of an economic model lessens the need for local officials to collect large amounts of primary local data. Models can be constructed using readily available secondary data and they can be built at any time so as to be available in the event of a disaster occurrence. Some modeling systems are available commercially while others can be estimated with relative ease using statistical software packages. Most models can be tailored to meet the specific needs of users.

Economic models can range in complexity from simple, linear regression models to highly complex, multivariate models. Two commonly used types of models are discussed in the next section: input-output models and cross-sectional models.

Input-Output Models

Among the many types of economic models available, input-output models are perhaps the most familiar to local government officials. These models portray the complex supply and demand relationships among industries, households, governments and other final demand sectors for a particular study region. Input-output models are used to explore how changes in productivity, jobs, or incomes in one sector might ripple through to the remainder of the local economy.

Most analysts rely upon commercially available software rather than developing their own input-output models. IMPLAN, produced by MIG, Incorporated, is a widely used input-output software program that enables users to run scenarios that explore the economic impacts of a particular event on the economy of a region.

Input-output models account for three different types of impacts: direct, indirect and induced. The direct impacts measure the change in regional economic activity ensuing from the event itself. For example, if a flood destroyed a small manufacturing firm with 50 workers, and that firm was unable to reopen after the flood, the direct impact of the flood would be a loss of 50 jobs to the regional economy.

Indirect impacts arise from the economic linkages between firms in the region. In the example above, the flood might result in lost sales or layoffs in local firms that supplied inputs to the flooded manufacturing firm. The lost sales or jobs in those supplying firms would be the indirect impacts.

Induced impacts measure the change in area economic activity caused by reductions in household spending. For example, workers in the manufacturing firm and supplying firms who lost their jobs or suffered temporary wage losses would likely reduce their household spending. Those spending reductions would result in lost sales for many types of area businesses and would also have an impact on the regional economy.

The sum of the direct, indirect and induced impacts constitutes the total economic impact of the flood. Given the complexity of the economic relationships within a region, this information would be very difficult to estimate using primary data sources. It is much easier to use a model such as IMPLAN to estimate the impacts, as opposed to collecting information from each directly or indirectly affected firm and worker.

Table 6. Estimated job loss impacts for three flood-related scenarios

Study Area	Scenario 1: Loss of 10 manufacturing jobs	Scenario 2: Loss of 10 trade/service jobs	Scenario 3: Loss of 10 typical households
Benton County	17.8	13.1	4.0
Black Hawk County	16.8	12.6	3.7
Cerro Gordo County	17.7	13.0	4.2
Floyd County	13.0	11.6	2.3
Johnson County	17.9	13.3	3.9
Linn County	19.1	13.5	4.5
Louisa County	14.9	11.2	1.8

Flood Impact Modeling Exercise

The following example illustrates how IMPLAN or another input-output model might be used to assess the economic impacts of three different flood-related loss scenarios in a region.

- Scenario 1 models the estimated direct, indirect and induced job losses that would result from a loss of 10 jobs in manufacturing firms that might typically be found in areas at higher risk for flooding. The mix of firms used for this modeling exercise includes printing, concrete manufacturing firms, machine shops and related fabricated metals firms.
- Scenario 2 models the estimated direct, indirect and induced job losses resulting from a loss of 10 jobs in the local trade and services sector. The mix of firms for this scenario includes motor vehicle and parts suppliers, automotive repair firms, and food and drinking establishments.
- Scenario 3 models the estimated direct, indirect and induced job losses that would occur if 10 typical households moved away from the region. The resulting loss in local income and spending by those households would mean lower sales by local firms and related impacts on supplying firms and workers. For this scenario, the typical household was defined a family with annual household income at the median value for the county.

Table 6 shows the estimated job impacts for these three loss scenarios in the seven study counties. The job losses reflect the total number of jobs that would be lost in each scenario considering its direct, indirect and induced effects. In Scenario 1, for example, the total impact of losing 10 manufacturing jobs in Benton County would be those 10 jobs plus an additional 7.8 linked jobs.

The expected impacts in Benton County would be lower in Scenario 2, where the loss of 10 retail and service jobs would result in losses of just 3.1 additional linked jobs. The values are lower in the retail/service scenario than in the manufacturing scenario because the selected types of retail/service firms typically have weaker linkages with local suppliers and they tend to pay lower wages.

Scenario 3 differs slightly from the first two scenarios because it begins with a reduction in local consumer spending rather than an initial job loss. In Benton County, the model estimates local spending by a typical household in the community supports .4 of one job. Losing 10 households would translate to an expect loss of four jobs in the local economy.

The differences in multiplier values across the study communities can be explained by differences in the size and complexity of their economies. The larger counties have a greater diversity of firms and stronger supply linkages among firms and households within the county. Multiplier values in these counties tend to be higher than in smaller counties, where there is a greater likelihood that economic activity leaks out to supplying firms outside the county.

It is important to note that the results from these three scenarios are not additive. They have been presented side by side only to illustrate the differential impacts across industries and county economies of varying size and complexity. Also, these scenarios assume that the initial economic shock represents net losses after accounting for any offsetting activity or within-region shifting that would likely occur.

Cross-sectional Models

Cross-sectional models are particularly useful for economic analysis in small areas where time series data are scarce. Cross-sectional models are built using data sets with observations from a collection of similar geographic entities such as counties, cities, or census tracts. The models estimate how certain economic or demographic characteristics vary with community size. By exploiting these size relationships, cross-sectional models can be used to simulate a growth or decline scenario in a particular subject community.

Following are some examples of questions that might be addressed using cross-sectional models:

- Labor force impacts: What are the changes in total labor force size and commuting patterns resulting from growth or decline in regional employment?
- Housing impacts: What are the changes in the demand for housing in a region that might result from a change in area employment, population, or household income?
- Fiscal impacts: What are the net changes in local government revenues and expenditures resulting from a change in the local population size?

A highly simplified, two-variable model illustrates the utility of cross-sectional models for post-disaster analysis. For example, to model a housing impact scenario involving a decline in the size of the local labor force, one might construct the following model using actual secondary data tabulated for a cross-section of cities or counties in a state or larger region:

> Occupied Housing Units = ***Estimated Coefficient*** * Local Labor Force Size

In this example, the number of occupied housing units serves as a proxy measure for housing demand. The model hypothesizes that housing demand is dependent upon a city's labor force size. After estimating the unknown coefficient for the labor force term using statistical methods, one could predict the expected reduction in the number of occupied housing units commensurate with a given labor force change.

Housing Demand Modeling Exercise

A natural disaster might affect both the supply of and demand for housing in a region. Both sides of the supply and demand equation are important in understanding post-disaster housing needs. Changes in the physical housing supply can be measured directly using local assessors' data and other sources, as discussed in other components of the housing needs assessment project. Changes in the demand for area housing are much more difficult to measure.

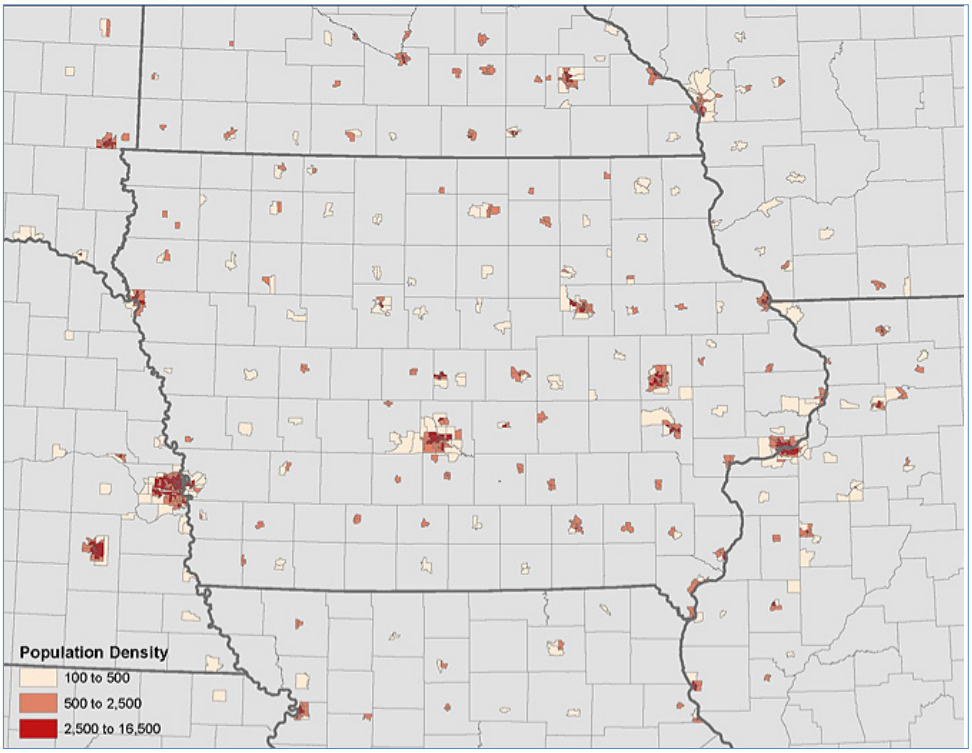
Two key factors are important in explaining the demand for housing in a region: the number of people who desire housing and the amount of income they can spend on housing. Either or both of those factors could be affected by an event that "shocks" or alters the local economy, especially an event involving local job losses.

A housing model was developed for this project to explore how post-flood job losses or gains in the eight study communities may have affected the number of housing units required to satisfy local housing demand. While it is not possible to sort out flood-related and recession-related effects independently, one can estimate their combined effects on local housing demand.

The cross-sectional housing model was estimated using census tract-level data for urbanized areas in Iowa and neighboring states. The study region included census tracts with a minimum population density of 100 persons per square mile. The density threshold of 100 persons per square mile ensured that the model described housing

market conditions in neighborhoods and communities as opposed to sparsely settled rural areas. The study region also included urban areas within 60 miles of Iowa's borders in order to create a more robust model. Figure 7 shows the locations of the selected census tracts.

Figure 7. Study region for cross-sectional housing model



The model estimates the expected change in housing units demanded as a function of local workforce size and other local economic characteristics. Workforce size was selected as the key independent variable because it measures local employment considering net commuting flows. As such, it best describes how economic conditions in a broader region might translate into changes in demand for housing units within a community.

The basic structure of the housing demand model follows:

Equation 1
Occupied units

= f (resident workforce size, vacancy rate, population density, median household income, median housing value, recent population growth rate and percentage of residents 65 years or older)

Equation 2
Vacant units

= f (resident workforce size, population density, median household income, median rent, unemployment rate, worker out-commuting rate, recent population growth rate and percentage of housing units built before 1940)

Equation 1 predicts the expected change in occupied housing units given a change in the local workforce size, with the number of occupied units serving as a proxy for local housing demand. A positive relationship between occupied housing units and workforce size is expected.

Equation 2 predicts a change in the housing vacancy rate given a local workforce change. Here, a negative relationship is expected. If the local workforce size increases, at least some fraction of currently vacant housing units could be occupied by the new worker households. Conversely, if the workforce size decreases, the local housing vacancy rate should increase.

The model was constructed as a simultaneous system, which allowed estimated changes in the vacancy rate to feed back into the housing demand equation. The coefficients were estimated using a three-stage, least-squares method to account for possible correlation of errors across the equations and among the explanatory variables. The model was specified to produce reduced form coefficients, allowing the workforce variable to be manipulated independently of all other variables in the model.

Table 7 shows the results of a modeling scenario for the study communities. In this scenario, each community's workforce size was changed by an amount equal to their actual workforce gain or loss from 2007 to 2009. These values, obtained directly from US Census Bureau Local Employment Dynamics data, are shown in column 1. Column 2 shows the predicted change in overall housing demand obtained from equation 1 in the model. Column 3 shows the predicted change in vacant housing units obtained from equation 2. Subtracting the change in vacant units from the overall demand change yields the expected net demand for new housing units, shown in column 4.

The expected demand for new housing units was positive in four of the study communities: Cedar Rapids,

Columbus Junction, Coralville and Iowa City. The model predicted that a fraction of the new demand would be met by available vacant units; however, some new construction was expected in all four communities. The highest level of activity was expected in Cedar Rapids, where strong employment growth led to an estimated demand for 1,616 new housing units. The model predicted that six new units would be required to meet new housing demand in Columbus Junction. Growth in Iowa City and Coralville translated into an expected demand for 1,315 new units in the two areas combined.

The estimated net demand for new housing units in Charles City, Mason City and Waverly was zero. These cities experienced workforce declines from 2007 to 2009, resulting in lower overall demand for housing and expected increases in the number of vacant units.

Table 7. Results of modeling scenario by city

Study city	Change in number of employed residents	Change in housing units demanded	Change in number of vacant units	Net new housing demand
Cedar Rapids	2,272	1,767	(151)	1,616
Charles City	(26)	(25)	25	–
Columbus Junction	7	7	(1)	6
Coralville	312	235	(20)	215
Iowa City	1,003	862	(73)	789
Mason City	(1,047)	(810)	810	–
Waterloo	(437)	(353)	353	–
Waverly	(48)	(35)	35	–

The results of the modeling exercise suggest that the effects of the national recession may have mitigated post-disaster housing needs in the study communities. Workforce declines in several communities likely reduced local occupancy rates, thus increasing the supply of housing units available to residents displaced by flooding.

It is also possible that weaker housing market conditions related to the recession put downward pressure on housing prices in the study communities, although this was not explicitly addressed within the model. The model could be enhanced by allowing housing prices and rents to vary within the system of equations and feed back into the demand equation, thus acknowledging the two-way relationship between demand levels and prices.

The housing model might also be expanded to explore other dimensions of housing need. For example, the model as specified does not recognize the possible mismatch between the cost of available units and the incomes of residents who require housing. This might be addressed by estimating the demand for low-income or affordable housing separately from all other housing units. Similarly, it might be desirable to distinguish between the demand for rental properties versus the demand for owner-occupied properties.

Limitations of Economic Impact and Other Models for Post-disaster Analysis

Economic impact and other models are based on average relationships among economic measures of interest. By their nature, they fail to account for many unique local characteristics and circumstances. The fact that they abstract from a specific, disaster-affected community can be viewed in both a positive and negative lights. On the up side, models allow the use of outside information to fill in gaps in local information. On the down side, a modeling approach might be criticized for appearing to minimize the losses suffered by individual households and businesses in the community.

Observations and Recommendations

Compilations of direct damages, losses and costs associated with a disaster should not be confused with the economic impact of the disaster on the local economy. Most post-disaster data collection efforts are focused on disaster-affected individuals, households, businesses and governments. They do not survey the broader population or capture offsetting economic activity. Relying on these data alone may lead to exaggerated local perceptions about the scale of the disaster in terms of the broader economy.

Analysis of secondary economic indicators can help to identify notable changes in area economic trends before and after the disaster. Indicators that may be useful for assessing local housing needs include changes in population, public school enrollment, workers' commuting rates, taxable retail sales, unemployment rates, total employment and the composition of local employment change. In this study, a detailed analysis of these indicators failed to find conclusive evidence of lasting effects of the disasters on the study communities, although this does not mean the floods had no effects.

Several challenges associated with the availability and specificity of secondary data may limit their usefulness for documenting specific types of disaster consequences. Variations in the data caused by regular seasonal patterns, long-term business cycles, and other events can mask any disaster-related effects. Rigorous statistical methods

using more detailed data than is currently available would be required to conclusively determine the magnitude of effects on the study communities.

Economic models solve many of the problems associated with trend analysis because they can control for specific factors in local economic performance. Economic models can be used to help local officials understand the possible long-term effects of a natural disaster on regional productivity and well-being. The disadvantages of using models include the cost and effort to develop them, their relative complexity and the fact that they produce generic results. Because they cannot capture unique local circumstances, they may not accurately reflect the actual experiences of disaster-affected communities. Their greatest utility may be in pre-disaster planning as opposed to post-disaster evaluation.

Absent strong evidence of net local employment losses, population losses, or household income losses, a detailed economic impact or related assessment may not be warranted after a disaster. If local officials do choose to pursue an economic impact analysis, they should be prepared for the possibility that no impact may be detected using available data and modeling techniques.

Regardless of the method chosen, any economic analysis of disaster-affected communities should be supplemented with local, primary data collection in order to identify groups with particular housing or other needs.

Appendix 1. Cedar Rapids/Linn County Economic Impact Analysis

Overview of the Study Area

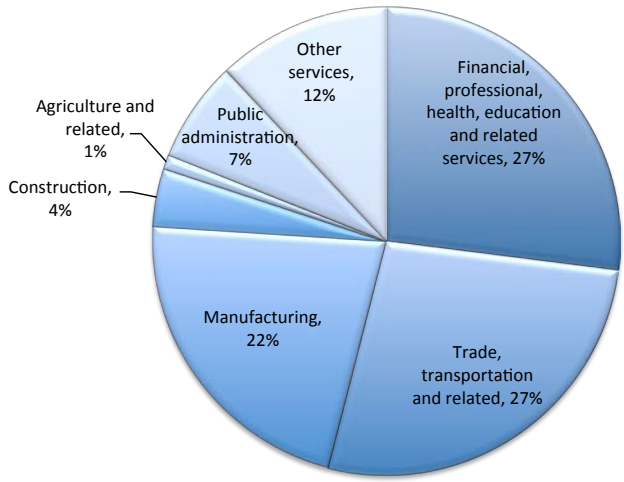
The city of Cedar Rapids, Iowa, had 126,326 residents in 2010. The city's population grew by 4.6% from 2000 to 2010, faster than the statewide average rate of 4.1%. The number of housing units in Cedar Rapids increased by 9.5% from 2000 to 2010, reaching 57,217 total units in 2010. Housing unit growth for the state of Iowa averaged 8.4% for the decade.

Cedar Rapids is located in Linn County, which is the core of a three-county metropolitan statistical area (MSA) that also includes the counties of Benton and Jones. Linn County had 211,226 residents in 2010, while the entire Cedar Rapids MSA had 257,940 residents. Linn County experienced population growth of 10.2% and housing unit growth of 14.5% from 2000 to 2010.

Economic Characteristics

The Linn County economy is highly diversified. Figure 1 illustrates the county's percentage of gross regional product by major industry group.[1] The manufacturing sector contributes 22% of gross product in the county. Professional and high-value services such as finance, insurance, health care and education contribute 27% of gross regional product. Trade, transportation and related industries constitute 27% of the county's economy.

Figure 1. Gross regional product for Linn County



Source: IMPLAN model of the Linn County economy, Iowa State University

[1]Gross regional product, also referred to as value added, includes all labor income, profits and payments to government.

Commuting flow data for Cedar Rapids attest to the city's importance as a regional employment center. Residents from other communities hold nearly 60% of the jobs in the city. The city of Marion supplies 8.9% of workers in Cedar Rapids, followed by Hiawatha (2.4%) and Iowa City (2.3%). Figure 2 shows the total inflow and outflow job counts for Cedar Rapids in 2009.

Figure 1. Inflow/outflow job counts for 2009

Source: Local Employment Dynamics, US Census Bureau

Cedar Rapids also serves as a major center for retail and service activity. Taxable retail sales data from the Iowa Department of Revenue show that Cedar Rapids averaged $22,800 in taxable, per capita sales in fiscal year 2009, compared to an average of $11,200 for the state of Iowa. After adjusting for local income differentials, the ratio of city and state per capita sales yields a pull-factor ratio of 1.94, suggesting that Cedar Rapids serves a retail customer base that is 94% larger than its own population size.

Housing Characteristics

Table 1 summarizes key housing characteristics for Cedar Rapids. Except where noted, the data were obtained from 2005–2009 American Community Survey (ACS) estimates produced by the US Census Bureau.[2] The ACS values reflect average characteristics during the entire 2005–2009

[2]ACS estimates are presented with 90% confidence intervals, meaning there is a 90% likelihood that the true value for the population falls within the range of values shown.

period; thus, they include both pre-flood and post-flood housing conditions.

ACS data suggest that the median value of homes in Cedar Rapids ranges from about $121,500 to $125,000. Between 14 and 17% of owner-households with a mortgage have monthly housing costs exceeding 35% of their household income. About 31–36% of renter-households have monthly housing costs that exceed 35% of their incomes. The city's housing-unit vacancy rate of 7.0% was lower than the statewide average of 8.6%, according to 2010 Census data.

Flood Risk Exposure (Prior to 2008)

Figure 3 shows the relative exposure to flood risk in Linn County by population group and housing type prior to the 2008 floods. The chart compares the percentage of county population, housing and jobs that were located in high-risk census blocks. For this analysis, census blocks having more than 75% of their total land area located within a 500-year floodplain were designated as high-risk blocks. Block-level population and housing data were obtained from the 2000 Census. Job counts for 2007 were obtained from Local Employment Dynamics data from the US Census Bureau.

Overall, fewer than 4% of Linn County residents lived in census blocks with high exposure to flood risk. Residents belonging to one or more racial or ethnic minority groups had a higher exposure to flood risk compared to the non-Hispanic white population. A slightly higher fraction of the county's vacant housing units and renter-occupied units were located within at-risk blocks compared to other types of housing. The percentage of Linn County jobs located within the flood risk areas exceeded 10% in 2007.

Table 1. Key housing characteristics for Cedar Rapids compared to the state of Iowa

Measure	Cedar Rapids	State of Iowa
Total population (2010 Census)	126,326	3,046,355
Race other than white alone (%)	12.0	8.7
Hispanic origin of any race (%)	3.3	5.0
Total housing units (2010 Census)	57,217	1,336,417
Vacant units (%)	7.0	8.6
Owner-occupied units (%)	63.5	65.9
Renter-occupied units (%)	29.6	25.5
Housing units by type of structure (%)		
1 unit, detached	63.5–65.5	73.6–74.0
1 unit, attached	2.5–3.3	3.1–3.3
2 units	2.1–2.9	2.6–2.8
3 or 4 units	4.8–6.0	3.6–3.8
5 to 9 units	5.1–6.5	3.6–3.8
10 to 19 units	7.3–8.7	3.7–3.9
20 or more units	6.4–7.8	4.7–4.9
Mobile home	3.4–4.2	4.1–4.3
Boat, RV, van, etc.	0.0–0.1	0.0–0.1
Housing units built before 1940 (%)	18.8–20.6	28.7–29.1
Value of owner-occupied units (%)		
Less than $50,000	5.7–7.3	12.1–12.5
$50,000 to $99,999	22.4–25.0	28.8–29.4
$100,000 to $149,999	36.5–39.5	24.4–24.8
$150,000 to $199,999	15.2–17.4	15.2–15.6
$200,000 to $299,999	9.9–11.5	11.6–12.0
$300,000 to $499,999	3.3–4.3	5.0–5.2
$500,000 to $999,999	0.6–1.0	1.3–1.5
$1,000,000 or more	0.0–0.2	0.2–0.4
Median value of owner-occupied units ($)	121,503–124,897	115,292–116,308
Median gross rent ($)	606–646	603–611
Monthly housing costs exceeding 35% of income		
Owners with a mortgage (%)	14.3–16.9	16.6–17.2
Owners with no mortgage (%)	8.7–12.3	9.0–9.4
Renters (%)	30.6–35.8	35.1–36.3

Sources: 2010 Census and 2005–2009 American Community Survey, US Census Bureau

Indicators of Post-flood Economic Performance

The following sections compare indicators of local economic performance before and after the 2008 floods. Trends in population, enrollment and commuting patterns are examined for evidence of changes in residential location preferences in the region. Retail sales trends are investigated to detect changes in area household spending and the ability of local firms to capture that spending. Unemployment and employment trends are analyzed to gauge the region's general economic performance.

Population Change

Changes in the local population size have important implications for a community's housing needs. Local population size is very difficult to measure accurately, and local officials generally rely on the most recent decennial census for the most accurate information about their population size.

Figure 4 shows recent population trends for the city of Cedar Rapids. One data series shows actual decennial census counts for 2000 and 2010 with an imputed trend line for the intervening years. The second series plots annual population estimates produced by the US Census Bureau. Although subject to error, the Census Bureau's annual estimates can be used to discern changes in the pace of growth throughout the decade.

The annual population estimates for Cedar Rapids suggest that population growth in the city accelerated after 2004. There were no indications of a flood-related population decline in the estimated series. As revealed by the 2010 Census results, however, the annual estimates series slightly overpredicted the actual increase of 5,568 residents from 2000 to 2010.

School Enrollment

Housing losses and uncertainty over housing assistance during the 2008 floods raised fears that displaced residents would permanently relocate to surrounding suburbs or other nearby cities. If young families relocated en masse to surrounding communities, these shifts should be evident in enrollment data for area school districts.

Figure 5 shows the trend in public school enrollment for the Cedar Rapids public school district. The enrollment trends for neighboring school districts (within five miles) and for the state of Iowa are also illustrated. For each region, enrollment values in a given year are expressed in percentage terms compared to enrollment levels in the 2000–2001 academic year. The enrollment data were obtained from the Iowa Department of Education Basic Educational Data Survey.

Enrollment in the Cedar Rapids school district has been trending downward gradually since 2003, while surrounding school districts have seen rapid enrollment growth. Both areas have outperformed the average school district in Iowa in terms of enrollment change during the

Figure 3. Linn County: percentage of county populations, households and housing units with high risk for flooding

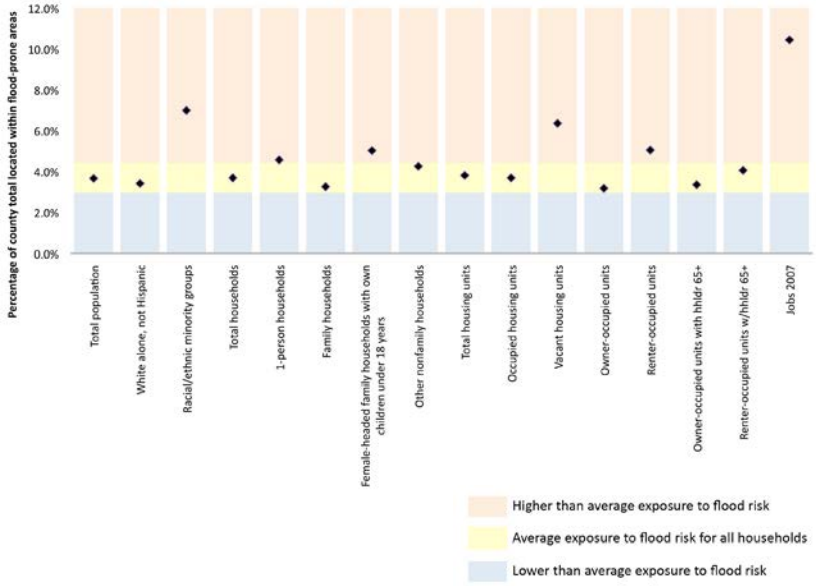
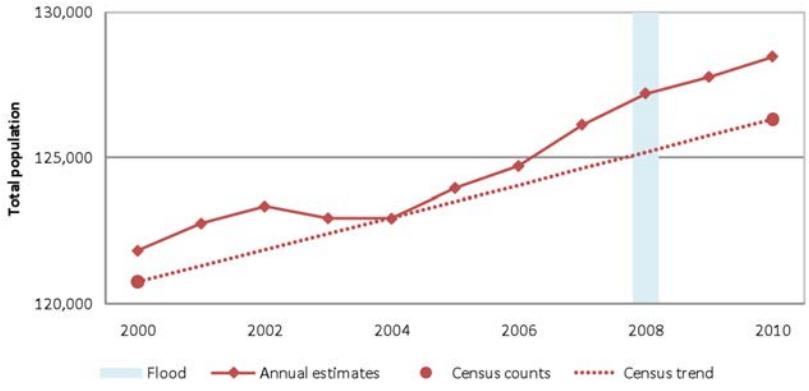


Figure 4. Cedar Rapids estimated and actual population



last decade. Enrollment changes since 2008 have not deviated sharply from recent historical trends, either in Cedar Rapids or the surrounding districts.

Area Commuting Patterns

Changes in the availability and affordability of local housing may have influenced local workers' commuting decisions. Data on the residential locations of Cedar Rapids workers can be used to detect any notable changes in the propensity for workers to live outside the city and commute to work as opposed to residing and working within the city.

Figure 6 illustrates the recent trend in in-commuting rates to Cedar Rapids. The chart measures the percentage of all jobs in Cedar Rapids that are filled by workers who, for one reason or another, live outside of the city. The commuting data were obtained from the US Census Bureau Local Employment Dynamics program.

In Cedar Rapids, the percentage of jobs filled by in-commuters had been trending upward for several years before the 2008 floods, reaching about 59% in 2007. The increased in-commuting to Cedar Rapids corresponds with population growth in the greater Cedar Rapids metropolitan area. Between 2007 and 2009, there appears to be no significant change in the likelihood that Cedar Rapids jobs were filled by nonresidents as opposed to residents.

Retail Trade

The local retail sector could have a mixed experience from a natural disaster. Any losses in local jobs and population could mean a reduction in area household incomes, leading to a decline in local retail sales. Alternatively, rebuilding and recovery efforts could temporarily stimulate the local retail sector. The magnitude of losses or gains would depend on the extent to which the local retail sector was already capturing or leaking sales of the region's residents before the disaster occurred.

Figure 5. Annual public school district enrollment

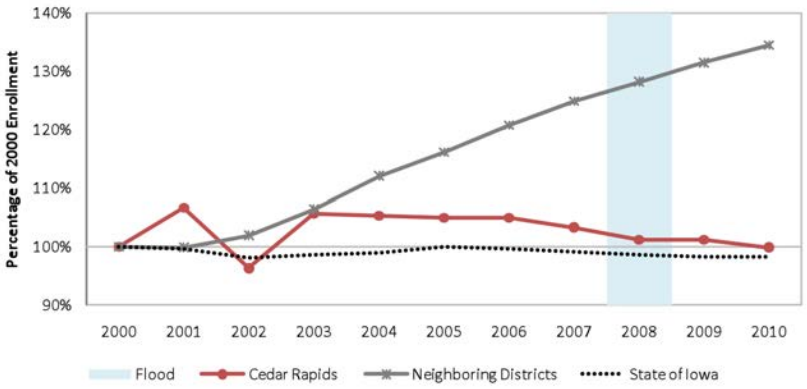


Figure 6. Annual rates of in-commuting by workers

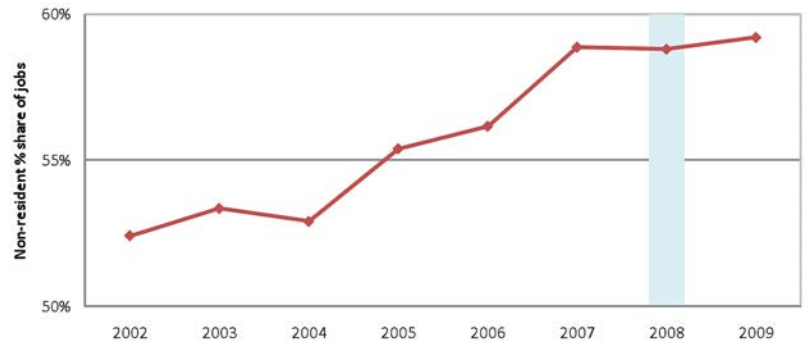


Figure 7. Quarterly taxable retail sales

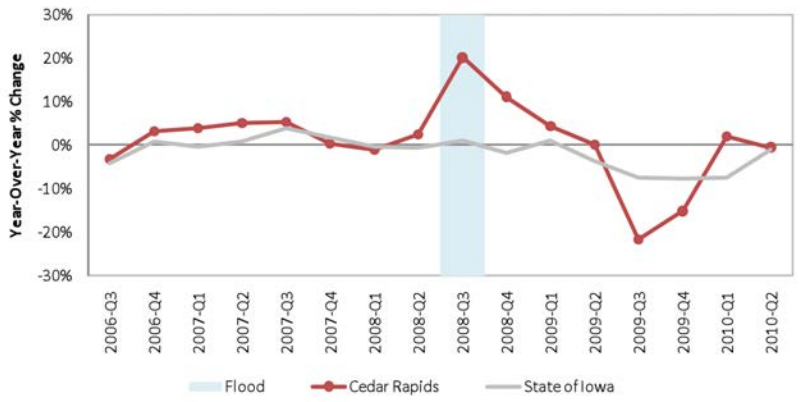


Figure 7 illustrates changes in taxable retail sales activity in Cedar Rapids during the eight quarters prior and subsequent to the period of flooding. The trend in retail sales for the state of Iowa is included for comparison. The chart shows real taxable retail sales in each quarter as a percentage of sales that occurred during the same quarter of the prior year. The taxable sales data were obtained from the Iowa Department of Revenue and Finance.

July–September retail sales in Cedar Rapids during the flood year were 20% higher than the year before. It is reasonable to assume that the city's strong retail performance during the third and fourth quarters of 2008 was related to flood recovery efforts. As a major center for retail trade activity in the surrounding region, Cedar Rapids and its merchants likely enjoyed a temporary boost in sales to residents of a much broader flood-affected region.

The statewide trend in sales suggests that by the second quarter of 2009, the effects of the national recession were beginning to be felt in Iowa's retail sector. Sales in Cedar Rapids declined as well, beginning in the third quarter of 2009. Sales in that period were 20% lower than the high levels achieved right after the floods. By the end of the second year following the flood, the city's trend was on track with the statewide average.

Unemployment Rate

Business disruptions and failures may have contributed to temporary and permanent layoffs of workers in the region. While many job losses would have been covered by regular or emergency unemployment insurance programs, others may not have been. Rising unemployment rates can signal higher levels of household economic stress and may also correspond with growing numbers of households experiencing difficulty in meeting their monthly housing costs.

Figure 8 shows the monthly unemployment rate in Linn County for two years prior to and after the period of flooding. The unemployment data were obtained from the US Bureau of Labor Statistics (BLS).

In order to compare Linn County to its peers, the average unemployment rate for other small metropolitan counties in Iowa is also shown. The peer group includes the following counties: Benton, Black Hawk, Bremer, Dubuque, Grundy, Johnson, Jones, Linn, Story, Washington and Woodbury.

Linn County's unemployment rate has closely tracked the pattern of change in other small metropolitan counties in Iowa. Since the floods, the unemployment rate in Linn County has slightly exceeded the peer group average.

Figure 8. Monthly unemployment rates

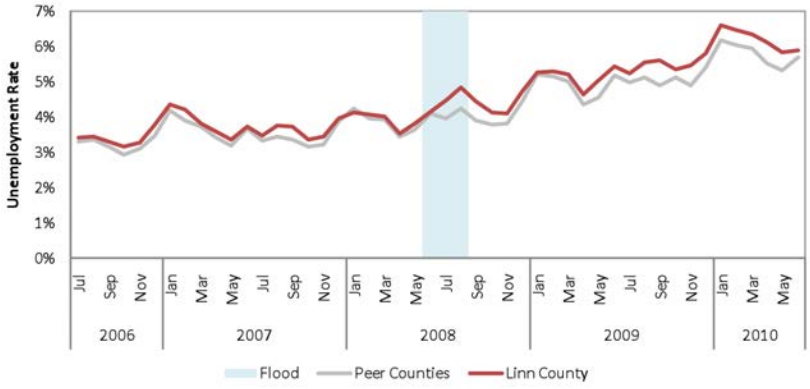
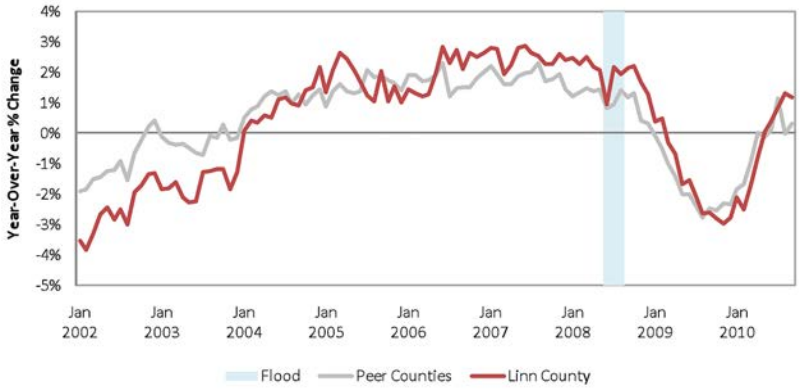


Figure 9. Monthly employment rates



Employment Change

Employment levels can be used to evaluate the overall performance of the local economy during and after the disaster period. Because employment levels have a high degree of seasonal variability, changes in employment trends are more easily detected by comparing employment in each month to the same month in the prior year.

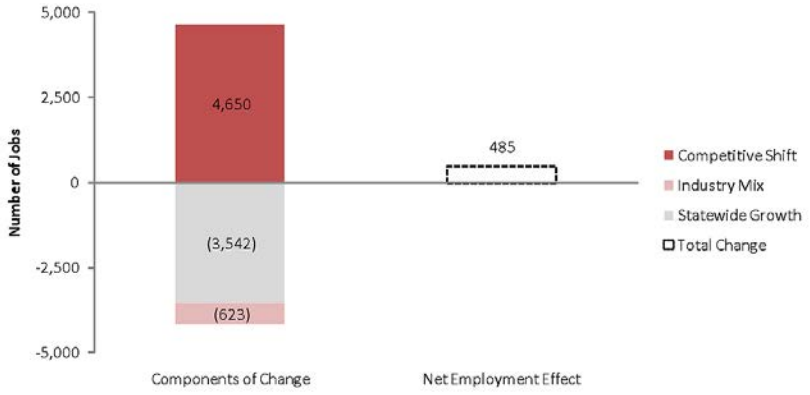
Figure 9 shows year-over-year percentage changes in Linn County employment and its comparison peer group (see section on unemployment in the summary report for a definition of the peer group). The employment data were obtained from the US BLS Quarterly Census of Employment and Wages.

Linn County enjoyed year-over-year gains in employment for a five-year period beginning early in 2004 and ending late in 2008. The county's employment trend suggests a brief flood-related decline in June 2008, although employment in that month was still higher compared to the prior year. The county began to experience year-over-year declines early in 2009, slightly later than the comparison peer group. The pattern of these employment

declines suggests that they were recession-related as opposed to flood-related. Employment growth in Linn County and its peer group resumed in mid-2010.

Figure 9 shows the timing and magnitude of employment change, but not the reasons for change. It cannot be concluded whether employment changes during and after the flooding were attributable to the flood itself, the recession, or other local or external causes. Using a method called shift-share analysis, one can attempt to isolate changes explained by local factors by controlling for external economic influences.

Figure 10. Shift-share analysis of employment change in Linn County, 2007–2009



Shift-share analysis deconstructs job gains or losses into three explanatory components: statewide growth, industry mix and local competitive share. The statewide growth component provides an expected value for employment growth based on the average performance of all nonfarm industries across the state. Industry mix accounts for local concentrations of employment in sectors that, at the statewide level, outperformed or underperformed the nonfarm industry average. The competitive share component measures the performance of local firms in comparison to other firms in the same industries in other counties.

Figure 10 shows a competitive shift-share analysis for employment change in Linn County from 2007–2009. The industry-level employment data used for this analysis were obtained from the US Bureau of Economic Analysis.

Had all industries in Linn County performed at the statewide nonfarm average rate, the county would have lost 3,542 jobs from 2007 to 2009. The industry mix in Linn County was weighted slightly toward industries that performed worse than the nonfarm average rate. Given that industrial mix, an additional loss of 623 jobs from the county could have been expected.

The county actually gained 485 jobs for the period, suggesting that the industries in Linn County performed better than their statewide counterparts. The county's positive competitive shift component was equivalent to 4,650 jobs. This analysis shows that the competitiveness of the Linn County economy remained strong relative to the rest of the state, despite the 2008 floods.

Summary of Recent Economic and Demographic Trends

This analysis did not identify significant changes in regional economic activity that could be attributed solely to the weather-related disasters of 2008. Despite substantial losses experienced by individual households and businesses, the overall performance of the Cedar Rapids/Linn County economy did not show evidence of lasting structural change. Cedar Rapids showed a strong but temporary boost in retail trade in the months after the flood. Population growth in the city has been strong, and employment growth during the recent national recession exceeded expected levels given the county's industrial structure.

Appendix 2. Charles City/Floyd County Economic Impact Analysis

Overview of the Study Area

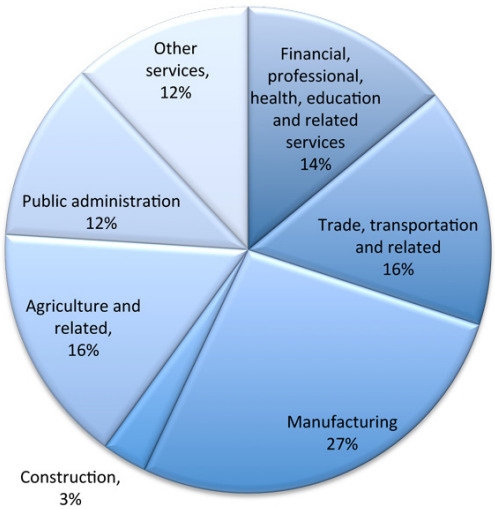
The city of Charles City, Iowa, had 7,652 residents in 2010. The city's population declined by 2.0% from 2000 to 2010, compared to a statewide average growth rate of 4.1%. The number of housing units in Charles City increased by 4.6% from 2000 to 2010, reaching 3,761 total units in 2010. Housing unit growth for the state of Iowa averaged 8.4% for the decade.

Charles City is located in Floyd County, a nonmetropolitan county with a population of 16,303 residents in 2010. The county experienced a population decline of 3.5% and housing unit growth of 2.9% from 2000 to 2010.

Economic Characteristics

The Floyd County economy is strongly influenced by industries related to agriculture and manufacturing activity. Figure 1 illustrates the county's percentage of gross regional product by major industry group.[1] The manufacturing sector contributes 27% of gross product in the county. Agriculture and related activities contribute 16% of gross regional product. Trade, transportation and related industries constitute another 16% of the county's economy.

Figure 1. Gross regional product for Floyd County

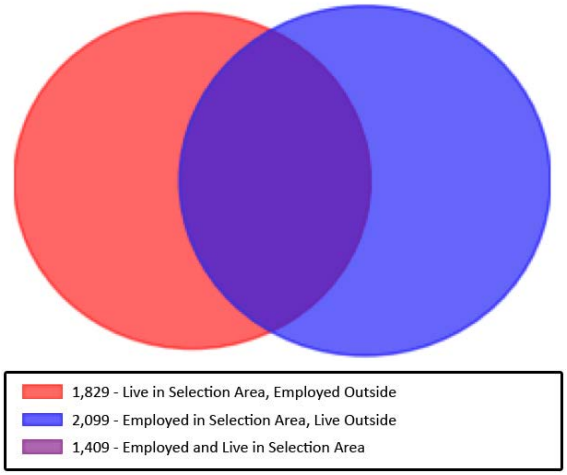


Source: IMPLAN model of the Floyd County economy, Iowa State University

[1]Gross regional product, also referred to as value added, includes all labor income, profits and payments to government.

Commuting flow data for Charles City show the city's dependence on the surrounding region for its supply of workers and for employment opportunities for its own residents. About 56% of Charles City residents commute elsewhere to work. An even larger number of workers commute into the city, accounting for 60% of jobs in Charles City. The largest worker inflows originate from Mason City, which supplies 2.7% of workers in Charles City, followed by Nashua (1.5%) and New Hampton (1.3%). Figure 2 shows the total inflow and outflow job counts for Charles City in 2009.

Figure 2. Inflow/outflow job counts for 2009



Source: Local Employment Dynamics, US Census Bureau

Charles City also serves as a regional center for retail and service activity. Taxable retail sales data from the Iowa Department of Revenue show that Charles City averaged $11,300 in per capita sales in fiscal year 2009, compared to an average of $11,200 for the state of Iowa. After adjusting for local income differentials, the ratio of the city and state per capita sales values yields a pull-factor ratio of 1.06, suggesting that Charles City serves a retail customer base that is 6% larger than its own population size.

Housing Characteristics

Table 1 summarizes key housing characteristics for Charles City. Except where noted, the data were obtained from 2005–2009 American Community Survey (ACS) estimates produced by the US Census Bureau.[2] The ACS

[2]ACS estimates are presented with 90% confidence intervals, meaning there is a 90% likelihood that the true value for the population falls within the range of values shown.

values reflect average characteristics during the entire 2005–2009 period; thus, they include both pre-flood and post-flood housing conditions.

ACS data suggest that the median value of homes in Charles City ranges from about $75,000 to $87,000. Between 9 and 21% of owner-households with a mortgage have monthly housing costs exceeding 35% of their household income. About 26–48% of renter-households have monthly housing costs that exceed 35% of their incomes. The city's housing unit vacancy rate of 8.5% was very close to the statewide average, according to 2010 Census data.

Flood Risk Exposure (Prior to 2008)

Figure 3 shows the relative exposure to flood risk in Floyd County by population group and housing type prior to the 2008 floods. The chart compares the percentage of county population, housing and jobs that were located in high-risk census blocks. For this analysis, census blocks having more than 75% of their total land area located within a 500-year floodplain were designated as high-risk blocks. Block-level population and housing data were obtained from the 2000 Census. Job counts for 2007 were obtained from Local Employment Dynamics data from the US Census Bureau.

Overall, about 7% of Floyd County residents lived in census blocks with high exposure to flood risk. Residents belonging to one or more racial or ethnic minority groups had a slightly higher exposure to flood risk compared to the non-Hispanic white population. Female-headed family households with children, nonfamily households with more than one resident, and owner-occupied homes with elderly householders had a higher exposure than other types of households. The fraction of housing units and jobs located in the high-risk blocks averaged between 7 and 8%.

Table 1. Key housing characteristics for Charles City compared to the state of Iowa

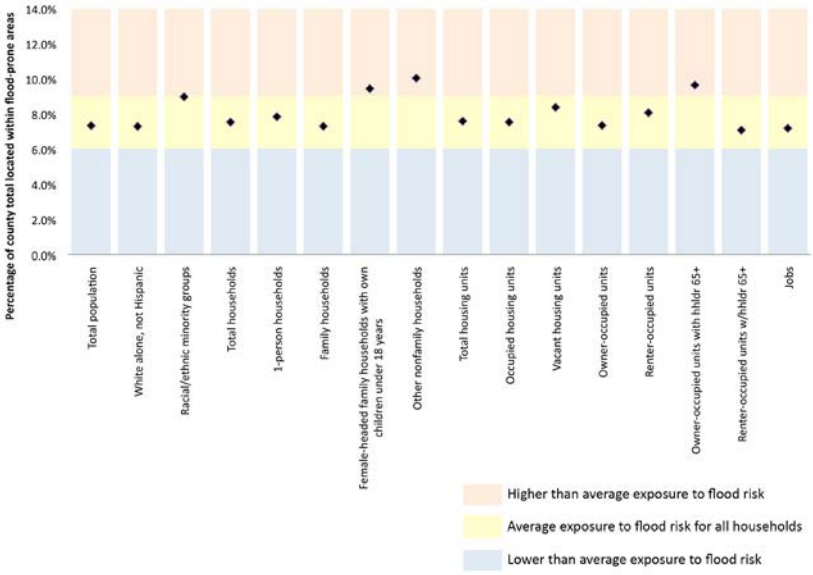
Measure	Charles City	State of Iowa
Total population (2010 Census)	7,652	3,046,355
Race other than white alone (%)	7.3	8.7
Hispanic origin of any race (%)	2.6	5.0
Total housing units (2010 Census)	3,761	1,336,417
Vacant units (%)	8.5	8.6
Owner-occupied units (%)	58.5	65.9
Renter-occupied units (%)	33.0	25.5
Housing units by type of structure (%)		
1 unit, detached	70.8–78.8	73.6–74.0
1 unit, attached	0.0–2.4	3.1–3.3
2 units	2.5–7.3	2.6–2.8
3 or 4 units	4.4–10.2	3.6–3.8
5 to 9 units	1.8–6.6	3.6–3.8
10 to 19 units	0.4–5.2	3.7–3.9
20 or more units	2.3–6.7	4.7–4.9
Mobile home	0.0–0.8	4.1–4.3
Boat, RV, van, etc.	0.0–0.6	0.0–0.1
Housing units built before 1940 (%)	28.4–38.2	28.7–29.1
Value of owner-occupied units (%)		
Less than $50,000	11.0–19.4	12.1–12.5
$50,000 to $99,999	48.7–60.3	28.8–29.4
$100,000 to $149,999	36.5–39.5	24.4–24.8
$150,000 to $199,999	14.4–23.8	15.2–15.6
$200,000 to $299,999	5.2–11.8	11.6–12.0
$300,000 to $499,999	0.0–1.0	5.0–5.2
$500,000 to $999,999	0.0–1.1	1.3–1.5
$1,000,000 or more	0.0–1.0	0.2–0.4
Median value of owner-occupied units ($)	74,978–86,822	115,292–116,308
Median gross rent ($)	384–434	603–611
Monthly housing costs exceeding 35% of income		
Owners with a mortgage (%)	9.1–21.3	16.6–17.2
Owners with no mortgage (%)	2.3–12.3	9.0–9.4
Renters (%)	25.8–47.6	35.1–36.3

Sources: 2010 Census and 2005–2009 American Community Survey, US Census Bureau

Indicators of Post-flood Economic Performance

The following sections compare indicators of local economic performance before and after the 2008 floods. Trends in population, enrollment and commuting patterns are examined for evidence of changes in residential location preferences in the region. Retail sales trends are investigated to detect changes in area household spending and the ability of local firms to capture that spending. Unemployment and employment trends are analyzed to gauge the region's general economic performance.

Figure 3. Floyd County: percentage of county populations, households and housing units with high risk for flooding

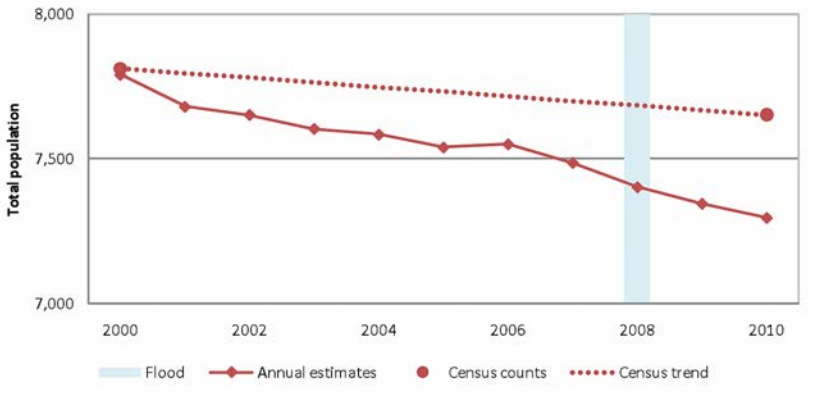


Population Change

Changes in the local population size have important implications for a community's housing needs. Local population size is very difficult to measure accurately, and local officials generally rely on the most recent decennial census for the most accurate information about their population size.

Figure 4 shows recent population trends for the city of Charles City. One data series shows actual decennial census counts for 2000 and 2010 with an imputed trend line for the intervening years. The second series plots annual population estimates produced by the US Census Bureau. Although subject to error, the Census Bureau's annual estimates can be used to discern changes in the pace of growth throughout the decade.

Figure 4. Charles City estimated and actual population



The annual population estimates for Charles City suggest that more rapid population loss occurred after 2006 than in the early part of the decade. There were no indications of a change in the trend after the floods. As revealed by the 2010 Census results, however, the annual estimates series overpredicted the city's population losses for the decade as a whole.

School Enrollment

Housing losses and uncertainty over housing assistance during the 2008 floods raised fears that displaced residents would permanently relocate to surrounding suburbs or other nearby cities. If young families relocated en masse to surrounding communities, these shifts should be evident in enrollment data for area school districts.

Figure 5 shows the trend in public school enrollment for the Charles City public school district. The enrollment trends for neighboring school districts (within five miles) and for the state of Iowa are also illustrated. For each region, enrollment values in a given year are expressed in percentage terms compared to enrollment levels in the 2000–2001 academic year. The enrollment data were obtained from the Iowa Department of Education Basic Educational Data Survey.

Enrollment in the Charles City school district has been trending downward gradually since 2003, while surrounding school districts have seen more rapid enrollment declines. Both areas have underperformed the statewide average enrollment trend during the last decade. Enrollment changes since 2008 appear consistent with

the longer-term trend in Charles City. The neighboring districts saw a slight interruption in their downward trend for the 2008–2009 academic year, but their enrollment declines resumed the following year.

Area Commuting Patterns

Changes in the availability and affordability of local housing may have influenced local workers' commuting decisions. Data on the residential locations of Charles City workers can be used to detect any notable changes in the propensity for workers to live outside the city and commute to work as opposed to residing and working within the city.

Figure 6 illustrates the recent trend in in-commuting rates to Charles City. The chart measures the percentage of all jobs in Charles City that are filled by workers who, for one reason or another, live outside of the city. The commuting data were obtained from the US Census Bureau Local Employment Dynamics program.

In Charles City, the percentage of jobs filled by in-commuters had hovered in the mid-50s before jumping to about 62% in 2007. Between 2007 and 2009, there was a slight decline in the percentage of Charles City jobs that were filled by nonresidents as opposed to residents.

Retail Trade

The local retail sector could have a mixed experience from a natural disaster. Any losses in local jobs and population could mean a reduction in area household incomes, leading to a decline in local retail sales. Alternatively, rebuilding and recovery efforts could temporarily stimulate the local retail sector. The magnitude of losses or gains would depend on the extent to which the local retail sector was already capturing or leaking sales of the region's residents before the disaster occurred.

Figure 7 illustrates changes in taxable retail sales activity in Charles City during the eight quarters prior and subsequent to the period of flooding. The statewide trend in retail sales is included for comparison. The chart shows real taxable retail sales in each quarter as a percentage of sales that occurred during the same quarter of the prior year. The taxable sales data were obtained from the Iowa Department of Revenue and Finance.

Charles City posted a retail sales decline of 4.5% for the third quarter of 2008, meaning that sales during July–September of the flood year were 4.5% lower than the year before. The city had already been experiencing year-over-year sales declines since the last quarter of 2007. There is no flood-related boost or decline evident in the quarterly sales data for Charles City.

Figure 5. Annual public school district enrollment

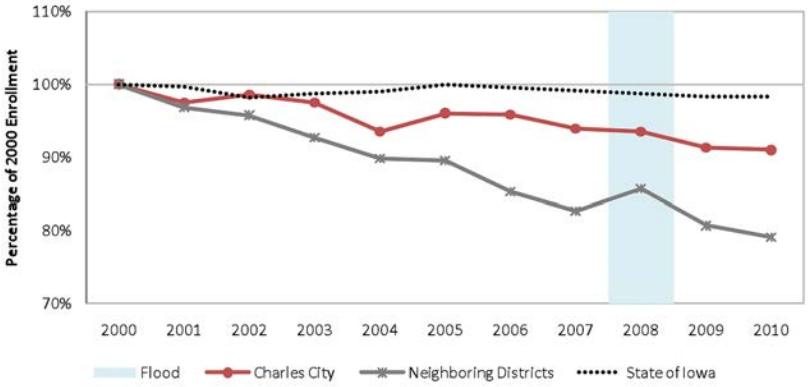


Figure 6. Annual rates of in-commuting by workers

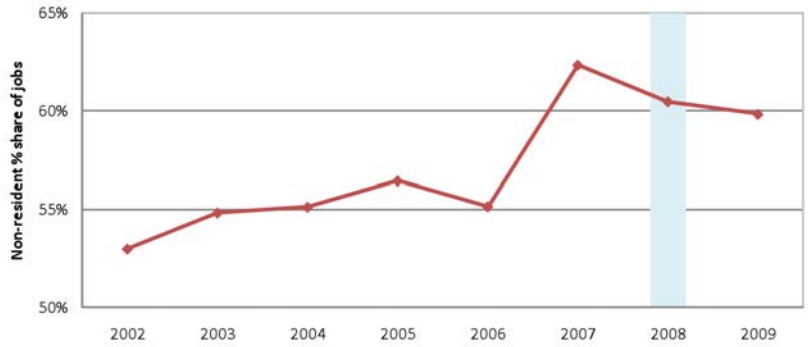
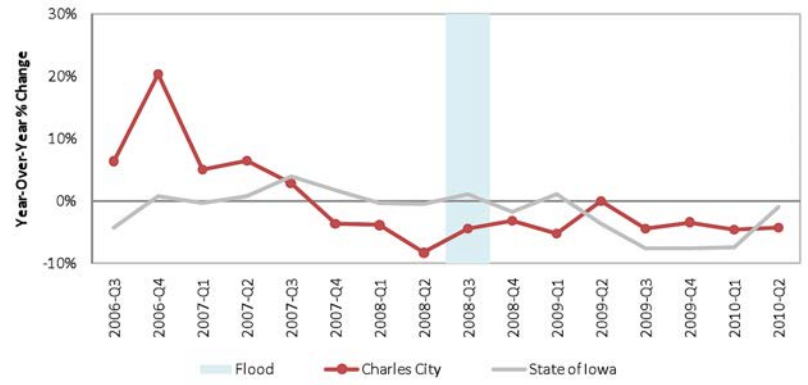


Figure 7. Quarterly taxable retail sales



Iowa's retail sales growth was relatively flat during the two years preceding the floods. Persistent statewide declines began in the second quarter of 2009, suggesting that recessionary effects on household spending were beginning to be felt in the state's retail sector. Since that time, neither Charles City nor the state experienced retail growth on a year-over-year basis.

Unemployment Rate

Business disruptions and failures may have contributed to temporary and permanent layoffs of workers in the region. While many job losses would have been covered by regular or emergency unemployment insurance programs, others may not have been. Rising unemployment rates rate can signal higher levels of household economic stress and may also correspond with growing numbers of households experiencing difficulty in meeting their monthly housing costs.

Figure 8 shows the monthly unemployment rate in Floyd County for two years prior to and after the period of flooding. The unemployment data were obtained from the US Bureau of Labor Statistics (BLS).

Figure 8. Monthly unemployment rates

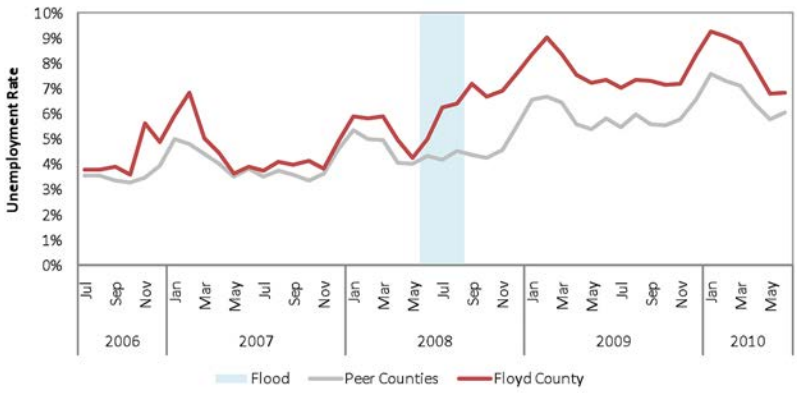
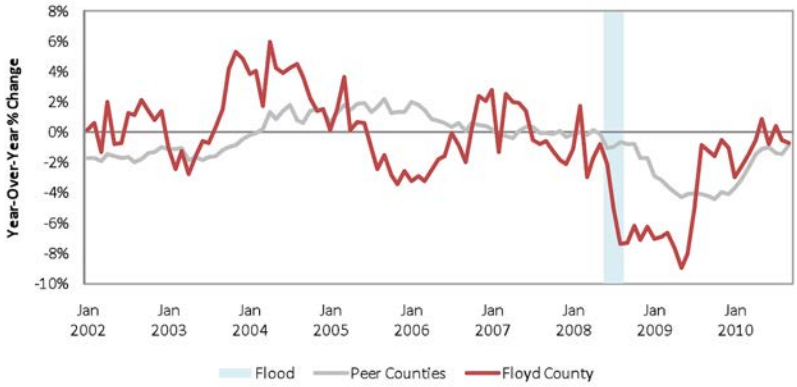


Figure 9. Monthly employment rates



In order to provide context for Floyd County's performance, the average unemployment rate for a group of similarly-sized nonmetropolitan counties in Iowa is also shown.[3]

Floyd County's unemployment closely tracked the pattern of change in its peer group prior to mid-2008. The county's trend began to deviate from the peer group in June 2008. Since that time, the unemployment rate in Floyd County has exceeded the peer group average.

Employment Change

Employment levels can be used to evaluate the overall performance of the local economy during and after the disaster period. Because employment levels have a high degree of seasonal variability, changes in employment trends are more easily detected by comparing employment in each month to the same month in the prior year.

Figure 9 shows year-over-year percentage changes in Floyd County employment and its comparison peer group (see section on unemployment in the summary report for a definition of the peer group). The employment data were obtained from the US BLS Quarterly Census of Employment and Wages.

Floyd County's employment trend was more cyclical than its peer group for most of the period illustrated below. The county experienced year-over-year employment gains from mid-2003 into 2005, followed by declines through most of 2006. After brief periods of gain in 2007, the county's employment growth sputtered in 2008. Strong declines coincided with the period of flooding in 2008; however, steep year-over-year losses continued well into 2009. The magnitude and duration of the post-flood employment losses suggests that they were recession-related as opposed to flood-related. The county's employment trend has more closely followed its peer group since early 2010, and the county posted slight gains in May 2010.

Figure 9 shows the timing and magnitude of employment change, but not the reasons for change. It is not possible to conclude whether employment changes during and

[3]The peer group includes the counties of Boone, Buchanan, Carroll, Cass, Cedar, Cherokee, Chickasaw, Clarke, Crawford, Delaware, Fayette, Floyd, Franklin, Greene, Hamilton, Hardin, Henry, Jackson, Jasper, Jefferson, Lucas, Marion, Monona, Montgomery, Page, Plymouth, Poweshiek, Shelby, Sioux, Tama, Union and Winneshiek.

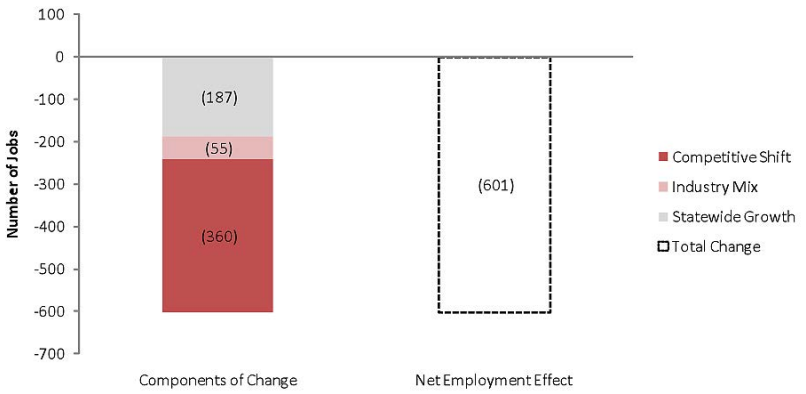
after the flooding were attributable to the flood itself, the recession, or other local or external causes. Using a method called shift-share analysis, one can attempt to isolate changes explained by local factors by controlling for external economic influences.

Shift-share analysis deconstructs job gains or losses into three explanatory components: statewide growth, industry mix and local competitive share. The statewide growth component provides an expected value for employment growth based on the average performance of all nonfarm industries across the state. Industry mix accounts for local concentrations of employment in sectors that, at the statewide level, outperformed or underperformed the nonfarm industry average. The competitive share component measures the performance of local firms in comparison to other firms in the same industries in other counties.

Figure 10 shows a competitive shift-share analysis for employment change in Floyd County from 2007 to 2009. The industry-level employment data used for this analysis were obtained from the US Bureau of Economic Analysis.

Had all industries in Floyd County performed at the statewide nonfarm average rate, the county would have lost 187 jobs from 2007 to 2009. The industry mix in Floyd County was weighted slightly toward industries that performed worse than the nonfarm-industry average in Iowa. Given that industrial mix, an additional loss of 55 jobs from the county could have been expected.

Figure 10. Shift-share analysis of employment change in Floyd County, 2007–2009



The actual loss of 601 jobs in Floyd County suggests that its industries performed worse than their statewide counterparts. On a competitive basis, the county lost 360 more jobs than would have otherwise been expected.

Summary of Recent Economic and Demographic Trends

This analysis did not identify significant changes in regional economic activity that could be attributed solely to the weather-related disasters of 2008. Employment and unemployment data suggest that Floyd County's economy was weaker after 2008; however, the national recession may have played a greater role than the floods. Post-flood population, enrollment and retail trade trends in Charles City were generally consistent with trends before the flooding occurred.

Appendix 3. Columbus Junction/Louisa County Economic Impact Analysis

Overview of the Study Area

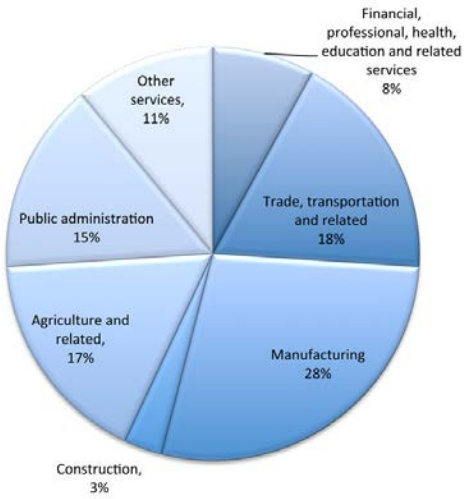
The city of Columbus Junction, Iowa, had 1,899 residents in 2010. The city's population declined by 0.1% from 2000 to 2010, compared to a statewide average growth rate of 4.1%. The number of housing units in Columbus Junction increased by 1.6% from 2000 to 2010, reaching 760 total units in 2010. Housing unit growth for the state of Iowa averaged 8.4% for the decade.

Columbus Junction is located in Louisa County, a rural county with a population of 11,387 residents in 2010. The county experienced a population decline of 6.5% and a decline in the number of housing units of 2.6% from 2000 to 2010.

Economic Characteristics

The Louisa County economy is highly diversified. Figure 1 illustrates the county's percentage of gross regional product by major industry group.[1] The manufacturing sector contributes 28% of gross product in the county. Agriculture and related activities contribute 17% of gross regional product. Trade, transportation and related industries constitute another 18% of the county's economy.

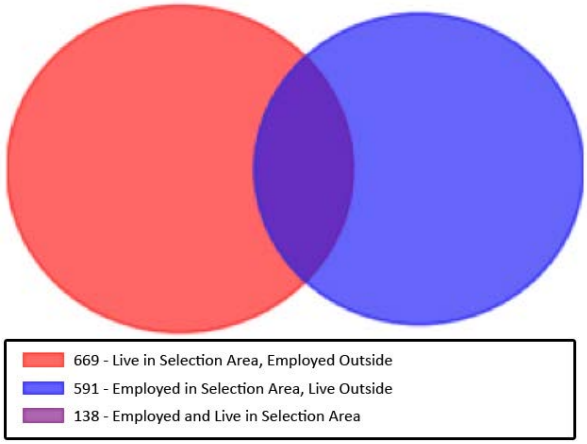
Figure 1. Gross regional product for Louisa County



Source: IMPLAN model of the Louisa County economy, Iowa State University

Commuting flow data for Columbus Junction show the city's dependence on the surrounding region for its supply of workers and for employment opportunities for its own residents. About 83% of Columbus Junction residents commute elsewhere to work. Nonresidents who commute into Columbus Junction for work account for 81% of jobs in the city. The largest worker inflows originate from Columbus City, which supplies 3.7% of workers in Columbus Junction, followed by Wapello (3.0%) and Washington (3.0%). Figure 2 shows the total inflow and outflow job counts for Columbus Junction in 2009.

Figure 2. Inflow/outflow job counts for 2009



Source: Local Employment Dynamics, US Census Bureau

Columbus Junction also serves as a regional center for retail and service activity. Taxable retail sales data from the Iowa Department of Revenue show that Columbus Junction averaged $5,300 in per capita sales in fiscal year 2009, compared to an average of $11,200 for the state of Iowa. After adjusting for local income differentials, the ratio of the city and state per capita sales values yields a pull-factor ratio of 0.51, suggesting that nearly half of the estimated retail purchases by Columbus Junction households and businesses are made in surrounding trade centers.

Housing Characteristics

Table 1 summarizes key housing characteristics for Columbus Junction. Except where noted, the data were obtained from 2005–2009 American Community Survey (ACS) estimates produced by the US Census Bureau.[2] The

[1] Gross regional product, also referred to as value added, includes all labor income, profits and payments to government.

[2] ACS estimates are presented with 90% confidence intervals, meaning there is a 90% likelihood that the true value for the population falls within the range of values shown.

ACS values reflect average characteristics during the entire 2005–2009 period; thus, they include both pre-flood and post-flood housing conditions.

ACS data suggest that the median value of homes in Columbus Junction ranges from about $74,000 to $90,000. An estimated 1–9% of owner-households with a mortgage have monthly housing costs exceeding 35% of their household income. Anywhere from about 24–60% of renter-households have monthly housing costs that exceed 35% of their incomes. The city's housing unit vacancy rate of 9.6% was higher than the statewide average, according to 2010 Census data.

Flood Risk Exposure (Prior to 2008)

Figure 3 shows the relative exposure to flood risk in Louisa County by population group and housing type prior to the 2008 floods. The chart compares the percentage of county population, housing and jobs that were located in high-risk census blocks. For this analysis, census blocks having more than 75% of their total land area located within a 500-year floodplain were designated as high-risk blocks. Block-level population and housing data were obtained from the 2000 Census. Job counts for 2007 were obtained from Local Employment Dynamics data from the US Census Bureau.

Overall, about 11% of Louisa County residents lived in census blocks with high exposure to flood risk. The county's minority group population had a comparatively lower exposure to flood risk. Nonfamily households with multiple residents had a higher exposure than other households. A higher fraction of the county's vacant housing units were located in at-risk blocks compared to other types of housing. About 13% of jobs in Louisa County were located in the high-risk blocks in 2007.

Table 1. Key housing characteristics for Columbus Junction compared to the state of Iowa

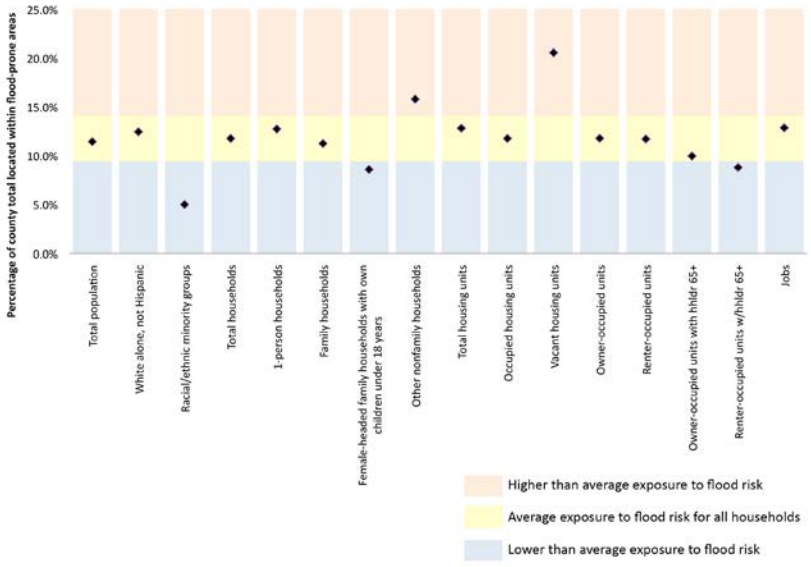
Measure	Columbus Junction	State of Iowa
Total population (2010 Census)	1,899	3,046,355
Race other than white alone (%)	25.8	8.7
Hispanic origin of any race (%)	48.0	5.0
Total housing units (2010 Census)	760	1,336,417
Vacant units (%)	9.6	8.6
Owner-occupied units (%)	59.3	65.9
Renter-occupied units (%)	31.1	25.5
Housing units by type of structure (%)		
1 unit, detached	55.7–68.1	73.6–74.0
1 unit, attached	0.0–1.8	3.1–3.3
2 units	1.0–8.8	2.6–2.8
3 or 4 units	3.3–11.7	3.6–3.8
5 to 9 units	0.8–8.4	3.6–3.8
10 to 19 units	0.3–4.7	3.7–3.9
20 or more units	0.0–0.6	4.7–4.9
Mobile home	12.8–22.4	4.1–4.3
Boat, RV, van, etc.	0.0–2.5	0.0–0.1
Housing units built before 1940 (%)	26.0–39.6	28.7–29.1
Value of owner-occupied units (%)		
Less than $50,000	17.0–32.0	12.1–12.5
$50,000 to $99,999	31.5–47.9	28.8–29.4
$100,000 to $149,999	23.2–34.4	24.4–24.8
$150,000 to $199,999	1.1–6.1	15.2–15.6
$200,000 to $299,999	0.0–5.5	11.6–12.0
$300,000 to $499,999	0.0–4.1	5.0–5.2
$500,000 to $999,999	0.0–1.9	1.3–1.5
$1,000,000 or more	0.0–4.1	0.2–0.4
Median value of owner-occupied units ($)	73,406–89,194	115,292–116,308
Median gross rent ($)	423–677	603–611
Monthly housing costs exceeding 35% of income		
Owners with a mortgage (%)	0.9–9.1	16.6–17.2
Owners with no mortgage (%)	0.0–9.4	9.0–9.4
Renters (%)	26.3–60.3	35.1–36.3

Sources: 2010 Census and 2005–2009 American Community Survey, US Census Bureau

Indicators of Post-flood Economic Performance

The following sections compare indicators of local economic performance before and after the 2008 floods. Trends in population, enrollment and commuting patterns are examined for evidence of changes in residential location preferences in the region. Retail sales trends are investigated to detect changes in area household spending and the ability of local firms to capture that spending. Unemployment and employment trends are analyzed to gauge the region's general economic performance.

Figure 3. Louisa County: percentage of county populations, households and housing units with high risk for flooding

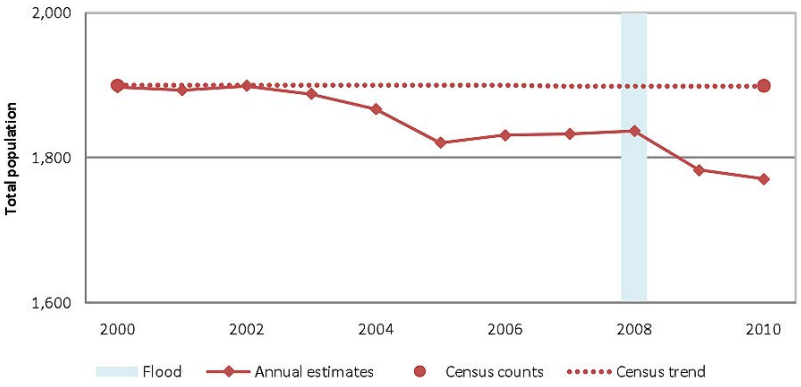


Population Change

Changes in the local population size have important implications for a community's housing needs. Local population size is very difficult to measure accurately, and local officials generally rely on the most recent decennial census for the most accurate information about their population size.

Figure 4 shows recent population trends for the city of Columbus Junction. One data series shows actual decennial census counts for 2000 and 2010 with an imputed trend line for the intervening years. The second series plots annual population estimates produced by the US Census Bureau. Although subject to error, the Census Bureau's annual estimates can be used to discern changes in the pace of growth throughout the decade.

Figure 4. Columbus Junction estimated and actual population



The annual population estimates for Columbus Junction suggest that the city lost population from 2002 to 2005 and from 2008 to 2010. As revealed by the 2010 Census results, however, the annual estimates series overpredicted the city's population losses for the decade as a whole. It is not possible to determine from the available data if the city actually experienced population loss after the 2008 floods.

School Enrollment

Housing losses and uncertainty over housing assistance during the 2008 floods raised fears that displaced residents would permanently relocate to surrounding suburbs or other nearby cities. If young families relocated en masse to surrounding communities, these shifts should be evident in enrollment data for area school districts.

Figure 5 shows the trend in public school enrollment for the Columbus Junction public school district. The enrollment trends for neighboring school districts (within five miles) and for the state of Iowa are also illustrated. For each region, enrollment values in a given year are expressed in percentage terms compared to enrollment levels in the 2000–2001 academic year. The enrollment data were obtained from the Iowa Department of Education Basic Educational Data Survey.

Enrollment in the Columbus Junction school district has been trending downward gradually since 2003. The surrounding school districts have seen smaller declines. Both areas have underperformed the statewide average enrollment trend during the last decade. Enrollment changes since 2008 appear consistent with the longer-term trends in Columbus Junction and the surrounding

districts. There are no clear indications of flood-related enrollment declines.

Area Commuting Patterns

Changes in the availability and affordability of local housing may have influenced local workers' commuting decisions. Data on the residential locations of Columbus Junction workers can be used to detect any notable changes in the propensity for workers to live outside the city and commute to work as opposed to residing and working within the city.

Figure 6 illustrates the recent trend in in-commuting rates to Columbus Junction. The chart measures the percentage of all jobs in Columbus Junction that are filled by workers who, for one reason or another, live outside of the city. The commuting data were obtained from the US Census Bureau Local Employment Dynamics Program.

In Columbus Junction, the percentage of jobs filled by in-commuters has declined in recent years from a high of nearly 90% in 2004. The data provide no evidence of a flood-related increase in the city's already high rates of in-commuting.

Retail Trade

The local retail sector could have a mixed experience from a natural disaster. Any losses in local jobs and population could mean a reduction in area household incomes, leading to a decline in local retail sales. Alternatively, rebuilding and recovery efforts could temporarily stimulate the local retail sector. The magnitude of losses or gains would depend on the extent to which the local retail sector was already capturing or leaking sales of the region's residents before the flood occurred.

Figure 7 illustrates changes in taxable retail sales activity in Columbus Junction during the eight quarters prior and subsequent to the period of flooding. The statewide trend in retail sales is included for comparison. The chart shows real taxable retail sales in each quarter as a percentage of sales that occurred during the same quarter of the prior year. The taxable sales data were obtained from the Iowa Department of Revenue and Finance.

Figure 5. Annual public school district enrollment

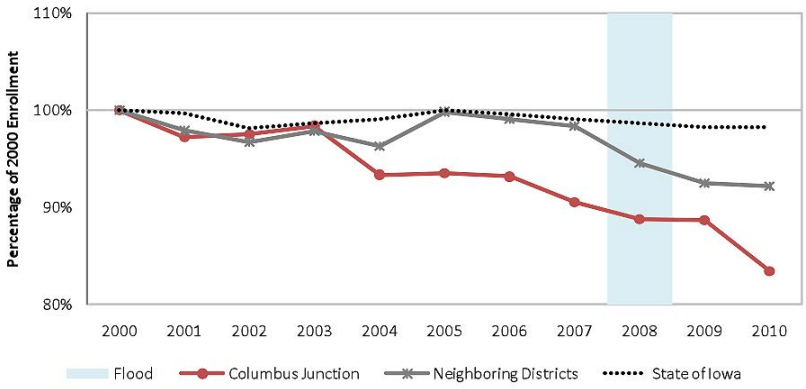


Figure 6. Annual rates of in-commuting by workers

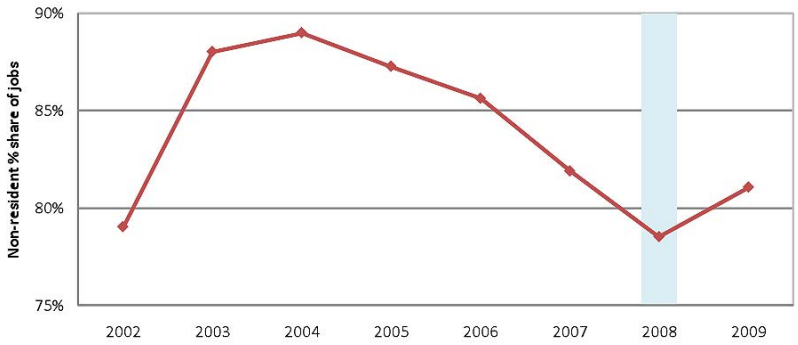
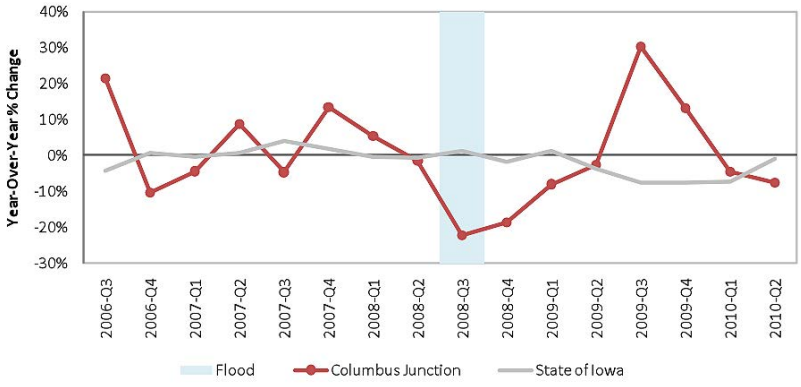


Figure 7. Quarterly taxable retail sales



Columbus Junction posted a retail sales decline of 22% for the third quarter of 2008, meaning that sales during July–September of the flood year were 22% lower than the year before. Prior to that quarter, the city's retail sector had shown relative stability, with year-over-year gains occurring in three of the previous five quarters. Year-over-year declines continued in Columbus Junction during the year after the floods. The city's retail sector appears to have experienced a temporary flood-related decline with little or no offsetting boost from recovery efforts.

Iowa's retail sales growth was relatively flat during the two years preceding the floods. Persistent statewide declines began in the second quarter of 2009, possibly indicating that recessionary effects on household spending were beginning to be felt in the state's retail sector. In Columbus Junction, sales in the third quarter of 2009 were 30% higher than the low levels experienced during the flood period. Data for 2010 suggest the city's retail sector has not experienced recent growth.

Unemployment Rate

Business disruptions and failures may have contributed to temporary and permanent layoffs of workers in the region. While many job losses would have been covered by regular or emergency unemployment insurance programs, others may not have been. Rising unemployment rates can signal higher levels of household economic stress and may also correspond with growing numbers of households experiencing difficulty in meeting their monthly housing costs.

Figure 8 shows the monthly unemployment rate in Louisa County for two years prior to and after the period of flooding. The unemployment data were obtained from the US Bureau of Labor Statistics (BLS).

In order to provide context for Louisa County's performance, the average unemployment rate for a group of similar rural counties in Iowa is also shown. The peer group includes the counties of Adair, Audubon, Butler, Clayton, Fremont, Ida, Iowa, Keokuk, Louisa and Lyon.

Louisa County's unemployment closely tracked the pattern of change in its peer group prior to April 2008. The county experienced rising unemployment rates through the rest of 2008, with unemployment climbing faster than the peer group. Louisa County's trend line converged again with its peer group average in January 2009. Since that time, the unemployment rate in Louisa County has remained above the peer group average. Without more rigorous analysis, it is not possible to ascertain if the flooding explains any part of the gap in unemployment rates between Louisa County and its peer group.

Figure 8. Monthly unemployment rates

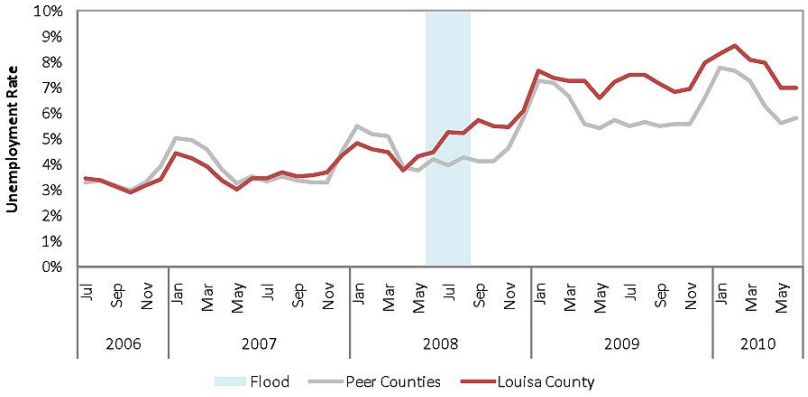
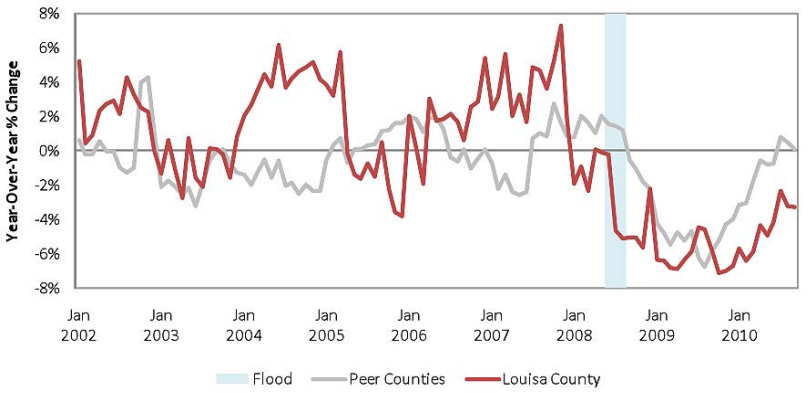


Figure 9. Monthly employment rates



Employment Change

Employment levels can be used to evaluate the overall performance of the local economy during and after the disaster period. Because employment levels have a high degree of seasonal variability, changes in employment trends are more easily detected by comparing employment in each month to the same month in the prior year.

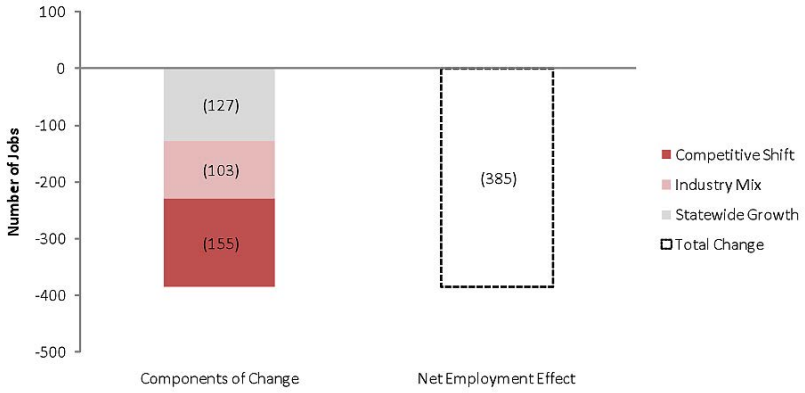
Figure 9 shows year-over-year percentage changes in Louisa County employment and its comparison peer group (see section on unemployment in the summary report for a definition of the peer group). The employment data were obtained from the US BLS Quarterly Census of Employment and Wages.

Louisa County's employment trend was somewhat counter-cyclical compared to its peer group for much of the pre-flood period illustrated below. The county began to experience year-over-year employment declines in January 2008. While a sharp drop was apparent from June to July 2008, the magnitude of that drop did not exceed other steep declines throughout the data series for the county.

Louisa County's employment trend has more closely followed its peer group during the post-flood period,

although its performance has been weaker than its peers. Figure 9 shows the timing and magnitude of employment change, but not the reasons for change. It cannot be concluded whether employment changes during and after the flooding were attributable to the flood itself, the recession, or other local or external causes. Using a method called shift-share analysis, one can attempt to isolate changes explained by local factors by controlling for external economic influences.

Figure 10. Shift-share analysis of employment change in Louisa County, 2007–2009



Shift-share analysis deconstructs job gains or losses into three explanatory components: statewide growth, industry mix and local competitive share. The statewide growth component provides an expected value for employment growth based on the average performance of all nonfarm industries across the state. Industry mix accounts for local concentrations of employment in sectors that, at the statewide level, outperformed or underperformed the nonfarm industry average. The competitive share component measures the performance of local firms in comparison to other firms in the same industries in other counties.

Figure 10 shows a competitive shift-share analysis for employment change in Louisa County from 2007 to 2009. The industry-level employment data used for this analysis were obtained from the US Bureau of Economic Analysis.

Had all industries in Louisa County performed at the statewide nonfarm average rate, the county would have lost 127 jobs from 2007 to 2009. The industry mix in Louisa County was weighted toward industries that performed worse than the nonfarm-industry average in Iowa. Given that industrial mix, we could have expected an additional loss of 103 jobs from the county.

The actual loss of 385 jobs in Louisa County suggests that its industries performed worse than their statewide counterparts. On a competitive basis, the county lost 155 more jobs than would have otherwise been expected.

Summary of Recent Economic and Demographic Trends

This analysis produced mixed evidence of the effects of the 2008 floods in Columbus Junction and Louisa County. Employment and unemployment data suggest the county's economy was weaker after 2008; however, it is not possible to sort out the effects of the floods from the national recession. Post-flood population and enrollment trends for Columbus Junction were generally consistent with the pre-flood period. Retail trade data reveal a strong disruption in commercial activity coinciding with the disaster period.

Appendix 4. Coralville/Johnson County Economic Impact Analysis

Overview of the Study Area

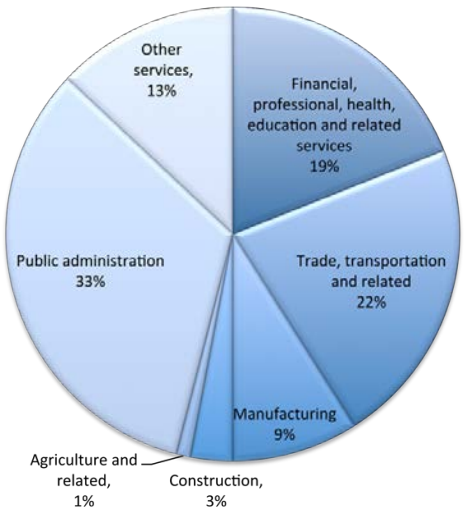
The city of Coralville, Iowa, had 18,907 residents in 2010. The city's population grew by 25% from 2000 to 2010, much faster than the statewide average rate of 4.1%. The number of housing units in Coralville increased by 23% from 2000 to 2010, reaching 8,310 total units in 2010. Housing unit growth for the state of Iowa averaged 8.4% for the decade.

Coralville is located in Johnson County, which is the core of a two-county metropolitan statistical area (MSA) that also includes Washington County. Johnson County had 130,882 residents in 2010, while the entire Iowa City MSA had 152,586 residents. Johnson County experienced population growth of 17.9% and housing unit growth of 22.1% from 2000 to 2010.

Economic Characteristics

The Johnson County economy is strongly oriented toward public- and private-sector service provision. Figure 1 illustrates the county's percentage of gross regional product by major industry group.[1] The public administration sector contributes 33% of gross product in the county. Professional and high-value services such as finance, insurance, health care and education contribute 19% of gross regional product. Trade, transportation and related industries constitute 22% of the county's economy.

Figure 1. Gross regional product for Johnson County

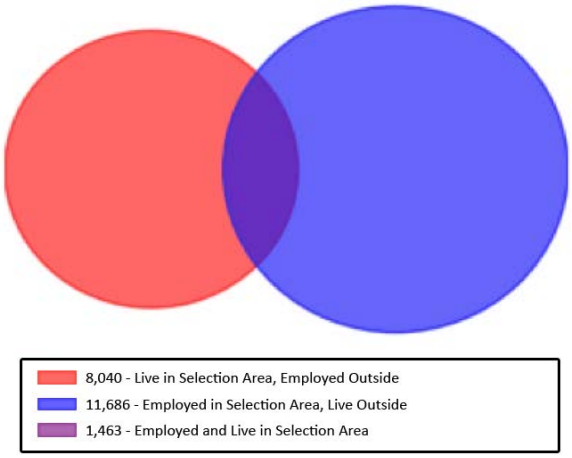


Source: IMPLAN model of the Johnson County economy, Iowa State University

[1]Gross regional product, also referred to as value added, includes all labor income, profits and payments to government.

Commuting flow data for Coralville attest to the city's importance as a regional employment center. Nearly 90% of jobs in the city are filled by residents from other communities. The city of Iowa City supplies 17.1% of workers in Coralville, followed by Cedar Rapids (10.8%) and North Liberty (3.9%). Figure 2 shows the total inflow and outflow job counts for Coralville in 2009.

Figure 2. Inflow/outflow job counts for 2009



Source: Local Employment Dynamics, US Census Bureau

Coralville also serves as a major center for retail and service activity. Taxable retail sales data from the Iowa Department of Revenue show that Coralville averaged $37,500 in taxable, per capita sales in fiscal year 2009, compared to an average of $11,200 for the state of Iowa. After adjusting for local income differentials, the ratio of city and state per capita sales yields a pull-factor ratio of 3.27, suggesting that Coralville serves a retail customer base that is more than three times larger than its own population size.

Housing Characteristics

Table 1 summarizes key housing characteristics for Coralville. Except where noted, the data were obtained from 2005–2009 American Community Survey (ACS) estimates produced by the US Census Bureau.[2] The ACS values reflect average characteristics during the entire

[2]ACS estimates are presented with 90% confidence intervals, meaning there is a 90% likelihood that the true value for the population falls within the range of values shown.

2005–2009 period; thus, they include both pre-flood and post-flood housing conditions.

ACS data suggest that the median value of homes in Coralville ranges from $162,000 to $181,000. Between 13 and 22% of owner-households with a mortgage have monthly housing costs exceeding 35% of their household income. Anywhere from 35 to 50% of renter-households have monthly housing costs that exceed 35% of their incomes. The city's housing unit vacancy rate of 6.6% was lower than the statewide average of 8.6%, according to 2010 Census data.

Flood Risk Exposure (Prior to 2008)

Figure 3 shows the relative exposure to flood risk in Johnson County by population group and housing type prior to the 2008 floods. The chart compares the percentage of county population, housing and jobs that were located in high-risk census blocks. For this analysis, census blocks having more than 75% of their total land area located within a 500-year floodplain were designated as high-risk blocks. Block-level population and housing data were obtained from the 2000 Census. Job counts for 2007 were obtained from Local Employment Dynamics data from the US Census Bureau.

Overall, fewer than 3% of Johnson County residents lived in census blocks with high exposure to flood risk. Female-headed households with children and nonfamily households with multiple residents had a slightly higher exposure to flood risk than other types of households. A higher fraction of the county's vacant housing units and renter-occupied units were located within at-risk blocks compared to other types of housing. The percentage of Johnson County jobs located within the flood risk areas was nearly 14% in 2007, higher than the average exposure for the county's households.

Table 1. Key housing characteristics for Coralville compared to the state of Iowa

Measure	Coralville	State of Iowa
Total population (2010 Census)	18,907	3,046,355
Race other than white alone (%)	20.6	8.7
Hispanic origin of any race (%)	5.1	5.0
Total housing units (2010 Census)	8,310	1,336,417
Vacant units (%)	6.6	8.6
Owner-occupied units (%)	51.8	65.9
Renter-occupied units (%)	41.6	25.5
Housing units by type of structure (%)		
1 unit, detached	34.8–39.4	73.6–74.0
1 unit, attached	13.1–18.7	3.1–3.3
2 units	2.8–7.6	2.6–2.8
3 or 4 units	4.2–8.0	3.6–3.8
5 to 9 units	9.0–14.0	3.6–3.8
10 to 19 units	11.9–16.7	3.7–3.9
20 or more units	7.1–10.9	4.7–4.9
Mobile home	0.2–1.6	4.1–4.3
Boat, RV, van, etc.	0.0–0.3	0.0–0.1
Housing units built before 1940 (%)	2.5–4.9	28.7–29.1
Value of owner-occupied units (%)		
Less than $50,000	2.0–5.4	12.1–12.5
$50,000 to $99,999	4.5–9.3	28.8–29.4
$100,000 to $149,999	23.8–33.2	24.4–24.8
$150,000 to $199,999	18.0–26.6	15.2–15.6
$200,000 to $299,999	15.3–22.1	11.6–12.0
$300,000 to $499,999	12.4–18.0	5.0–5.2
$500,000 to $999,999	2.3–6.3	1.3–1.5
$1,000,000 or more	0.0–0.5	0.2–0.4
Median value of owner-occupied units ($)	162,363–180,637	115,292–116,308
Median gross rent ($)	668–706	603–611
Monthly housing costs exceeding 35% of income		
Owners with a mortgage (%)	12.6–21.8	16.6–17.2
Owners with no mortgage (%)	0.0–11.4	9.0–9.4
Renters (%)	35.1–49.7	35.1–36.3

Sources: 2010 Census and 2005–2009 American Community Survey, US Census Bureau

Indicators of Post-flood Economic Performance

The following sections compare indicators of local economic performance before and after the 2008 floods. Trends in population, enrollment and commuting patterns are examined for evidence of changes in residential location preferences in the region. Retail sales trends are investigated to detect changes in area household spending and the ability of local firms to capture that spending. Unemployment and employment trends are assessed to gauge the region's general economic performance.

Population Change

Changes in the local population size have important implications for a community's housing needs. Local population size is very difficult to measure accurately, and local officials generally rely on the most recent decennial census for the most accurate information about their population size.

Figure 4 shows recent population trends for the city of Coralville. One data series shows actual decennial census counts for 2000 and 2010 with an imputed trend line for the intervening years. The second series plots annual population estimates produced by the US Census Bureau. Although subject to error, the Census Bureau's annual estimates can be used to discern changes in the pace of growth throughout the decade.

The annual population estimates for Coralville suggest relatively consistent population growth in the city throughout the last decade. There were no indications of a flood-related population decline in the estimated series. The 2010 Census results showed that the annual estimates series closely predicted the actual rate of population growth in Coralville from 2000 to 2010.

School Enrollment

Housing losses and uncertainty over housing assistance during the 2008 floods raised fears that displaced residents would permanently relocate to surrounding suburbs or other nearby cities. If young families relocated en masse to surrounding communities, these shifts should be evident in enrollment data for area school districts.

Figure 5 shows the trend in public school enrollment for Iowa City and Coralville. The enrollment trends for neighboring school districts (within five miles) and for the state of Iowa are also illustrated. For each region, enrollment values in a given year are expressed in percentage terms compared to enrollment levels in the 2000–2001 academic year. The enrollment data were obtained from the Iowa Department of Education Basic Educational Data Survey.

Enrollment in Iowa City/Coralville schools has grown steadily since 2002. Surrounding school districts have seen similar rates of enrollment growth. Both areas have outperformed the average school district in Iowa in terms of enrollment change during the last decade.

Figure 3. Johnson County: percentage of county populations, households and housing units with high risk for flooding

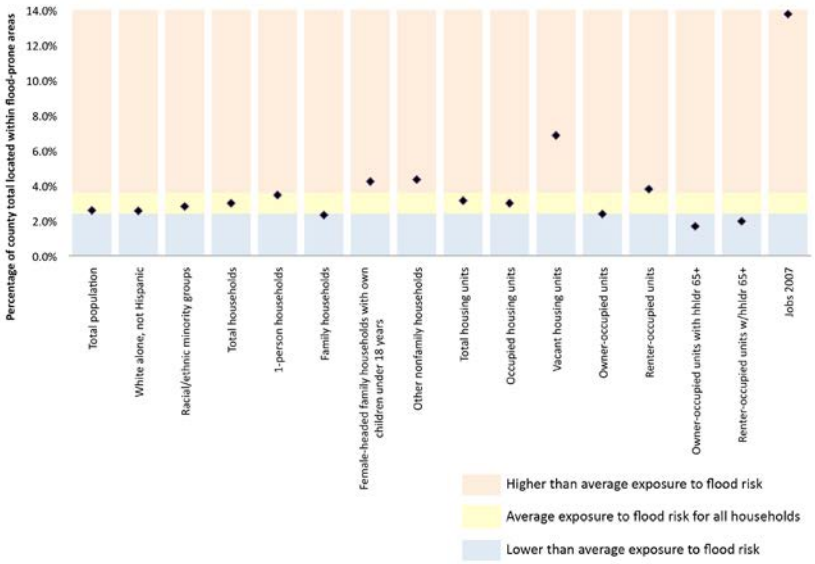
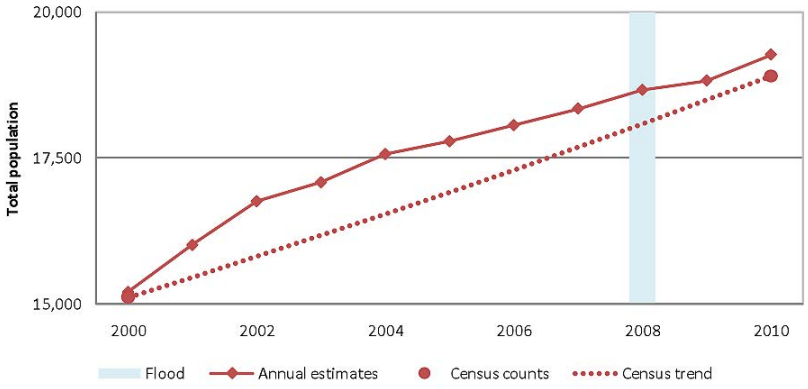


Figure 4. Coralville estimated and actual population



Enrollment changes since 2008 have not deviated sharply from recent historical trends, either in Iowa City/Coralville or the surrounding districts. There is no clear evidence of a flood-related shift in enrollment from Iowa City and Coralville to surrounding districts.

Area Commuting Patterns

Changes in the availability and affordability of local housing may have influenced local workers' commuting decisions. Data on the residential locations of Coralville workers can be used to detect any notable changes in the propensity for workers to live outside the city and commute in to work as opposed to residing and working within the city.

Figure 6 illustrates the recent trend in in-commuting rates to Coralville. The chart measures the percentage of all jobs in Coralville that are filled by workers who, for one reason or another, live outside of the city. The commuting data were obtained from the US Census Bureau Local Employment Dynamics program.

In Coralville, the percentage of jobs filled by in-commuters had been trending upward for several years before the 2008 floods, reaching about 89% in 2007. The increased in-commuting to Coralville corresponds with strong population growth in the greater Iowa City metropolitan area. Between 2007 and 2009, there appears to be no significant change in the likelihood that Coralville jobs were filled by nonresidents as opposed to residents.

Retail Trade

The local retail sector could have a mixed experience from a natural disaster. Any losses in local jobs and population could mean a reduction in area household incomes, leading to a decline in local retail sales. Alternatively, rebuilding and recovery efforts could temporarily stimulate the local retail sector. The magnitude of losses or gains would depend on the extent to which the local retail sector was already capturing or leaking sales of the region's residents before the disaster occurred.

Figure 5. Annual public school district enrollment

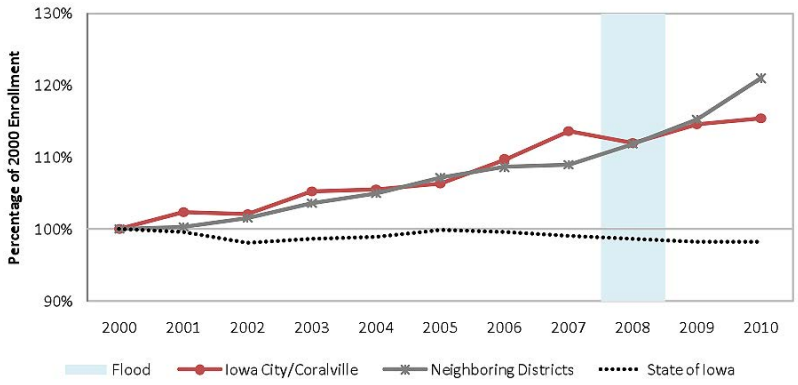


Figure 6. Annual rates of in-commuting by workers

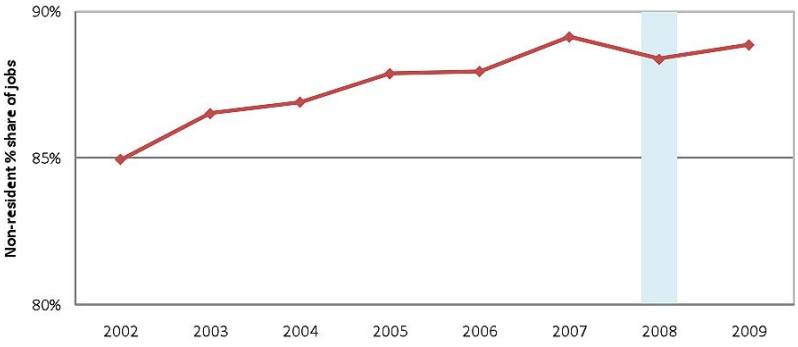


Figure 7. Quarterly taxable retail sales

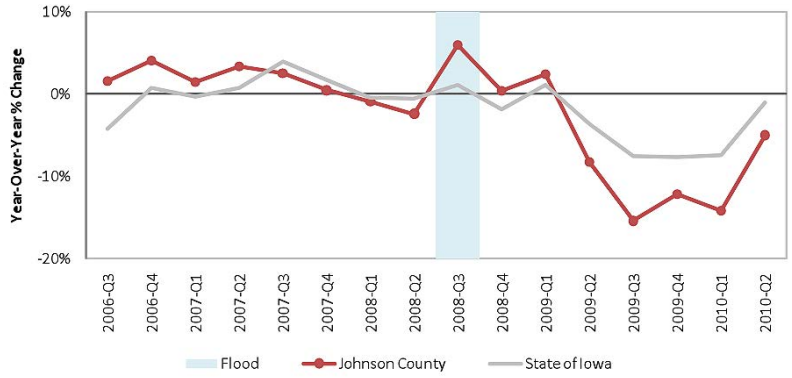


Figure 7 illustrates changes in taxable retail sales activity in Johnson County during the eight quarters prior and subsequent to the period of flooding.[3] The trend in retail sales for the state of Iowa is included for comparison. The chart shows real taxable retail sales in each quarter as a percentage of sales that occurred during the same quarter

[3]County-level analysis was selected in favor of city-level analysis because the Coralville and Iowa City economies are highly interdependent. A separate analysis of their retail sectors would create an artificial distinction between the experiences of the two cities.

of the prior year. The taxable sales data were obtained from the Iowa Department of Revenue and Finance.

July–September retail sales in Johnson County during the flood year were 6% higher than the year before. Area merchants may have enjoyed a temporary boost in sales to flood-affected residents and businesses in a broader flood-affected region, as the Iowa City/Coralville region serves as a major regional center for retail trade.

The statewide trend in sales suggests that by the second quarter of 2009, the effects of the national recession were beginning to be felt in Iowa's retail sector. Sales in Johnson County have followed the statewide trend during the post-flood period, although the county's decline was steeper than the state.

Unemployment Rate

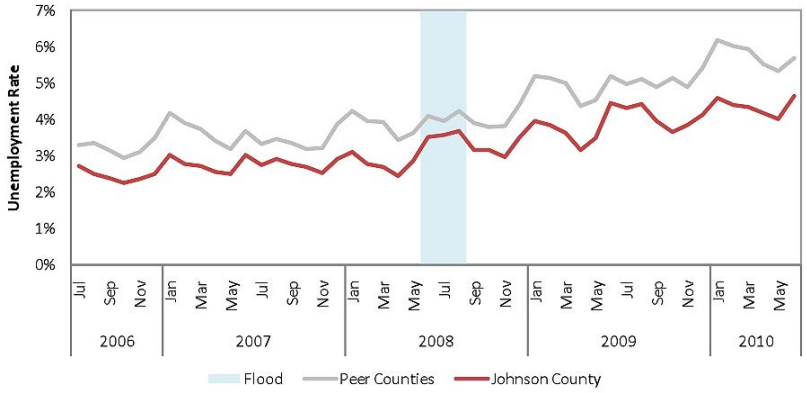
Business disruptions and failures may have contributed to temporary and permanent layoffs of workers in the region. While many job losses would have been covered by regular or emergency unemployment insurance programs, others may not have been. Rising unemployment rates can signal higher levels of household economic stress and may also correspond with growing numbers of households experiencing difficulty in meeting their monthly housing costs.

Figure 8 shows the monthly unemployment rate in Johnson County for two years prior to and after the period of flooding. The unemployment data were obtained from the US Bureau of Labor Statistics (BLS).

In order to compare Johnson County to its peers, the average unemployment rate for other small metropolitan counties in Iowa is also shown. The peer group includes the following counties: Benton, Black Hawk, Bremer, Dubuque, Grundy, Johnson, Jones, Linn, Story, Washington and Woodbury.

Johnson County's unemployment rate has generally followed the pattern of change in other small metropolitan counties in Iowa, although its rate has been lower than the peer group average rate. While there appears to be an increase in the rate during the flood period, the amount of that increase is not greater than seasonal or cyclical fluctuations that occurred in other years.

Figure 8. Monthly unemployment rates



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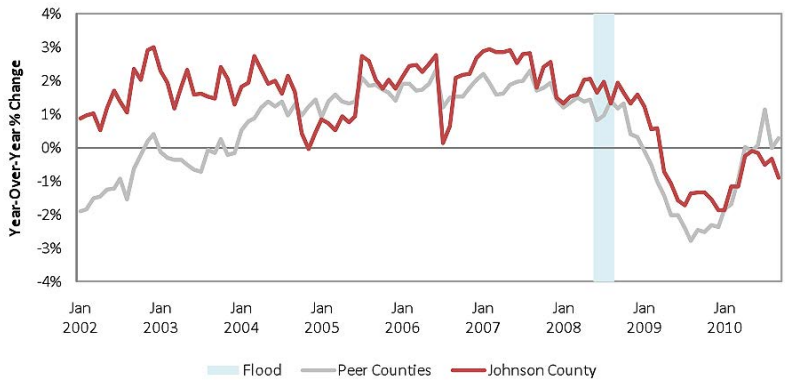


Employment Change

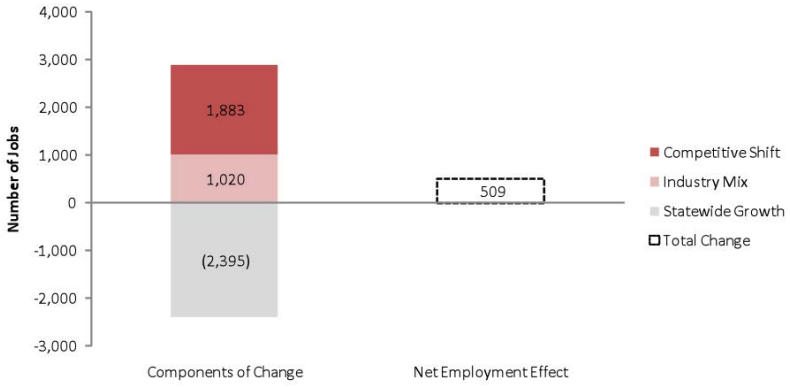
Employment levels can be used to evaluate the overall performance of the local economy during and after the disaster period. Because employment levels have a high degree of seasonal variability, changes in employment trends are more easily detected by comparing employment in each month to the same month in the prior year.

Figure 9 shows year-over-year percentage changes in Johnson County employment and its comparison peer group (see section on unemployment in the summary report for a definition of the peer group). The employment data were obtained from the US BLS Quarterly Census of Employment and Wages.

Johnson County enjoyed year-over-year gains in employment for most of the period from 2002 through 2008. The county's employment trend did not deviate markedly during the flood period and Johnson County continued to outperform its peers. The county began to experience year-over-year declines in early 2009, slightly later than its comparison peer group. The pattern of employment declines suggests that they were recession-related as opposed to flood-related.

Figure 9 shows the timing and magnitude of employment change, but not the reasons for change. We can't conclude whether employment changes during and after the flooding were attributable to the flood itself, the recession, or other local or external causes. Using a method called shift-share analysis, one can attempt to isolate changes explained by local factors by controlling for external economic influences.

Figure 10. Shift-share analysis of employment change in Johnson County, 2007–2009



Shift-share analysis deconstructs job gains or losses into three explanatory components: statewide growth, industry mix and local competitive share. The statewide growth component provides an expected value for employment growth based on the average performance of all nonfarm industries across the state. Industry mix accounts for local concentrations of employment in sectors that, at the statewide level, outperformed or under-performed the nonfarm industry average. The competitive share component measures the performance of local firms in comparison to other firms in the same industries in other counties.

Figure 10 shows a competitive shift-share analysis for employment change in Johnson County from 2007 to 2009. The industry-level employment data used for this analysis were obtained from the US Bureau of Economic Analysis.

Had all industries in Johnson County performed at the statewide nonfarm average rate, the county would have lost 2,395 jobs from 2007 to 2009. The industry mix in Johnson County was weighted toward industries that outperformed the statewide nonfarm average rate. That industrial mix should have offset the county's expected job loss by 1,020 jobs.

The county actually gained 509 jobs during the period, suggesting that the industries in Johnson County performed better than their statewide counterparts. The county's competitive shift component was equivalent to 1,833 jobs. This analysis suggests that the 2008 floods did not diminish the competitiveness of the Johnson County economy relative to the rest of the state.

Summary of Recent Economic and Demographic Trends

This analysis did not identify significant changes in regional economic activity that could be attributed solely to the weather-related disasters of 2008. Despite substantial losses experienced by individual households and businesses, the overall performance and structure of the Coralville/Johnson County economy did not show evidence of lasting structural change. Trends in population and enrollment show continued growth in the city of Coralville. The county's retail sector experienced a slight boost during the flood period. Unemployment and employment trends suggest that Johnson County has fared better than its peers during the recent recession, and that the county's competitive position within the state has remained strong since 2008.

Appendix 5. Iowa City/Johnson County Economic Impact Analysis

Overview of the Study Area

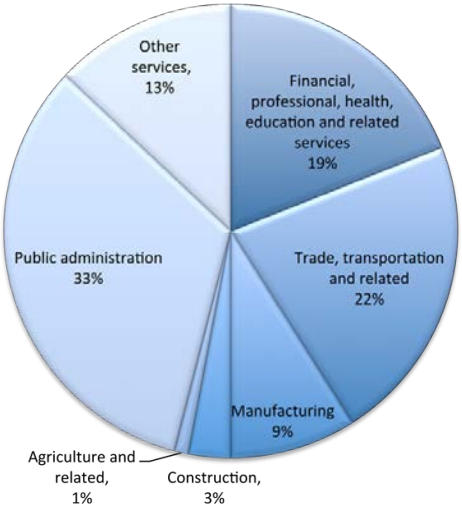
The city of Iowa City, Iowa, had 67,862 residents in 2010. The city's population grew by 9.1% from 2000 to 2010, faster than the statewide average rate of 4.1%. The number of housing units in Iowa City increased by 12.2% from 2000 to 2010, reaching 29,270 total units in 2010. Housing unit growth for the state of Iowa averaged 8.4% for the decade.

Iowa City is located in Johnson County, which is the core of a two-county metropolitan statistical area (MSA) that also includes Washington County. Johnson County had 130,882 residents in 2010, while the entire Iowa City MSA had 152,586 residents. Johnson County experienced population growth of 17.9% and housing unit growth of 22.1% from 2000 to 2010.

Economic Characteristics

The Johnson County economy is strongly oriented toward public- and private-sector service provision. Figure 1 illustrates the county's percentage of gross regional product by major industry group.[1] The public administration sector contributes 33% of gross product in the county. Professional and high-value services such as finance, insurance, health care and education contribute 19% of gross regional product. Trade, transportation and related industries constitute 22% of the county's economy.

Figure 1. Gross regional product for Johnson County

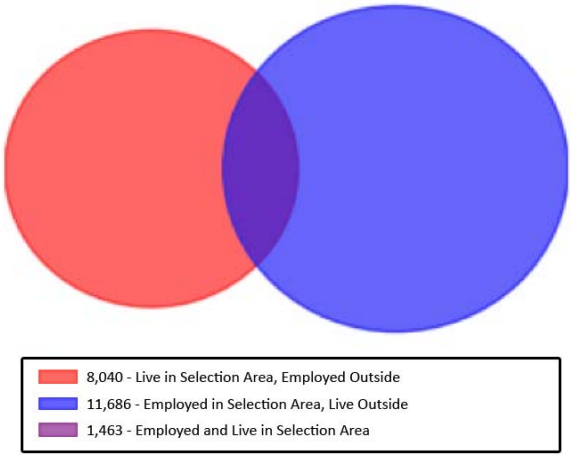


Source: IMPLAN model of the Johnson County economy, Iowa State University

[1]Gross regional product, also referred to as value added, includes all labor income, profits and payments to government.

Commuting flow data for Iowa City attest to the city's importance as a regional employment center. More than 65% of jobs in the city are filled by residents of other communities. The city of Coralville supplies 9.1% of workers in Iowa City, followed by Cedar Rapids (5.4%) and North Liberty (3.2%). Figure 2 shows the total inflow and outflow job counts for Iowa City in 2009.

Figure 2. Inflow/outflow job counts for 2009



Source: Local Employment Dynamics, US Census Bureau

Iowa City also serves as a major center for retail and service activity. Taxable retail sales data from the Iowa Department of Revenue show that Iowa City averaged $13,400 in taxable, per capita sales in fiscal year 2009, compared to an average of $11,200 for the state of Iowa. After adjusting for local income differentials, the ratio of city and state per capita sales yields a pull factor ratio of 1.18, suggesting that Iowa City serves a retail customer base that is nearly 20% larger than its own population size.

Housing Characteristics

Table 1 summarizes key housing characteristics for Iowa City. Except where noted, the data were obtained from 2005–2009 American Community Survey (ACS) estimates produced by the US Census Bureau.[2] The ACS values reflect average characteristics during the entire 2005–2009

[2]ACS estimates are presented with 90% confidence intervals, meaning there is a 90% likelihood that the true value for the population falls within the range of values shown.

period; thus, they include both pre-flood and post-flood housing conditions.

ACS data suggest that the median value of homes in Iowa City ranges from $168,000 to $175,000. Between 18 and 24% of owner-households with a mortgage have monthly housing costs exceeding 35% of their household income. About 58–64% of renter-households have monthly housing costs that exceed 35% of their incomes. The city's housing unit vacancy rate of 5.5% was lower than the statewide average of 8.6%, according to 2010 Census data.

Flood Risk Exposure (Prior to 2008)

Figure 3 shows the relative exposure to flood risk in Johnson County by population group and housing type prior to the 2008 floods. The chart compares the percentage of county population, housing and jobs that were located in high-risk census blocks. For this analysis, census blocks having more than 75% of their total land area located within a 500-year floodplain were designated as high-risk blocks. Block-level population and housing data were obtained from the 2000 Census. Job counts for 2007 were obtained from Local Employment Dynamics data from the US Census Bureau.

Overall, fewer than 3% of Johnson County residents lived in census blocks with high exposure to flood risk. Female-headed households with children and nonfamily households with multiple residents had a slightly higher exposure to flood risk than other types of households. A higher fraction of the county's vacant housing units and renter-occupied units were located within at-risk blocks compared to other types of housing. The percentage of Johnson County jobs located within the flood risk areas was nearly 14% in 2007, higher than the average exposure for the county's households.

Table 1. Key housing characteristics for Iowa City compared to the state of Iowa

Measure	Iowa City	State of Iowa
Total population (2010 Census)	67,862	3,046,355
Race other than white alone (%)	17.5	8.7
Hispanic origin of any race (%)	5.3	5.0
Total housing units (2010 Census)	29,270	1,336,417
Vacant units (%)	5.5	8.6
Owner-occupied units (%)	44.5	65.9
Renter-occupied units (%)	50.0	25.5
Housing units by type of structure (%)		
1 unit, detached	40.3–42.9	73.6–74.0
1 unit, attached	6.2–7.8	3.1–3.3
2 units	3.6–5.4	2.6–2.8
3 or 4 units	3.9–5.7	3.6–3.8
5 to 9 units	9.5–12.1	3.6–3.8
10 to 19 units	14.8–17.4	3.7–3.9
20 or more units	11.3–13.5	4.7–4.9
Mobile home	2.2–3.4	4.1–4.3
Boat, RV, van, etc.	0.0–0.1	0.0–0.1
Housing units built before 1940 (%)	13.3–15.9	28.7–29.1
Value of owner-occupied units (%)		
Less than $50,000	4.1–6.3	12.1–12.5
$50,000 to $99,999	5.0–7.4	28.8–29.4
$100,000 to $149,999	24.3–28.3	24.4–24.8
$150,000 to $199,999	25.1–29.7	15.2–15.6
$200,000 to $299,999	20.4–24.6	11.6–12.0
$300,000 to $499,999	8.7–11.1	5.0–5.2
$500,000 to $999,999	1.1–2.3	1.3–1.5
$1,000,000 or more	0.3–1.5	0.2–0.4
Median value of owner-occupied units ($)	168,039–175,161	115,292–116,308
Median gross rent ($)	713–755	603–611
Monthly housing costs exceeding 35% of income		
Owners with a mortgage (%)	18.3–24.1	16.6–17.2
Owners with no mortgage (%)	7.7–14.9	9.0–9.4
Renters (%)	57.4–63.8	35.1–36.3

Sources: 2010 Census and 2005–2009 American Community Survey, US Census Bureau

Indicators of Post-flood Economic Performance

The following sections compare indicators of local economic performance before and after the 2008 floods. Trends in population, enrollment and commuting patterns are examined for evidence of changes in residential location preferences in the region. Retail sales trends are investigated to detect changes in area household spending and the ability of local firms to capture that spending. Unemployment and employment trends are assessed to gauge the region's general economic performance.

Population Change

Changes in the local population size have important implications for a community's housing needs. Local population size is very difficult to measure accurately, and local officials generally rely on the most recent decennial census for the most accurate information about their population size.

Figure 4 shows recent population trends for the city of Iowa City. One data series shows actual decennial census counts for 2000 and 2010 with an imputed trend line for the intervening years. The second series plots annual population estimates produced by the US Census Bureau. Although subject to error, the Census Bureau's annual estimates can be used to discern changes in the pace of growth throughout the decade.

The annual population estimates for Iowa City suggest steady population growth throughout the 2000–2010 decade. There were no indications of a flood-related population decline in the estimated series. As revealed by the 2010 Census results, however, the annual estimates series overpredicted the city's actual population growth from 2000 to 2010.

School Enrollment

Housing losses and uncertainty over housing assistance during the 2008 floods raised fears that displaced residents would permanently relocate to surrounding suburbs or other nearby cities. If young families relocated en masse to surrounding communities, these shifts should be evident in enrollment data for area school districts.

Figure 5 shows the trend in public school enrollment for Iowa City and Coralville. The enrollment trends for neighboring school districts (within five miles) and for the state of Iowa are also illustrated. For each region, enrollment values in a given year are expressed in percentage terms compared to enrollment levels in the 2000–2001 academic year. The enrollment data were obtained from the Iowa Department of Education Basic Educational Data Survey.

Enrollment in Iowa City/Coralville schools has grown steadily since 2002. Surrounding school districts have seen similarly strong rates of enrollment growth. Both areas have outperformed the average school district in Iowa in terms of enrollment change during the last decade.

Figure 3. Johnson County: percentage of county populations, households and housing units with high risk for flooding

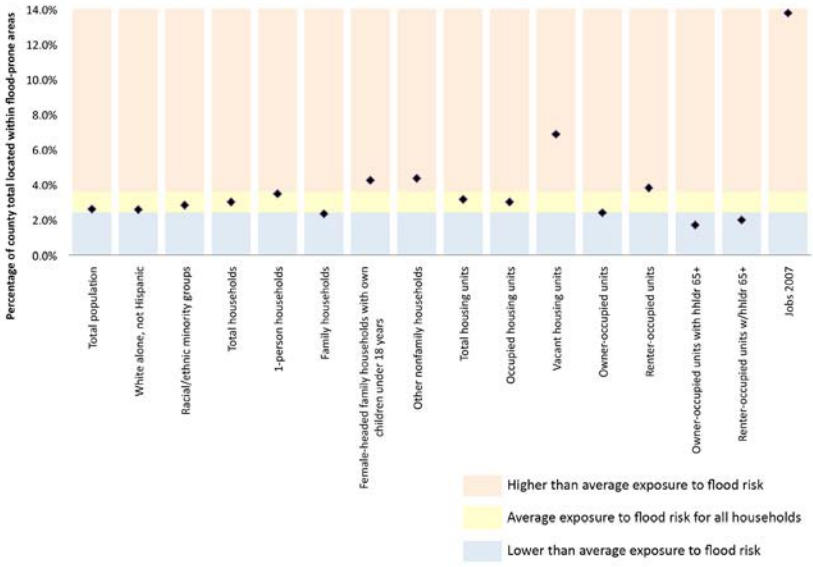
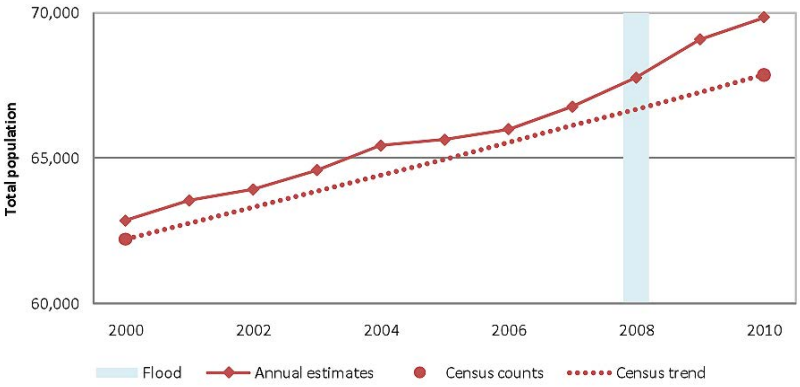


Figure 4. Iowa City estimated and actual population



Enrollment changes since 2008 have not deviated sharply from recent historical trends, either in Iowa City/Coralville or the surrounding districts. There is no clear evidence of a flood-related shift in enrollment from Iowa City and Cedar Rapids to surrounding districts.

Area Commuting Patterns

Changes in the availability and affordability of local Changes in the availability and affordability of local housing may have influenced local workers' commuting decisions. Data on the residential locations of Coralville workers can be used to detect any notable changes in the propensity for workers to live outside the city and commute in to work as opposed to residing and working within the city.

Figure 6 illustrates the recent trend in in-commuting rates to Coralville. The chart measures the percentage of all jobs in Coralville that are filled by workers who, for one reason or another, live outside of the city. The commuting data were obtained from the US Census Bureau Local Employment Dynamics program.

In Coralville, the percentage of jobs filled by in-commuters had been trending upward for several years before the 2008 floods, reaching about 89% in 2007. The increase in in-commuting to Coralville corresponds with strong population growth in the greater Iowa City metropolitan area. Between 2007 and 2009, there appears to be no significant change in the likelihood that Coralville jobs were filled by nonresidents as opposed to residents.

Figure 5. Annual public school district enrollment

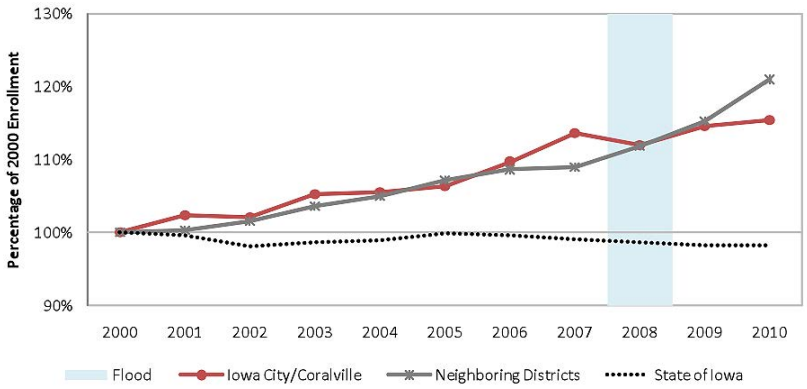


Figure 6. Annual rates of in-commuting by workers

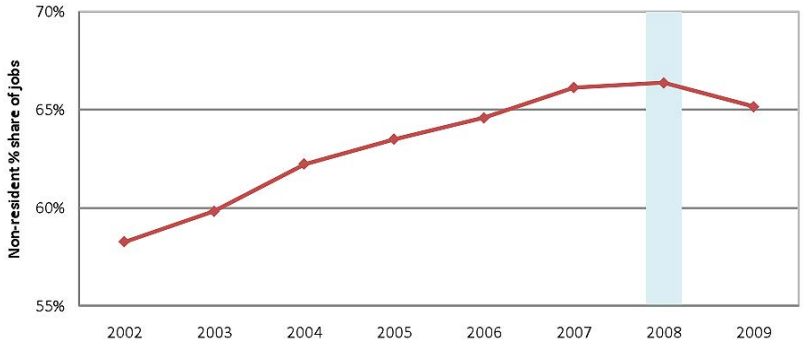
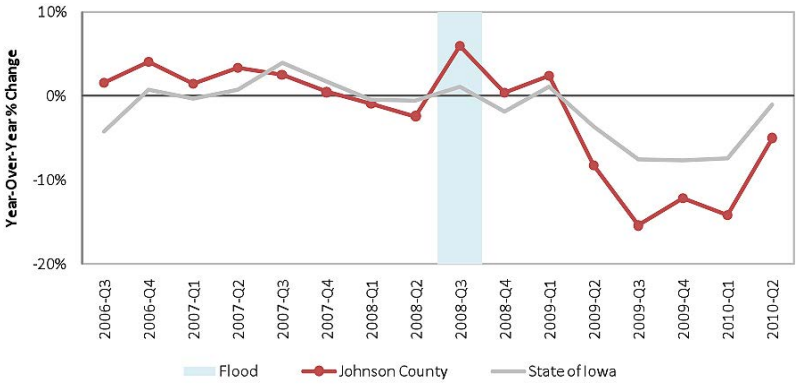


Figure 7. Quarterly taxable retail sales



Retail Trade

The local retail sector could have a mixed experience from a natural disaster. Any losses in local jobs and population could mean a reduction in area household incomes, leading to a decline in local retail sales. Alternatively, rebuilding and recovery efforts could temporarily stimulate the local retail sector. The magnitude of losses or gains would depend on the extent to which the local retail sector was already capturing or leaking sales of the region's residents before the disaster occurred.

Figure 7 illustrates changes in taxable retail sales activity in Johnson County during the eight quarters prior and subsequent to the period of flooding.[3] The trend in retail sales for the state of Iowa is included for comparison. The chart shows real taxable retail sales in each quarter as a percentage of sales that occurred during the same quarter

[3]County-level analysis was selected in favor of city-level analysis because the Coralville and Iowa City economies are highly interdependent. A separate analysis of their retail sectors would create an artificial distinction between the experiences of the two cities.

of the prior year. The taxable sales data were obtained from the Iowa Department of Revenue and Finance.

July–September retail sales in Johnson County during the flood year were 6% higher than the year before. Area merchants may have enjoyed a temporary boost in sales to flood-affected residents and businesses in a broader flood-affected region, as the Iowa City/Coralville region serves as a major regional center for retail trade.

The statewide trend in sales suggests that by the second quarter of 2009, the effects of the national recession were beginning to be felt in Iowa's retail sector. Sales in Johnson County have followed the statewide trend during the post-flood period, although the county's decline was steeper than the state.

Unemployment Rate

Business disruptions and failures may have contributed to temporary and permanent layoffs of workers in the region. While many job losses would have been covered by regular or emergency unemployment insurance programs, others may not have been. Rising unemployment rates can signal higher levels of household economic stress and may also correspond with growing numbers of households experiencing difficulty in meeting their monthly housing costs.

Figure 8 shows the monthly unemployment rate in Johnson County for two years prior to and after the period of flooding. The unemployment data were obtained from the US Bureau of Labor Statistics (BLS).

In order to compare Johnson County to its peers, the average unemployment rate for other small metropolitan counties in Iowa is also shown. The peer group includes the following counties: Benton, Black Hawk, Bremer, Dubuque, Grundy, Johnson, Jones, Linn, Story, Washington and Woodbury.

Johnson County's unemployment rate has followed the pattern of change demonstrated by other small metropolitan counties in Iowa, although its rate has been lower than the peer group average rate. While there appears to be an increase in the rate during the flood period, the amount of that increase is not greater than seasonal or cyclical fluctuations that occurred in other years.

Figure 8. Monthly unemployment rates

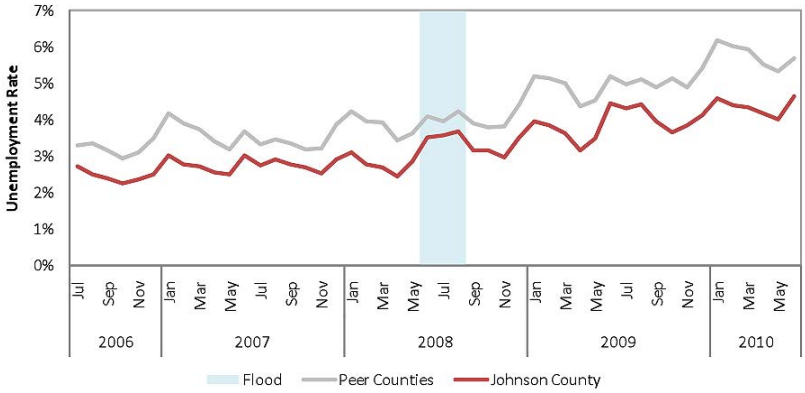
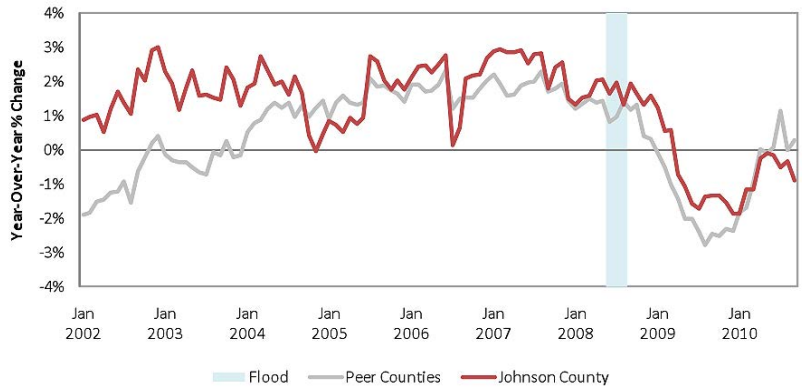


Figure 9. Monthly employment rates



Employment Change

Employment levels can be used to evaluate the overall performance of the local economy during and after the disaster period. Because employment levels have a high degree of seasonal variability, changes in employment trends are more easily detected by comparing employment in each month to the same month in the prior year.

Figure 9 shows year-over-year percentage changes in Johnson County employment and its comparison peer group (see section on unemployment in the summary report for a definition of the peer group). The employment data were obtained from the US BLS Quarterly Census of Employment and Wages.

Johnson County enjoyed year-over-year gains in employment for most of the period from 2002 through 2008. The county's employment trend did not deviate markedly during the flood period and Johnson County continued to outperform its peers. The county began to experience year-over-year declines in early in 2009, slightly later than its comparison peer group. The pattern of employment declines suggests that they were recession-related as opposed to flood-related.

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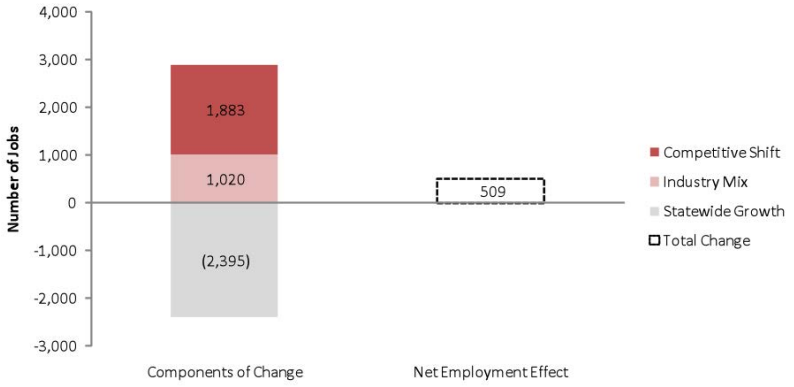
Figure 10. Shift-share analysis of employment change in Johnson County, 2007–2009



Shift-share analysis deconstructs job gains or losses into three explanatory components: statewide growth, industry mix and local competitive share. The statewide growth component provides an expected value for employment growth based on the average performance of all nonfarm industries across the state. Industry mix accounts for local concentrations of employment in sectors that, at the statewide level, outperformed or underperformed the nonfarm industry average. The competitive share component measures the performance of local firms in comparison to other firms in the same industries in other counties.

Figure 10 shows a competitive shift-share analysis for employment change in Johnson County from 2007 to 2009. The industry-level employment data used for this analysis were obtained from the US Bureau of Economic Analysis.

Had all industries in Johnson County performed at the statewide nonfarm average rate, the county would have lost 2,395 jobs from 2007 to 2009. The industry mix in Johnson County was weighted toward industries that outperformed the statewide nonfarm average rate. That industrial mix should have offset the county's expected job loss by 1,020 jobs.

The county actually gained 509 jobs during the period, suggesting that the industries in Johnson County performed better than their statewide counterparts. The county's competitive shift component was equivalent to 1,833 jobs. This analysis suggests that the 2008 floods did not diminish the competitiveness of the Johnson County economy relative to the rest of the state.

Summary of Recent Economic and Demographic Trends

This analysis did not identify significant changes in regional economic activity that could be attributed solely to the weather-related disasters of 2008. Despite substantial losses experienced by individual households and businesses, the overall performance and structure of the Iowa City/Johnson County economy did not show evidence of lasting structural change. Trends in population and enrollment show continued growth in Iowa City. The county's retail sector experienced a slight boost during the flood period. Unemployment and employment trends suggest that Johnson County has fared better than its peers during the recent recession, and that the county's competitive position within the state has remained strong since 2008.

Appendix 6. Mason City/Cerro Gordo County Economic Impact Analysis

Overview of the Study Area

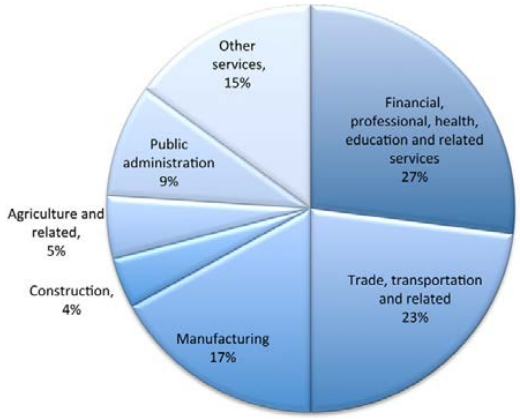
The city of Mason City, Iowa, had 28,079 residents in 2010. The city's population declined by 3.7% from 2000 to 2010, compared to a statewide average growth rate of 4.1%. The number of housing units in Mason City increased by 2.5% from 2000 to 2010, reaching 13,352 total units in 2010. Housing unit growth for the state of Iowa averaged 8.4% for the decade.

Mason City is located in Cerro Gordo County, a large urban county with a population of 44,141 residents in 2010. The county experienced a population decline of 4.9% and housing unit growth of 3.1% from 2000 to 2010.

Economic Characteristics

The Cerro Gordo County economy is well-diversified among goods-producing and service-providing industries. Figure 1 illustrates the county's percentage of gross regional product by major industry group.[1] Professional and high value services such as finance, insurance, health and education contribute 27% of gross product in the county. Trade, transportation and related industries contribute 23% of gross regional product. Manufacturing constitutes another 17% of the county's economy.

Figure 1. Gross regional product for Cerro Gordo County

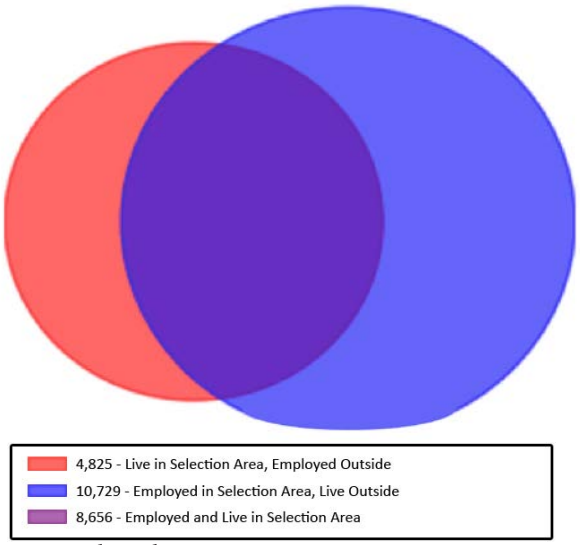


Source: IMPLAN model of the Cerro Gordo County economy, Iowa State University

[1]Gross regional product, also referred to as value added, includes all labor income, profits and payments to government.

Commuting flow data for Mason City attest to the city's importance as a regional employment center. About 55% of jobs in the city are filled by residents from other communities. The largest worker inflows originate from Clear Lake, which supplies 5.2% of workers in Mason City, followed by Charles City (1.5%) and Des Moines (1.5%). Figure 2 shows the total inflow and outflow job counts for Mason City in 2009.

Figure 2. Inflow/outflow job counts for 2009



Source: Local Employment Dynamics, US Census Bureau

Mason City also serves as a regional center for retail and service activity. Taxable retail sales data from the Iowa Department of Revenue show that Mason City averaged $20,300 in per capita sales in fiscal year 2009, compared to an average of $11,200 for the state of Iowa. After adjusting for local income differentials, the ratio of the city and state per capita sales values yields a pull-factor ratio of 1.82, suggesting that Mason City serves a retail customer base that is 82% larger than its own population size.

Housing Characteristics

Table 1 summarizes key housing characteristics for Mason City. Except where noted, the data were obtained from 2005–2009 American Community Survey (ACS) estimates produced by the US Census Bureau.[2] The ACS values

[2]ACS estimates are presented with 90% confidence intervals, meaning there is a 90% likelihood that the true value for the population falls within the range of values shown.

reflect average characteristics during the entire 2005–2009 period; thus, they include both pre-flood and post-flood housing conditions.

ACS data suggest that the median value of homes in Mason City ranges from $94,000 to $101,000. Between 16 and 24% of owner-households with a mortgage have monthly housing costs exceeding 35% of their household income. Anywhere from 32 to 43% of renter-households have monthly housing costs that exceed 35% of their incomes. The city's housing unit vacancy rate of 7.4% was lower than the statewide average of 8.6%, according to 2010 Census data.

Flood Risk Exposure (Prior to 2008)

Figure 3 shows the relative exposure to flood risk in Cerro Gordo County by population group and housing type prior to the 2008 floods. The chart compares the percentage of county population, housing, and jobs that were located in high-risk census blocks. For this analysis, census blocks having more than 75% of their total land area located within a 100-year floodplain were designated as high-risk blocks. Block-level population and housing data were obtained from the 2000 Census. Job counts for 2007 were obtained from Local Employment Dynamics data from the US Census Bureau.

Overall, about .5% of Cerro Gordo County residents lived in census blocks with high exposure to flood risk. Nonfamily households with multiple residents faced a higher risk than other types of households. About 1% of Cerro Gordo County jobs were located in the high-risk blocks in 2007.

Table 1. Key housing characteristics for Mason City compared to the state of Iowa

Measure	Mason City	State of Iowa
Total population (2010 Census)	28,079	3,046,355
Race other than white alone (%)	6.2	8.7
Hispanic origin of any race (%)	5.1	5.0
Total housing units (2010 Census)	13,352	1,336,417
Vacant units (%)	7.4	8.6
Owner-occupied units (%)	62.2	65.9
Renter-occupied units (%)	30.4	25.5
Housing units by type of structure (%)		
1 unit, detached	72.7–77.5	73.6–74.0
1 unit, attached	1.1–2.7	3.1–3.3
2 units	1.5–4.1	2.6–2.8
3 or 4 units	2.1–4.1	3.6–3.8
5 to 9 units	3.7–6.7	3.6–3.8
10 to 19 units	2.0–4.0	3.7–3.9
20 or more units	5.9–8.9	4.7–4.9
Mobile home	0.8–2.0	4.1–4.3
Boat, RV, van, etc.	0.0–0.2	0.0–0.1
Housing units built before 1940 (%)	26.8–32.6	28.7–29.1
Value of owner-occupied units (%)		
Less than $50,000	10.1–14.5	12.1–12.5
$50,000 to $99,999	37.0–43.8	28.8–29.4
$100,000 to $149,999	17.5–23.7	24.4–24.8
$150,000 to $199,999	9.3–13.9	15.2–15.6
$200,000 to $299,999	10.0–14.2	11.6–12.0
$300,000 to $499,999	1.5–3.5	5.0–5.2
$500,000 to $999,999	0.1–1.1	1.3–1.5
$1,000,000 or more	0.0–0.3	0.2–0.4
Median value of owner-occupied units ($)	93,691–100,709	115,292–116,308
Median gross rent ($)	554–600	603–611
Monthly housing costs exceeding 35% of income		
Owners with a mortgage (%)	15.9–23.9	16.6–17.2
Owners with no mortgage (%)	5.6–11.6	9.0–9.4
Renters (%)	31.7–42.9	35.1–36.3

Sources: 2010 Census and 2005–2009 American Community Survey, US Census Bureau

Indicators of Post-flood Economic Performance

The following sections compare indicators of local economic performance before and after the 2008 floods. Trends in population, enrollment and commuting patterns are examined for evidence of changes in residential location preferences in the region. Retail sales trends are investigated to detect changes in area household spending and the ability of local firms to capture that spending. Unemployment and employment trends are assessed to gauge the region's general economic performance.

Population Change

Changes in the local population size have important implications for a community's housing needs. Local population size is very difficult to measure accurately, and local officials generally rely on the most recent decennial census for the most accurate information about their population size.

Figure 4 shows recent population trends for the city of Mason City. One data series shows actual decennial census counts for 2000 and 2010 with an imputed trend line for the intervening years. The second series plots annual population estimates produced by the US Census Bureau. Although subject to error, the Census Bureau's annual estimates can be used to discern changes in the pace of growth throughout the decade.

The annual population estimates for Mason City suggest a gradual decline in population throughout the last decade. There were no indications of a change in the trend after the floods. As revealed by the 2010 Census results, the annual estimates series overpredicted the city's population losses for the decade as a whole.

School Enrollment

Housing losses and uncertainty over housing assistance during the 2008 floods raised fears that displaced residents would permanently relocate to surrounding suburbs or other nearby cities. If young families relocated en masse to surrounding communities, these shifts should be evident in enrollment data for area school districts.

Figure 3. Cerro Gordo County: percentage of county populations, households and housing units with high risk for flooding

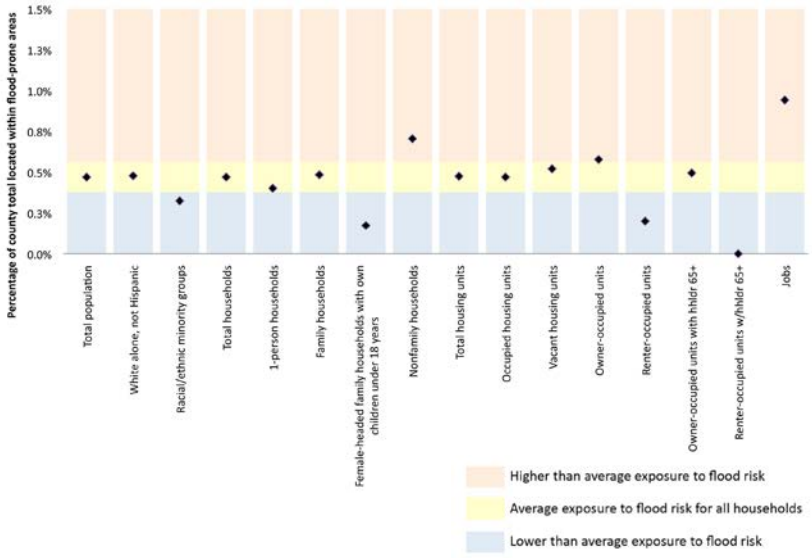


Figure 4. Mason City estimated and actual population

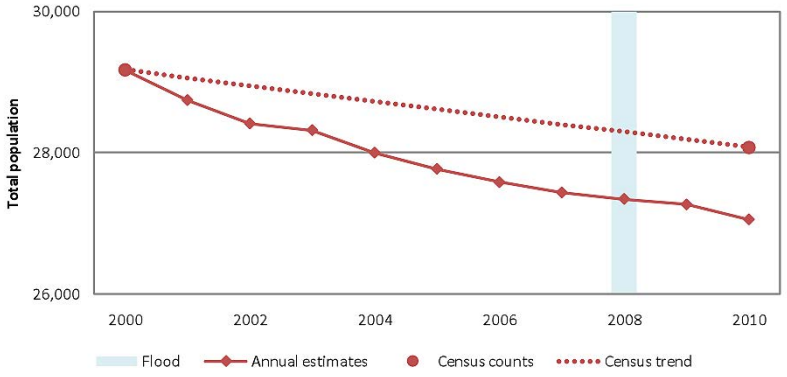


Figure 5 shows the trend in public school enrollment for the Mason City public school district. The enrollment trends for neighboring school districts (within five miles) and for the state of Iowa are also illustrated. For each region, enrollment values in a given year are expressed in percentage terms compared to enrollment levels in the 2000–2001 academic year. The enrollment data were obtained from the Iowa Department of Education Basic Educational Data Survey.

Enrollment in the Mason City school district has been trending downward gradually since 2001, although the pace of decline abated somewhat after 2007. School districts surrounding Mason City have seen larger enrollment declines. Both areas have underperformed the statewide average enrollment trend during the last decade. Enrollment changes since 2008 appear consistent with the longer-term trend in Mason City, and there is no evidence

that enrollment shifted to neighboring districts after the floods.

Area Commuting Patterns

Changes in the availability and affordability of local housing may have influenced local workers' commuting decisions. Data on the residential locations of Mason City workers can be used to detect any notable changes in the propensity for workers to live outside the city and commute in to work as opposed to residing and working within the city.

Figure 6 illustrates the recent trend in in-commuting rates to Mason City. The chart measures the percentage of all jobs in Mason City that are filled by workers who, for one reason or another, live outside of the city. The commuting data were obtained from the US Census Bureau Local Employment Dynamics program.

In Mason City, the percentage of jobs filled by in-commuters has steadily increased in recent years, reaching 53% in 2007. Changes in the in-commuting rate from 2007 to 2009 were consistent with the longer-term trend for the city.

Retail Trade

The local retail sector could have a mixed experience from a natural disaster. Any losses in local jobs and population could mean a reduction in area household incomes, leading to a decline in local retail sales. Alternatively, rebuilding and recovery efforts could temporarily stimulate the local retail sector. The magnitude of losses or gains would depend on the extent to which the local retail sector was already capturing or leaking sales of the region's residents before the disaster occurred.

Figure 7 illustrates changes in taxable retail sales activity in Mason City during the eight quarters prior and subsequent to the period of flooding. The statewide trend in retail sales is included for comparison. The chart shows real taxable retail sales in each quarter as a percentage of sales that occurred during the same quarter of the prior year. The taxable sales data were obtained from the Iowa Department of Revenue and Finance.

Figure 5. Annual public school district enrollment

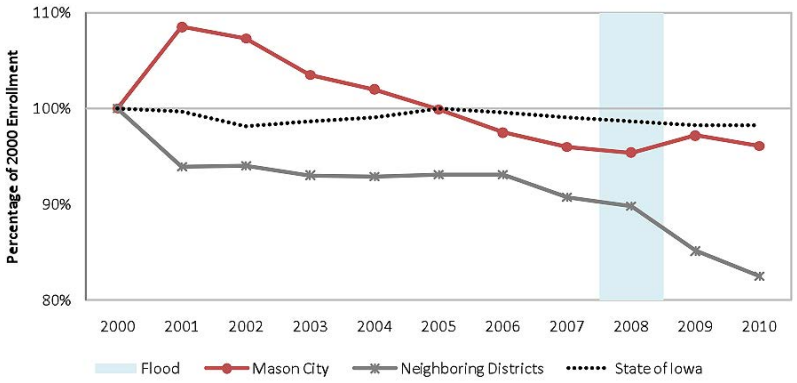


Figure 6. Annual rates of in-commuting by workers

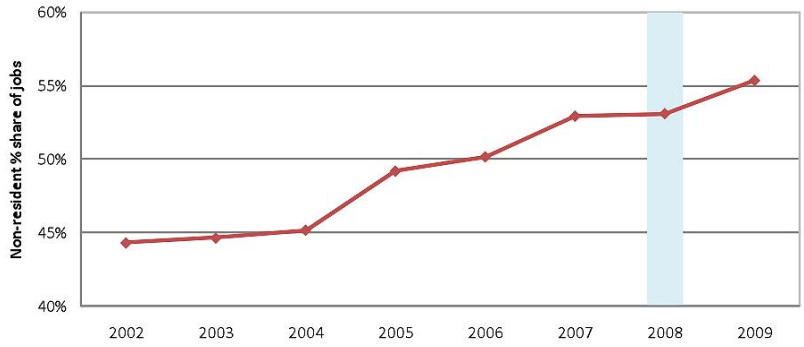
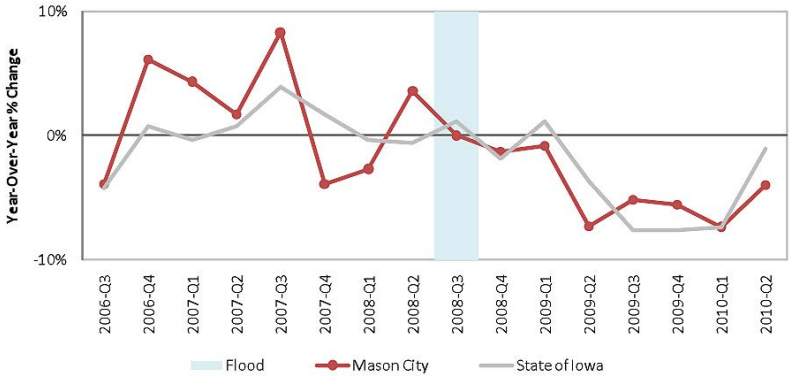


Figure 7. Quarterly taxable retail sales



Mason City posted a 0% change in real retail sales for the third quarter of 2008, meaning that sales levels during July–September of the flood year were no different than the year before. There is no flood-related boost or decline evident in the quarterly sales data for Mason City.

Iowa's retail sales growth was relatively flat during the two years preceding the floods. Persistent statewide declines began in the second quarter of 2009, suggesting that recessionary effects on household spending were

beginning to be felt in the state's retail sector. Mason City's performance has generally followed the statewide trend since the 2008 floods.

Unemployment Rate

Business disruptions and failures may have contributed to temporary and permanent layoffs of workers in the region. While many job losses would have been covered by regular or emergency unemployment insurance programs, others may not have been. Rising unemployment rates can signal higher levels of household economic stress and may also correspond with growing numbers of households experiencing difficulty in meeting their monthly housing costs.

Figure 8 shows the monthly unemployment rate in Cerro Gordo County for two years prior to and after the period of flooding. The unemployment data were obtained from the US Bureau of Labor Statistics (BLS).

In order to provide context for Cerro Gordo County's performance, the average unemployment rate for a group of similarly sized nonmetropolitan counties in Iowa is also shown. The peer group includes the counties of Cerro Gordo, Lee, Wapello and Webster.

Cerro Gordo County's unemployment rate has generally tracked the pattern of change in its peer group through the entire period shown. No notable increase in Cerro Gordo County's unemployment rate is evident during the flood period. Since the floods, the unemployment rate in Cerro Gordo County has remained below the peer group average.

Employment Change

Employment levels can be used to evaluate the overall performance of the local economy during and after the disaster period. Because employment levels have a high degree of seasonal variability, changes in employment trends are more easily detected by comparing employment in each month to the same month in the prior year.

Figure 9 shows year-over-year percentage changes in Cerro Gordo County employment and its comparison peer group (see section on unemployment in the summary report for a definition of the peer group). The employment

Figure 8. Monthly unemployment rates

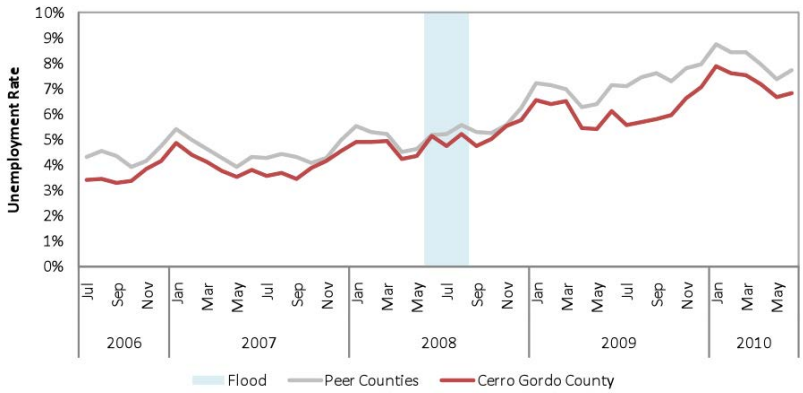
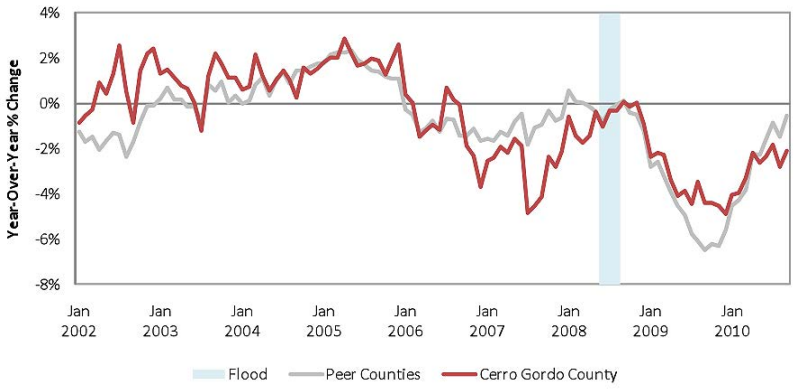


Figure 9. Monthly employment rates



data were obtained from the US BLS Quarterly Census of Employment and Wages.

Cerro Gordo County's employment trend has closely tracked its peer group for most of the period illustrated below. The county began to experience year-over-year employment declines in early 2006, and the declines have persisted since that time. The county's rate of job loss appeared to slow after mid-2007, but picked up again in late 2008. The magnitude and duration of the county's employment losses suggest that they were recession-related as opposed to flood-related.

Figure 9 shows the timing and magnitude of employment change, but not the reasons for change. It cannot be concluded whether employment changes during and after the flooding were attributable to the flood itself, the recession, or other local or external causes. Using a method called shift-share analysis, one can attempt to isolate changes explained by local factors by controlling for external economic influences.

Shift-share analysis deconstructs job gains or losses into three explanatory components: statewide growth, industry mix and local competitive share. The statewide growth

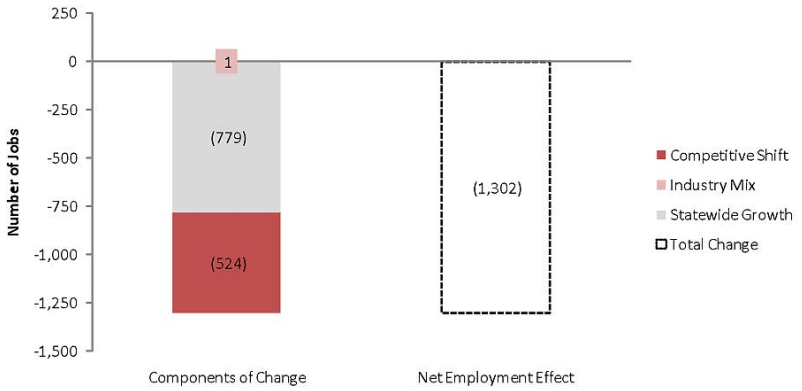
component provides an expected value for employment growth based on the average performance of all nonfarm industries across the state. Industry mix accounts for local concentrations of employment in sectors that, at the statewide level, outperformed or underperformed the nonfarm industry average. The competitive share component measures the performance of local firms in comparison to other firms in the same industries in other counties.

Figure 10 shows a competitive shift-share analysis for employment change in Cerro Gordo County from 2007 to 2009. The industry-level employment data used for this analysis were obtained from the US Bureau of Economic Analysis.

Had all industries in Cerro Gordo County performed at the statewide nonfarm average rate, the county would have lost 779 jobs from 2007 to 2009. The employment mix by industrial sector in Cerro Gordo County was nearly identical to the state, so the industry mix component was expected to offset the county's expected employment loss by only one job.

The actual loss of 1,302 jobs in Cerro Gordo County suggests that its industries performed worse than their statewide counterparts. On a competitive basis, the county lost 524 more jobs than would have otherwise been expected.

Figure 10. Shift-share analysis of employment change in Cerro Gordo County, 2007–2009



Summary of Recent Economic and Demographic Trends

This analysis did not identify significant changes in Mason City/Cerro Gordo County economic activity that could be attributed solely to the weather-related disasters of 2008. Cerro Gordo County employment and unemployment trends show evidence of recession-related stress, but there is no clear evidence of flood-related disruptions. Similarly, retail sales declines in Mason City were consistent with recessionary economic forces. Post-flood population and enrollment trends in Mason City were generally consistent with the pre-flood period.

Appendix 7. Waterloo/Black Hawk County Economic Impact Analysis

Overview of the Study Area

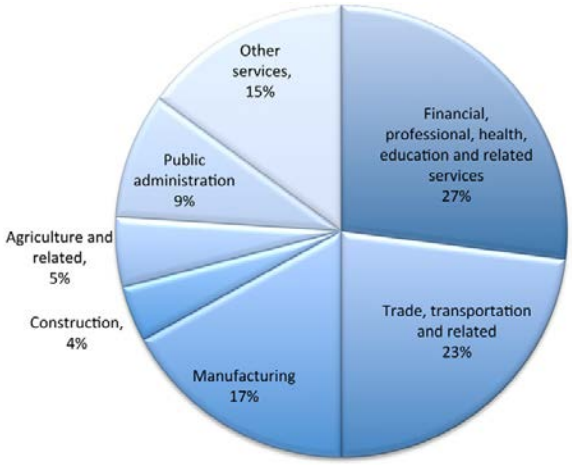
The city of Waterloo, Iowa, had 68,406 residents in 2010. The city's population declined by 0.5% from 2000 to 2010, compared to a statewide average growth rate of 4.1%. The number of housing units in Waterloo increased by 4.1% from 2000 to 2010, reaching 30,723 total units in 2010. Housing unit growth for the state of Iowa averaged 8.4% for the decade.

Waterloo is located in Black Hawk County, which is the core of a three-county metropolitan statistical area (MSA) that also includes the counties of Bremer and Grundy. Black Hawk County had 131,090 residents in 2010, while the entire Waterloo-Cedar Falls MSA had 167,819 residents. Black Hawk County experienced population growth of 2.4% and housing unit growth of 8.0% from 2000 to 2010.

Economic Characteristics

The Black Hawk County economy has a large and dominant manufacturing sector. Figure 1 illustrates the county's percentage of gross regional product by major industry group.[1] Professional and high-value services such as finance, insurance, health care and education contribute 22% of gross regional product. Trade, transportation and related industries constitute 18% of the county's economy.

Figure 1. Gross regional product for Black Hawk County

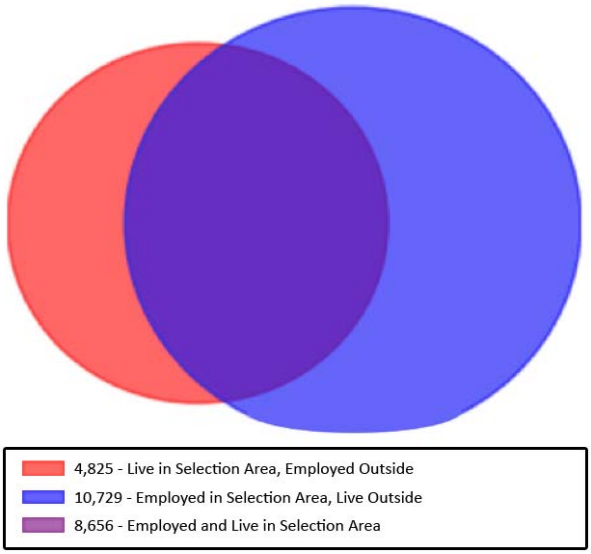


Source: IMPLAN model of the Black Hawk County economy, Iowa State University

[1]Gross regional product, also referred to as value added, includes all labor income, profits and payments to government.

Commuting flow data for Waterloo attest to the city's importance as a regional employment center. Nearly 64% of jobs in the city are filled by residents from other communities. The city of Cedar Falls supplies 11.5% of workers in Waterloo, followed by Evansdale (2.6%) and Waverly (1.8%). Figure 2 shows the total inflow and outflow job counts for Waterloo in 2009.

Figure 2. Inflow/outflow job counts for 2009



Source: Local Employment Dynamics, US Census Bureau

Waterloo also serves as a major center for retail and service activity. Taxable retail sales data from the Iowa Department of Revenue show that Waterloo averaged $17,165 in taxable, per capita sales in fiscal year 2009, compared to an average of $11,200 for the state of Iowa. After adjusting for local income differentials, the ratio of city and state per capita sales yields a pull-factor ratio of 1.55, suggesting that Waterloo serves a retail customer base that is 55% larger than its own population size.

Housing Characteristics

Table 1 summarizes key housing characteristics for Waterloo. Except where noted, the data were obtained from 2005–2009 American Community Survey (ACS) estimates produced by the US Census Bureau.[2] The ACS

[2]ACS estimates are presented with 90% confidence intervals, meaning there is a 90% likelihood that the true value for the population falls within the range of values shown.

values reflect average characteristics during the entire 2005–2009 period; thus, they include both pre-flood and post-flood housing conditions.

ACS data suggest that the median value of homes in Waterloo ranges from about $96,000 to $100,000. Between 16 and 21% of owner-households with a mortgage have monthly housing costs exceeding 35% of their household income. An estimated 42–48% of renter-households have monthly housing costs that exceed 35% of their incomes. The city's housing unit vacancy rate of 6.9% was lower than the statewide average of 8.6%, according to 2010 Census data.

Table 1. Key housing characteristics for Waterloo compared to the state of Iowa

Measure	Waterloo	State of Iowa
Total population (2010 Census)	68,406	3,046,355
Race other than white alone (%)	22.7	8.7
Hispanic origin of any race (%)	5.6	5.0
Total housing units (2010 Census)	30,723	1,336,417
Vacant units (%)	6.9	8.6
Owner-occupied units (%)	61.0	65.9
Renter-occupied units (%)	32.1	25.5
Housing units by type of structure (%)		
1 unit, detached	67.7–70.5	73.6–74.0
1 unit, attached	3.1–4.1	3.1–3.3
2 units	3.7–5.3	2.6–2.8
3 or 4 units	2.4–3.6	3.6–3.8
5 to 9 units	6.0–8.4	3.6–3.8
10 to 19 units	3.8–5.6	3.7–3.9
20 or more units	3.9–5.3	4.7–4.9
Mobile home	2.7–3.7	4.1–4.3
Boat, RV, van, etc.	0.0–0.1	0.0–0.1
Housing units built before 1940 (%)	25.8–28.4	28.7–29.1
Value of owner-occupied units (%)		
Less than $50,000	11.3–13.9	12.1–12.5
$50,000 to $99,999	37.8–41.4	28.8–29.4
$100,000 to $149,999	26.0–30.2	24.4–24.8
$150,000 to $199,999	10.4–13.2	15.2–15.6
$200,000 to $299,999	3.8–5.4	11.6–12.0
$300,000 to $499,999	2.0–3.4	5.0–5.2
$500,000 to $999,999	0.1–0.7	1.3–1.5
$1,000,000 or more	0.0–0.3	0.2–0.4
Median value of owner-occupied units ($)	95,670–99,730	115,292–116,308
Median gross rent ($)	570–596	603–611
Monthly housing costs exceeding 35% of income		
Owners with a mortgage (%)	16.5–20.5	16.6–17.2
Owners with no mortgage (%)	9.3–13.7	9.0–9.4
Renters (%)	41.6–48.0	35.1–36.3

Sources: 2010 Census and 2005–2009 American Community Survey, US Census Bureau

Flood Risk Exposure (Prior to 2008)

Figure 3 shows the relative exposure to flood risk in Black Hawk County by population group and housing type prior to the 2008 floods. The chart compares the percentage of county population, housing and jobs that were located in high-risk census blocks. For this analysis, census blocks having more than 75% of their total land area located within a 500-year floodplain were designated as high-risk blocks. Block-level population and housing data were obtained from the 2000 Census. Job counts for 2007 were obtained from Local Employment Dynamics data from the US Census Bureau.

Overall, about 15% of Black Hawk County residents lived in census blocks with high exposure to flood risk. The population in one or more racial or ethnic minority groups had a higher risk compared to the non-Hispanic white population. Female-headed households with children had a higher exposure to flood risk than other family and nonfamily households. A higher fraction of the county's vacant housing units were located within at-risk blocks compared to other types of housing. The percentage of Black Hawk County jobs located within the flood risk areas was nearly 20% in 2007, slightly higher than the average exposure for the county's households.

Indicators of Post-flood Economic Performance

The following sections compare indicators of local economic performance before and after the 2008 floods. Trends in population, enrollment and commuting patterns are examined for evidence of changes in residential location preferences in the region. Retail sales trends are investigated to detect changes in area household spending and the ability of local firms to capture that spending. Unemployment and employment trends are assessed to gauge the region's general economic performance.

Figure 3. Black Hawk County: percentage of county populations, households and housing units with high risk for flooding

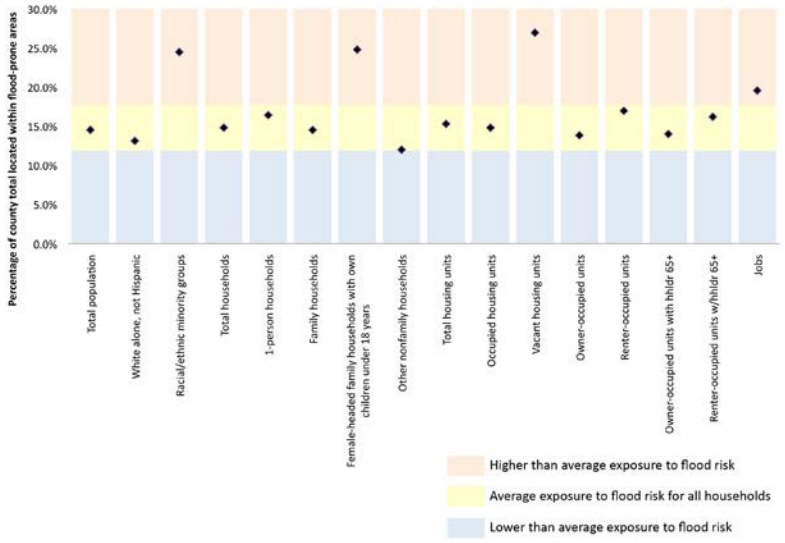


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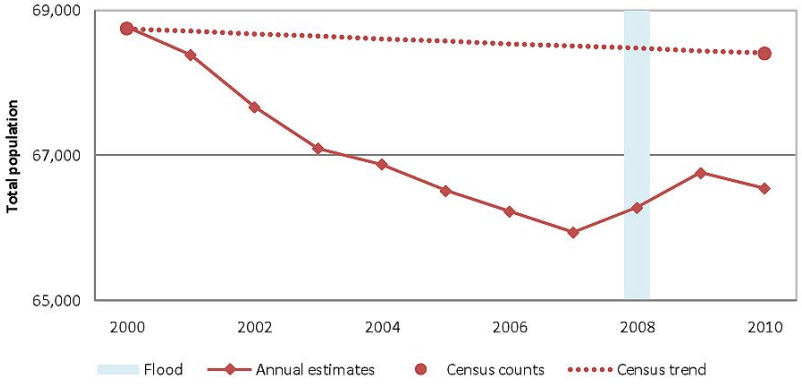
Figure 4. Waterloo estimated and actual population



The annual population estimates for Waterloo suggest that the city lost residents from 2000 through 2007. There were no indications of a flood-related population decline in the estimated series. As revealed by the 2010 Census results, the annual estimates series overpredicted the city's total population loss for the 2000–2010 decade.

School Enrollment

Housing losses and uncertainty over housing assistance during the 2008 floods raised fears that displaced residents would permanently relocate to surrounding suburbs or other nearby cities. If young families relocated en masse to surrounding communities, these shifts should be evident in enrollment data for area school districts.

Figure 5 shows the trend in public school enrollment for the Waterloo public school district. The enrollment trends for neighboring school districts (within five miles) and for the state of Iowa are also illustrated. For each region, enrollment values in a given year are expressed in percentage terms compared to enrollment levels in the 2000–2001 academic year. The enrollment data were obtained from the Iowa Department of Education Basic Educational Data Survey.

Enrollment in the Waterloo school district has been trending downward gradually since 2005, and has closely followed the statewide enrollment trend since 2006. Enrollment in the surrounding school districts has been climbing somewhat steadily since 2002, with a very slight drop occurring in 2008. Enrollment changes since 2008 have not deviated sharply from recent historical trends, either in Waterloo or the surrounding districts.

Area Commuting Patterns

Changes in the availability and affordability of local housing may have influenced local workers' commuting decisions. Data on the residential locations of Waterloo workers can be used to detect any notable changes in the propensity for workers to live outside the city and commute in to work as opposed to residing and working within the city.

Figure 6 illustrates the recent trend in in-commuting rates to Waterloo. The chart measures the percentage of all jobs in Waterloo that are filled by workers who, for one reason or another, live outside of the city. The commuting data were obtained from the US Census Bureau Local Employment Dynamics program.

In Waterloo, the percentage of jobs filled by in-commuters had been trending upward for several years before the 2008 floods, reaching about 63% in 2007. Between 2007 and 2009, there appears to be no significant change in the likelihood that Waterloo jobs were filled by nonresidents as opposed to residents.

Retail Trade

The local retail sector could have a mixed experience from a natural disaster. Any losses in local jobs and population could mean a reduction in area household incomes, leading to a decline in local retail sales. Alternatively, rebuilding and recovery efforts could temporarily stimulate the local retail sector. The magnitude of losses or gains would depend on the extent to which the local retail sector was already capturing or leaking sales of the region's residents before the disaster occurred.

Figure 7 illustrates changes in taxable retail sales activity in Waterloo during the eight quarters prior and subsequent to the period of flooding. The trend in retail sales for the state of Iowa is included for comparison. The chart shows real taxable retail sales in each quarter as a percentage of sales that occurred during the same quarter of the prior year. The taxable sales data were obtained from the Iowa Department of Revenue and Finance.

Figure 5. Annual public school district enrollment

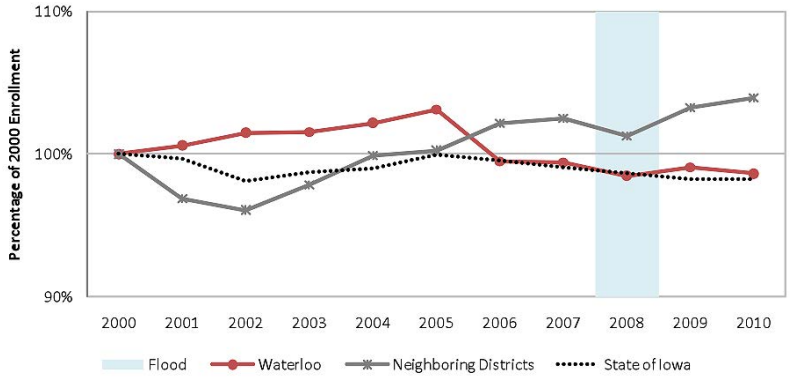


Figure 6. Annual rates of in-commuting by workers

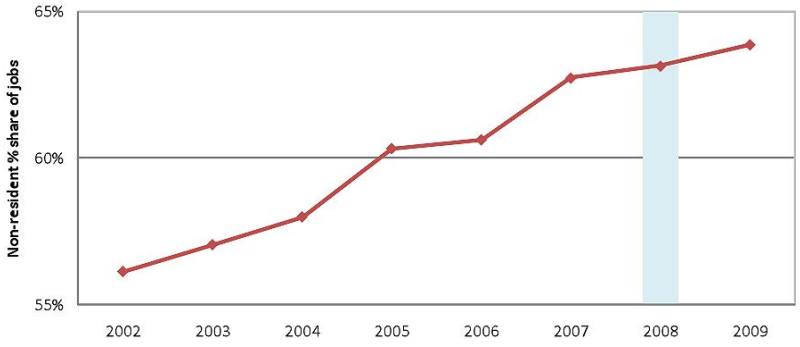
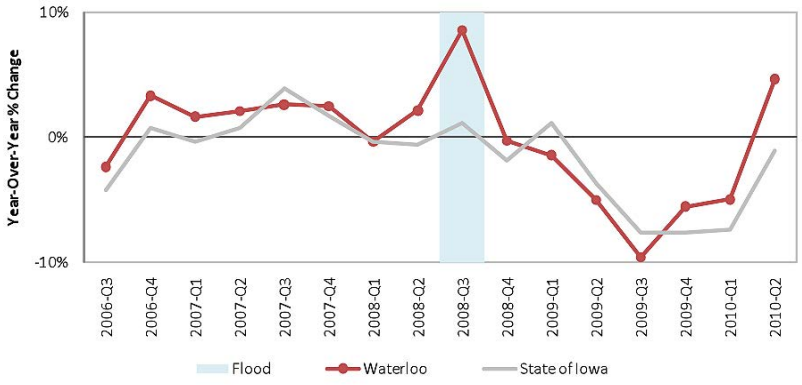


Figure 7. Quarterly taxable retail sales



July–September retail sales in Waterloo during the flood year were 8.5% higher than the year before. It is reasonable to assume that this sales increase was related to flood recovery efforts. As a major center for retail trade activity in the surrounding region, Waterloo merchants likely enjoyed a temporary boost in sales to residents of a much broader flood-affected region.

The statewide trend in sales suggests that by the second quarter of 2009, the effects of the national recession were beginning to be felt in Iowa's retail sector. Sales declines

in Waterloo had begun slightly earlier, in the fourth quarter of 2009. Waterloo sales in the third quarter of 2009 were 10% lower than the high levels achieved during the flood quarter in the previous year. By the end of the second year after the flood, Waterloo was outperforming the statewide average trend in retail sales performance.

Unemployment Rate

Business disruptions and failures may have contributed to temporary and permanent layoffs of workers in the region. While many job losses would have been covered by regular or emergency unemployment insurance programs, others may not have been. Rising unemployment rates can signal higher levels of household economic stress and may also correspond with growing numbers of households experiencing difficulty in meeting their monthly housing costs.

Figure 8 shows the monthly unemployment rate in Black Hawk County for two years prior to and after the period of flooding. The unemployment data were obtained from the US Bureau of Labor Statistics (BLS).

Figure 8. Monthly unemployment rates

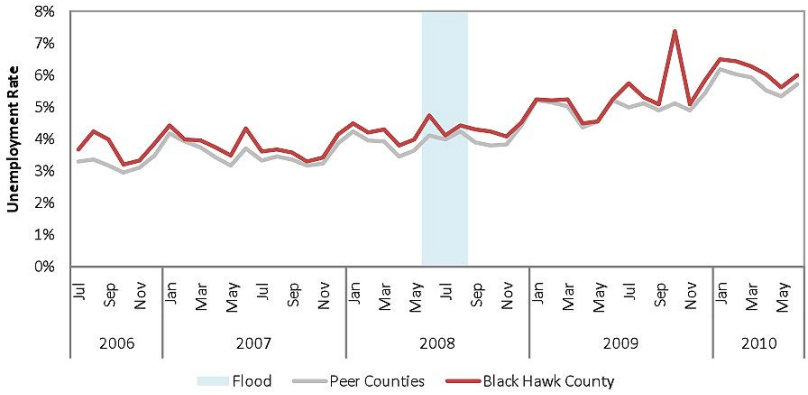
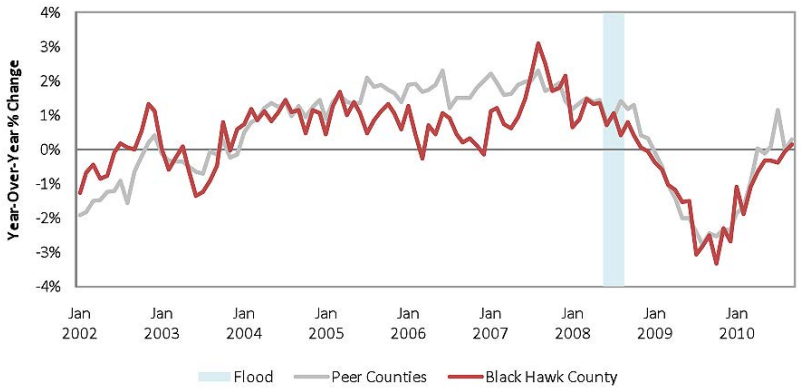


Figure 9. Monthly employment rates



In order to compare Black Hawk County to its peers, the average unemployment rate for other small metropolitan counties in Iowa is also shown. The peer group includes the following counties: Benton, Black Hawk, Bremer, Dubuque, Grundy, Johnson, Jones, Linn, Story, Washington and Woodbury.

Black Hawk County's unemployment rate has closely tracked the pattern of change in other small metropolitan counties in Iowa, both before and after the 2008 floods. The county's unemployment rate during the period of flooding did not deviate markedly from its longer-term trend.

Employment Change

Employment levels can be used to evaluate the overall performance of the local economy during and after the disaster period. Because employment levels have a high degree of seasonal variability, changes in employment trends are more easily detected by comparing employment in each month to the same month in the prior year.

Figure 9 shows year-over-year percentage changes in Black Hawk County employment and its comparison peer group (see section on unemployment in the summary report for a definition of the peer group). The employment data were obtained from the US BLS Quarterly Census of Employment and Wages.

Black Hawk County enjoyed year-over-year gains in employment for most of the five-year period beginning early in 2004 and ending late in 2008. There are no indications of a sharp decline during the period of flooding. Black Hawk County began to experience year-over-year declines in early in 2009, about the same time as other counties in the peer group. Employment in Black Hawk has continued to closely follow the peer group trend into 2010. The pattern of employment declines in Black Hawk County suggests that they were recession-related as opposed to flood-related.

Figure 9 shows the timing and magnitude of employment change, but not the reasons for change. It cannot be concluded whether employment changes during and after the flooding were attributable to the flood itself, the recession, or other local or external causes. Using a method called shift-share analysis, one can attempt to

isolate changes explained by local factors by controlling for external economic influences.

Shift-share analysis deconstructs job gains or losses into three explanatory components: statewide growth, industry mix and local competitive share. The statewide growth component provides an expected value for employment growth based on the average performance of all nonfarm industries across the state. Industry mix accounts for local concentrations of employment in sectors that, at the statewide level, outperformed or underperformed the nonfarm industry average. The competitive share component measures the performance of local firms in comparison to other firms in the same industries in other counties.

Figure 10. Shift-share analysis of employment change in Black Hawk County, 2007–2009

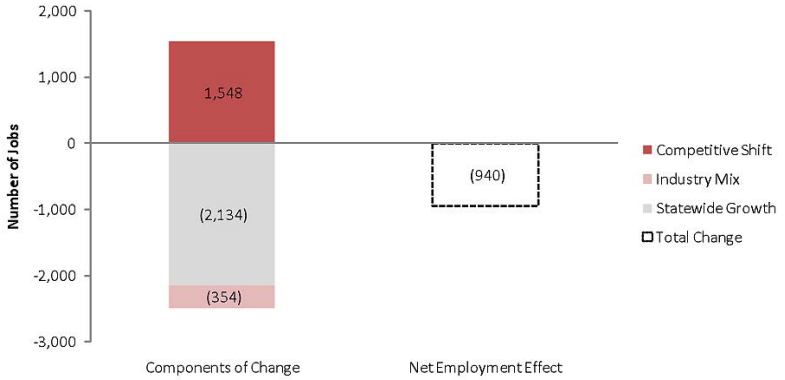


Figure 10 shows a competitive shift-share analysis for employment change in Black Hawk County from 2007 to 2009. The industry-level employment data used for this analysis were obtained from the US Bureau of Economic Analysis.

Had all industries in Black Hawk County performed at the statewide nonfarm average rate, the county would have lost 2,134 jobs from 2007 to 2009. The industry mix in Black Hawk County was weighted slightly toward industries that performed worse than the statewide nonfarm average rate. Given that industrial mix, we could have expected an additional loss of 354 jobs in the county.

The county actually lost only 940 jobs for the period, suggesting that the industries in Black Hawk County performed better than their statewide counterparts.

The county's positive competitive shift component was equivalent to 1,548 jobs. This analysis shows that the Black Hawk County economy remained competitive with the rest of the state despite the 2008 floods.

Summary of Recent Economic and Demographic Trends

This analysis did not identify significant changes in regional economic activity that could be attributed solely to the weather-related disasters of 2008. Despite the losses experienced by individual households and businesses as a result of the disasters, the overall performance of the Waterloo/Black Hawk County economy did not show evidence of lasting structural change. A temporary boost in retail sales activity was apparent in Waterloo. The city's post-flood population and enrollment trends appeared consistent with longer-term trends. Recent unemployment and employment trends in Black Hawk County are more suggestive of recession-related effects than flood-related effects.

Appendix 8. Waverly/Bremer County Economic Impact Analysis

Overview of the Study Area

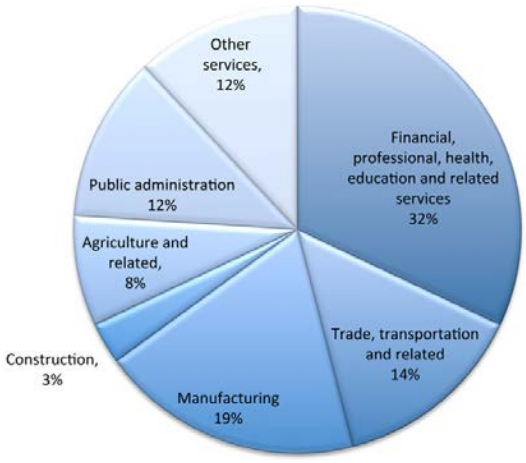
The city of Waverly, Iowa, had 9,874 residents in 2010. The city's population grew by 10.1% from 2000 to 2010, more than twice the statewide average growth rate of 4.1%. The number of housing units in Waverly increased by 10.0% from 2000 to 2010, reaching 3,732 total units in 2010. Housing unit growth for the state of Iowa averaged 8.4% for the decade.

Waverly is located in Bremer County, which is located within the three-county Waterloo-Cedar Falls metropolitan statistical area (MSA) that also includes the counties of Black Hawk and Grundy. Bremer County had 24,276 residents in 2010, while the entire Waterloo-Cedar Falls MSA had 167,819 residents. Bremer County experienced population growth of 4.1% and housing unit growth of 6.2% from 2000 to 2010.

Economic Characteristics

The Bremer County economy is weighted toward service-related industries. Figure 1 illustrates the county's percentage of gross regional product by major industry group.[1] Professional and other high-value services such as finance, insurance, real estate, health and education constitute nearly a third of gross product in the county. Public administration and other services each contribute another 12%. The manufacturing sector contributes 19% of the county's gross regional product.

Figure 1. Gross regional product for Bremer County

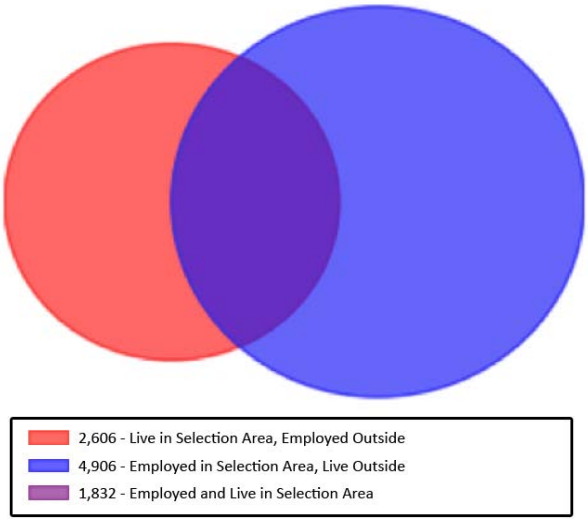


Source: IMPLAN model of the Bremer County economy, Iowa State University

[1]Gross regional product, also referred to as value added, includes all labor income, profits and payments to government.

Commuting flow data for Waverly attest to the city's importance as a regional employment center. Nearly 73% of jobs in the city are filled by residents from other communities. The city of Waterloo supplies 7.6% of workers in Waverly, followed by Cedar Falls (5.2%) and Tripoli (2.2%). Figure 2 shows the total inflow and outflow job counts for Waverly in 2009.

Figure 2. Inflow/outflow job counts for 2009



Source: Local Employment Dynamics, US Census Bureau

Waverly also serves as a regional center for retail and service activity. Taxable retail sales data from the Iowa Department of Revenue show that Waverly averaged $13,130 in taxable, per capita sales in fiscal year 2009, compared to an average of $11,200 for the state of Iowa. After adjusting for local income differentials, the ratio of city and state per capita sales yields a pull-factor ratio of 1.19, suggesting that Waverly serves a retail customer base that is 19% larger than its own population size.

Housing Characteristics

Table 1 summarizes key housing characteristics for Waverly. Except where noted, the data were obtained from 2005–2009 American Community Survey (ACS) estimates produced by the US Census Bureau.[2] The ACS values

[2]ACS estimates are presented with 90% confidence intervals, meaning there is a 90% likelihood that the true value for the population falls within the range of values shown.

reflect average characteristics during the entire 2005–2009 period; thus, they include both pre-flood and post-flood housing conditions.

ACS data suggest that the median value of homes in Waverly ranges from about $124,500 to $138,000. Between 8 and 17% of owner-households with a mortgage have monthly housing costs exceeding 35% of their household income. Anywhere from 35 to 62% of renter-households have monthly housing costs that exceed 35% of their incomes. The city's housing unit vacancy rate of 5.0% was lower than the statewide average of 8.6%, according to 2010 Census data.

Flood Risk Exposure (Prior to 2008)

Figure 3 shows the relative exposure to flood risk in Bremer County by population group and housing type prior to the 2008 floods. The chart compares the percentage of county population, housing and jobs that were located in high-risk census blocks. For this analysis, census blocks having more than 75% of their total land area located within a 500-year floodplain were designated as high-risk blocks. Block-level population and housing data were obtained from the 2000 Census. Job counts for 2007 were obtained from Local Employment Dynamics data from the US Census Bureau.

Overall, about 10% of Bremer County residents lived in census blocks with high exposure to flood risk. Residents in nonfamily households with more than one resident had a higher exposure to flood risk compared to other households. A higher fraction of the county's vacant housing units and renter-occupied units were located within at-risk blocks compared to other types of housing. About 10% of Bremer County jobs were located within the flood risk areas in 2007, similar to the percentage for county residents.

Table 1. Key housing characteristics for Waverly compared to the state of Iowa

Measure	Waverly	State of Iowa
Total population (2010 Census)	9,874	3,046,355
Race other than white alone (%)	4.7	8.7
Hispanic origin of any race (%)	1.3	5.0
Total housing units (2010 Census)	3,732	1,336,417
Vacant units (%)	5.0	8.6
Owner-occupied units (%)	69.1	65.9
Renter-occupied units (%)	25.9	25.5
Housing units by type of structure (%)		
1 unit, detached	74.1–81.3	73.6–74.0
1 unit, attached	0.8–3.8	3.1–3.3
2 units	2.1–7.1	2.6–2.8
3 or 4 units	2.0–6.4	3.6–3.8
5 to 9 units	0.6–3.8	3.6–3.8
10 to 19 units	0.0–1.3	3.7–3.9
20 or more units	4.8–8.0	4.7–4.9
Mobile home	0.6–3.4	4.1–4.3
Boat, RV, van, etc.	0.0–0.6	0.0–0.1
Housing units built before 1940 (%)	21.0–28.8	28.7–29.1
Value of owner-occupied units (%)		
Less than $50,000	1.9–6.5	12.1–12.5
$50,000 to $99,999	15.3–22.5	28.8–29.4
$100,000 to $149,999	34.5–45.1	24.4–24.8
$150,000 to $199,999	12.3–19.7	15.2–15.6
$200,000 to $299,999	10.4–18.4	11.6–12.0
$300,000 to $499,999	3.3–8.3	5.0–5.2
$500,000 to $999,999	0.0–1.8	1.3–1.5
$1,000,000 or more	0.0–0.8	0.2–0.4
Median value of owner-occupied units ($)	124,466–138,334	115,292–116,308
Median gross rent ($)	505–751	603–611
Monthly housing costs exceeding 35% of income		
Owners with a mortgage (%)	7.8–16.6	16.6–17.2
Owners with no mortgage (%)	4.1–14.7	9.0–9.4
Renters (%)	35.3–61.9	35.1–36.3

Sources: 2010 Census and 2005–2009 American Community Survey, US Census Bureau

Indicators of Post-flood Economic Performance

The following sections compare indicators of local economic performance before and after the 2008 floods. Trends in population, enrollment and commuting patterns are examined for evidence of changes in residential location preferences in the region. Retail sales trends are investigated to detect changes in area household spending and the ability of local firms to capture that spending. Unemployment and employment trends are assessed to gauge the region's general economic performance.

Population Change

Changes in the local population size have important implications for a community's housing needs. Local population size is very difficult to measure accurately, and local officials generally rely on the most recent decennial census for the most accurate information about their population size.

Figure 4 shows recent population trends for the city of Waverly. One data series shows actual decennial census counts for 2000 and 2010 with an imputed trend line for the intervening years. The second series plots annual population estimates produced by the US Census Bureau. Although subject to error, the Census Bureau's annual estimates can be used to discern changes in the pace of growth throughout the decade.

The annual population estimates for Waverly suggest that population growth in the city occurred mostly between 2003 and 2007. The estimates show a slight decline and leveling off of population growth after 2007. Indications of a flood-related population decline are weak. As revealed by the 2010 Census results, the annual estimates series underpredicted the city's actual gain of 906 residents from 2000 to 2010.

School Enrollment

Housing losses and uncertainty over housing assistance during the 2008 floods raised fears that displaced residents would permanently relocate to surrounding suburbs or other nearby cities. If young families relocated en masse to surrounding communities, these shifts should be evident in enrollment data for area school districts.

Figure 5 shows the trend in public school enrollment for the Waverly public school district. The enrollment trends for neighboring school districts (within five miles) and for the state of Iowa are also illustrated. For each region, enrollment values in a given year are expressed in percentage terms compared to enrollment levels in the 2000–2001 academic year. The enrollment data were obtained from the Iowa Department of Education Basic Educational Data Survey.

Enrollment in the Waverly school district has been relatively stable throughout most of the decade, with slight growth occurring from 2008 through 2010. The city's enrollment growth exceeded the statewide average, especially for the period since 2006. The districts near

Figure 3. Bremer County: percentage of county populations, households and housing units with high risk for flooding

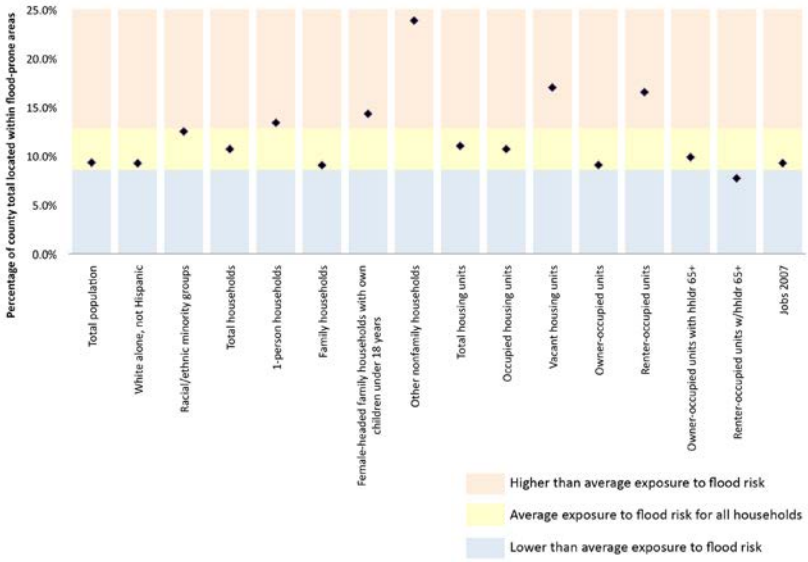
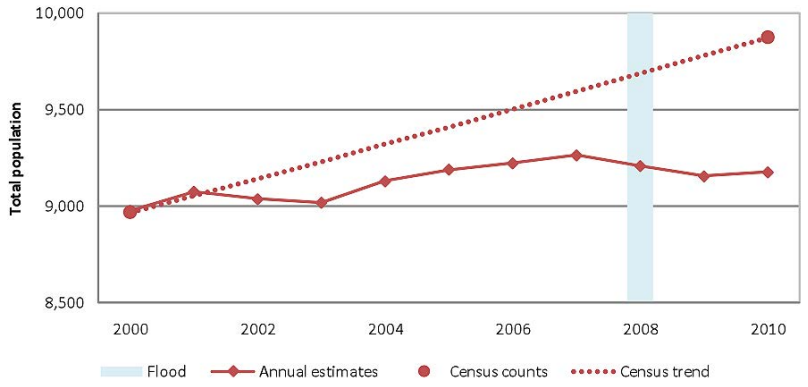


Figure 4. Waverly estimated and actual population



Waverly had enrollment declines early in the decade, but saw gains in 2003, 2007 and 2008. The outlying districts ended the decade with enrollment levels similar to where they began. Overall, enrollment changes since 2008 have not deviated sharply from recent historical trends, either in Waverly or the surrounding districts.

Area Commuting Patterns

Changes in the availability and affordability of local housing may have influenced local workers' commuting decisions. Data on the residential locations of Waverly workers can be used to detect any notable changes in the propensity for workers to live outside the city and commute in to work as opposed to residing and working within the city.

Figure 6 illustrates the recent trend in in-commuting rates to Waverly. The chart measures the percentage of all jobs in Waverly that are filled by workers who, for one reason or another, live outside of the city. The commuting data were obtained from the US Census Bureau Local Employment Dynamics program.

In Waverly, the percentage of jobs filled by in-commuters had been trending upward for several years before the 2008 floods. The in-commuting rate to the city peaked near 74% in 2008. Between 2007 and 2009, there appears to be no significant change in the likelihood that Waverly jobs were filled by nonresidents as opposed to residents.

Retail Trade

The local retail sector could have a mixed experience from a natural disaster. Any losses in local jobs and population could mean a reduction in area household incomes, leading to a decline in local retail sales. Alternatively, rebuilding and recovery efforts could temporarily stimulate the local retail sector. The magnitude of losses or gains would depend on the extent to which the local retail sector was already capturing or leaking sales of the region's residents before the disaster occurred.

Figure 5. Annual public school district enrollment

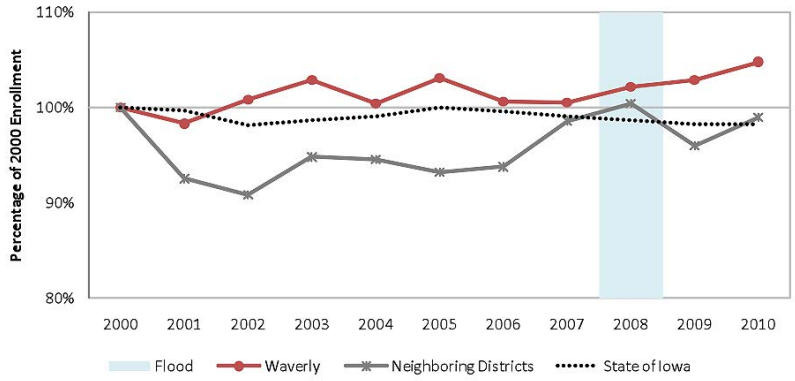


Figure 6. Annual rates of in-commuting by workers

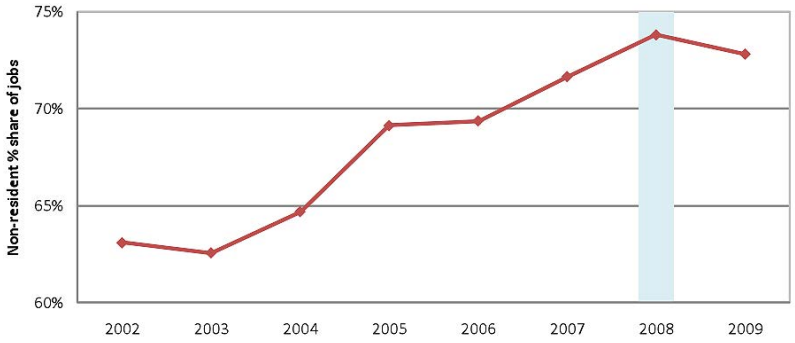


Figure 7. Quarterly taxable retail sales

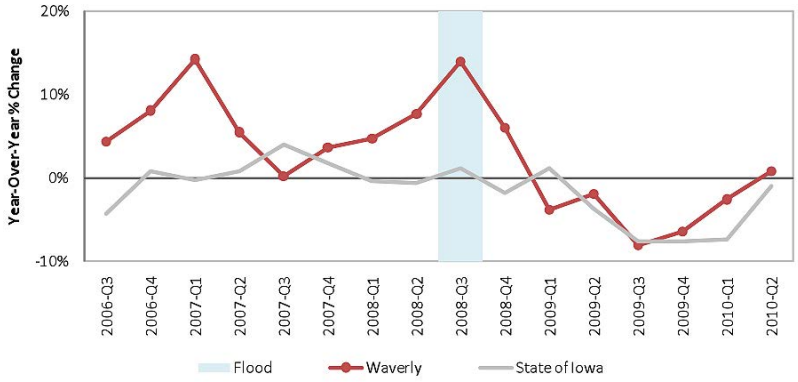


Figure 7 illustrates changes in taxable retail sales activity in Waverly during the eight quarters prior and subsequent to the period of flooding. The trend in statewide retail sales is included for comparison. The chart shows real taxable retail sales in each quarter as a percentage of sales that occurred during the same quarter of the prior year. The taxable sales data were obtained from the Iowa Department of Revenue and Finance.

July–September retail sales in Waverly during the flood year were 14% higher than the year before. While that

period marked the fourth consecutive quarter with year-over-year gains, it is reasonable to assume that at least some growth in the third and fourth quarters of 2008 was related to flood recovery efforts. Given the city's importance as a regional trade center, Waverly merchants may have enjoyed a temporary boost in sales to residents of a broader disaster-affected region.

The statewide trend in sales suggests that by the second quarter of 2009, the effects of the national recession were beginning to be felt in Iowa's retail sector. Sales in Waverly declined as well, beginning in the first quarter of 2009. Waverly's sales in the third quarter of 2009 were about 10% lower than the high levels achieved right after the floods. By the end of the second year following the flood, the city's sales levels had begun to stabilize.

Figure 8. Monthly unemployment rates

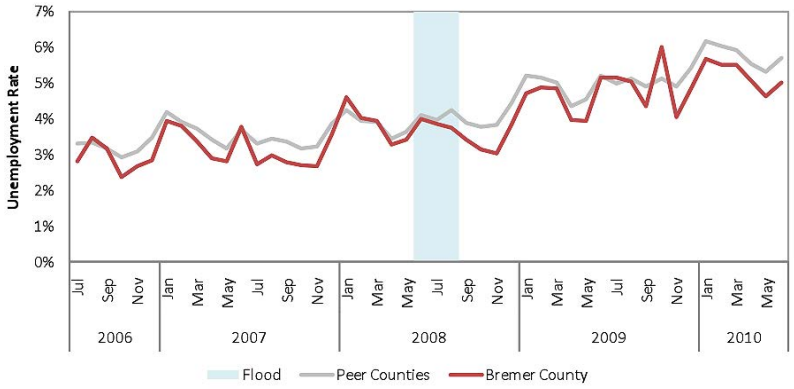
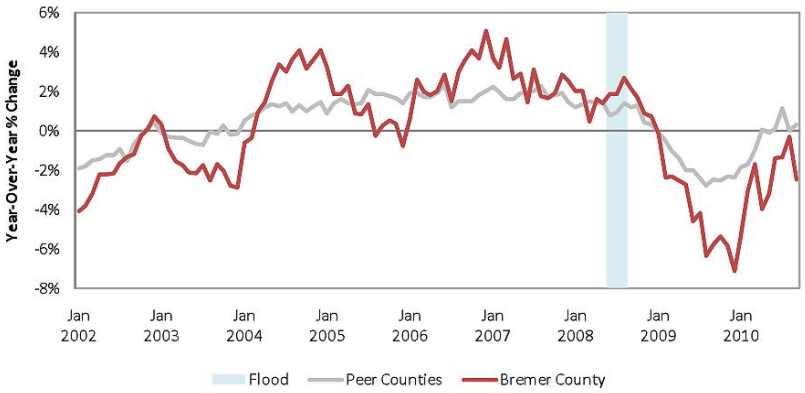


Figure 9. Monthly employment rates



Unemployment Rate

Business disruptions and failures may have contributed to temporary and permanent layoffs of workers in the region. While many job losses would have been covered by regular or emergency unemployment insurance programs, others may not have been. Rising unemployment rates can signal higher levels of household economic stress and may also correspond with growing numbers of households experiencing difficulty in meeting their monthly housing costs.

Figure 8 shows the monthly unemployment rate in Bremer County for two years prior to and after the period of flooding. The unemployment data were obtained from the US Bureau of Labor Statistics (BLS).

In order to compare Bremer County to its peers, the average unemployment rate for other small metropolitan counties in Iowa is also shown. The peer group includes the following counties: Benton, Black Hawk, Bremer, Dubuque, Grundy, Johnson, Jones, Linn, Story, Washington and Woodbury.

Bremer County's unemployment rate has closely tracked the pattern of change in other small metropolitan counties in Iowa. Since the floods, the unemployment rate in Bremer County has remained slightly lower than the peer group average.

Employment Change

Employment levels can be used to evaluate the overall performance of the local economy during and after the disaster period. Because employment levels have a high degree of seasonal variability, changes in employment trends are more easily detected by comparing employment in each month to the same month in the prior year.

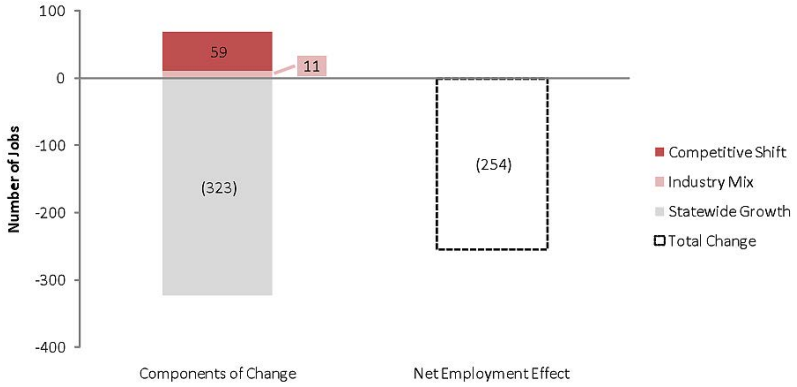
Figure 9 shows year-over-year percentage changes in Bremer County employment and its comparison peer group (see section on unemployment in the summary report for a definition of the peer group). The employment data were obtained from the US BLS Quarterly Census of Employment and Wages.

Bremer County enjoyed year-over-year gains in employment for most of the five-year period beginning early in 2004 and ending late in 2008. The county's employment trend does not show notable changes during the period of the floods. The county began to experience year-over-year declines in early 2009, at the same time as the comparison peer group. The pattern of these employment declines suggests that they were recession-related as opposed to flood-related. Employment growth

in Bremer County has lagged its peer group slightly since 2009.

Figure 9 shows the timing and magnitude of employment change, but not the reasons for change. It cannot be concluded whether employment changes during and after the flooding were attributable to the flood itself, the recession, or other local or external causes. Using a method called shift-share analysis, we can attempt to isolate changes explained by local factors by controlling for external economic influences.

Figure 10. Shift-share analysis of employment change in Bremer County, 2007–2009



Shift-share analysis deconstructs job gains or losses into three explanatory components: statewide growth, industry mix and local competitive share. The statewide growth component provides an expected value for employment growth based on the average performance of all nonfarm industries across the state. Industry mix accounts for local concentrations of employment in sectors that, at the statewide level, outperformed or underperformed the nonfarm industry average. The competitive share component measures the performance of local firms in comparison to other firms in the same industries in other counties.

Figure 10 shows a competitive shift-share analysis for employment change in Bremer County from 2007 to 2009. The industry-level employment data used for this analysis were obtained from the US Bureau of Economic Analysis.

Had all industries in Bremer County performed at the statewide nonfarm average rate, the county would have lost 323 jobs from 2007 to 2009. The industry mix in Bremer County was weighted slightly toward industries that outperformed the statewide nonfarm average rate. That industrial mix should have offset the county's expected job loss by 11 jobs.

Bremer County actually lost only 245 jobs for the period, suggesting that its industries performed better than their statewide counterparts. The county's positive competitive shift was equivalent to 59 jobs. This analysis shows that the Bremer County economy remained competitive with the rest of the state despite the 2008 floods.

Summary of Recent Economic and Demographic Trends

This analysis did not identify significant changes in regional economic activity that could be attributed solely to the weather-related disasters of 2008. Despite the losses experienced by individual households and businesses as a result of the disasters, the overall performance of the Waverly/Bremer County economy did not show evidence of lasting structural change. Population and enrollment trends suggest continued growth in the city. Recent unemployment trends and declines in retail trade and employment levels are more suggestive of recession-related effects than flood-related effects.