

THE ECONOMIC IMPACT OF SUCCESSFUL COMMERCIAL FIRE INTERVENTIONS

*PHOENIX FIRE DEPARTMENT
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L. WILLIAM SEIDMAN RESEARCH INSTITUTE

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Using tools that support sophisticated statistical modeling and planning, supplemented by an extensive understanding of the local, state and national economies, Seidman today offers a host of economic research and consulting services, including economic impact analyses, economic forecasting, general survey research, attitudinal and qualitative studies, and strategic analyses of economic development opportunities.

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Executive Summary

- This study uses a REMI model to estimate the economic impact of the City of Phoenix Fire Department's successful intervention at eight fires, June 1 to August 31, 2012, affecting thirteen commercial businesses or organizations.
- Approximately 2,173 total private non-farm jobs could have been lost in the State of Arizona over the course of one year if the City of Phoenix Fire Department had not successfully intervened at the eight commercial fires studied.
- If government and farm sector employment is included, the total impact could increase to 2,322 jobs over the course of just one year in the State of Arizona.
- Maricopa County, as the host county, could suffer most of the estimated job losses, including 495 full-time direct jobs for at least one year.
- Gross state product could be lower by approximately \$196 million (2012 \$) throughout the State of Arizona, and real disposable personal income by \$94.6 million (2012 \$), without the City of Phoenix Fire Department's successful interventions at these eight commercial fires.
- State revenues could also fall by approximately \$10.6 million (2012 \$) throughout Arizona if the fires had not been extinguished.
- The City of Phoenix Fire Department is therefore estimated to exert a significant impact on the local economy at both a state and county level.

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1. Introduction

The City of Phoenix Fire Department is committed to providing the highest level of public safety service for the community, protecting lives and property through fire suppression, emergency medical and transportation services, disaster management, fire prevention and public education.

One of the busiest fire departments in the country, the City of Phoenix Fire Department is responsible for a 519.1 square mile area, and the safety/well-being of almost 1.5 million people. In FY2010-11, it attended 13,893 fires.¹

The City of Phoenix Fire Department currently implements a wide range of key performance indicators (KPIs) to demonstrate its value to City officials and the wider community. However, these methods all overlook the impact of the Fire Department's operations on the local economy.

In August 2011, the Seidman Research Institute conducted an exploratory case study for the City of Phoenix Fire Department, evaluating the economic impact of saving a furniture manufacturer from a major fire. The case study suggested that up to 203 jobs could have been lost in the State of Arizona if the property had not been saved, plus \$20 million gross state product and \$9 million real disposable personal income (2011 \$).

Surprised by the magnitude of these impacts, the Seidman Research Institute therefore agreed to further assess the economic impact of successful fire interventions at commercial establishments over a longer time horizon. The objectives of this study are to:

- Implement a three month aggregate analysis of commercial fire interventions, focusing exclusively on any organization that could have temporarily or permanently lost their production capability and/or operations without the successful intervention of the City of Phoenix Fire Department.
- Quantify the total employment, gross state product (GSP), real disposable personal income (RDPI) and adjusted state/local tax revenue losses in the State of Arizona and Maricopa County if the fires had not been successfully contained.

¹ This is the latest publically-available figure.

The interventions included in this analysis occurred between June 1 and August 31, 2012, and each fire was in a post-incipient phase.²

Estimated impacts include the direct combined effects of every commercial property benefitting from a successful Fire Department intervention, alongside the indirect and induced effects that arise when their incomes and expenditures are recycled within the state's and county's economy. The year of study for this analysis is 2012, and all impacts are expressed in 2012 dollars (2012 \$).

Section 2 summarizes the economic impact method and the primary data used in the calculations. Simulation results for the State of Arizona and Maricopa County are offered in Section 3. Conclusions and recommendations are provided in Section 4.

2. Economic Impact Analysis – Study Method and Scenario Examined

Commercial businesses and organizations exert direct, indirect and induced impacts on a state or county's economy.

The *direct* impacts are generally easy to understand and calculate. They include the initial capital investment when a business or organization is launched, and the people directly employed to supply their products or services.

The *indirect* and *induced* effects are additional, second round expenditures and jobs created as a result of the initial "injection" of capital expenditures and direct employment. Indirect effects arise when a company makes purchases from suppliers to support its operation. Induced effects occur when workers either directly or indirectly associated with commercial businesses or organizations spend their incomes in the local economy, when suppliers place upstream demands on other producers, and when state and local governments spend new tax revenues. The income that a company or employee spends in the

² This means that the fire had progressed beyond the incipient or ignition phase, and was either growing in intensity, or was fully developed (the hottest and most dangerous phase of any fire).

local economy therefore generates revenues/income for a variety of different businesses, which creates induced effects.

The rounds of expenditures are not self-perpetuating in equal measure. Through time, they become smaller as more of the income/expenditures “leak” out of the local economy.³ The cumulative impacts of these rounds of expenditures or “ripple effects” are known as the multiplier effect in economics. Importantly, there is no one “magic” multiplier number for every conceivable scenario. Due to the inter-linked nature of the Arizona economy and its links to the rest of the U.S. (and the world), the eventual ripple effects depend on a variety of different factors.⁴

If a commercial business or organization is adversely affected by fire, causing a temporary or permanent cessation of trade or potentially even relocation, this will also affect the host state or county’s local economy. The potential impacts of fire damage include actual physical structure impairment, falls in sales output, or new production costs such as the purchase of replacement equipment and supplies. This will affect key economic variables such as employment, gross state product, disposable personal income and local/state tax revenues.

Therefore, a full understanding of the total impact that a successful fire intervention at a business will have on the Arizona economy is rather more complex than just an extrapolation of direct impacts.

Please note that this study only considers the potential economic losses if a commercial business or organization is forced to temporarily or permanently close down due to fire. No consideration is given to the potential construction impacts arising from unsuccessful interventions. Residential interventions are also excluded from the analysis.

³ For example, in the form of savings, or as payments for goods and services produced outside of a state.

⁴ In very simple terms, what matters is the size of the direct impact, where it occurs (that is, which county and which sector of the economy) and the duration of the impacts.

2.1. Study Method

This study makes use of an Arizona-specific version of the REMI regional forecasting model, updated at the Seidman Research Institute, to produce economic estimates of commercial businesses and organizations in the State of Arizona and Maricopa County.

Through its dynamic modeling, REMI takes account of variations in the economic impact of a business through time. These estimated impacts are the difference between the baseline economy and the baseline economy augmented with the new enterprise. As a result, the analysis measures the economy *with* and *without* the existence of the fire-stricken business in both the State of Arizona and Maricopa County. The use of a county level model also enables a more detailed disaggregation of results to occur, estimating the “leakage” of economic impacts into other counties in Arizona.

Seidman’s method for estimating the economic impacts involves four fundamental steps:

- 1. Prepare a baseline forecast for the state and county economy:** This baseline scenario provides a forecast of the future path of the local economies in the State of Arizona and Maricopa County based on a combination of the extrapolation of historic economic conditions and an exogenous forecast of relevant national economic variables. This is often referred to as the Business as Usual (BAU) case, and assumes that the commercial businesses and organizations included in the analysis did not require successful fire interventions to continue operating.
- 2. Develop policy scenario:** This describes the *direct* economic impacts generated by the loss of these commercial businesses and organizations for up to one year if the City of Phoenix Fire Department had been unable to successfully intervene.
- 3. Compare the baseline and policy scenario forecasts**
- 4. Produce delta results:** Differences between the future values of each variable in the forecast results estimate the magnitude of the loss of the businesses and organizations for the local economy, relative to the baseline.

The economic impacts measured in this study are:

- **Total Employment:** An estimate of the total number of full-time (or equivalent) jobs in the State of Arizona or Maricopa County, encompassing every sector and industry, including government and farm workers. Total employment therefore includes employees, sole proprietors and active partners, but excludes unpaid family workers and volunteers.
- **Total Private Non-Farm Employment:** An estimate of the total number of full-time (or equivalent) jobs in the State of Arizona or Maricopa County, encompassing all sectors and industries but excluding government and farm workers. This again includes employees, sole proprietors and active partners, but excludes unpaid family workers and volunteers.
- **Gross State Product (GSP):** This is the market value of goods and services produced by labor and property in the State of Arizona or Maricopa County. It represents the dollar value of all goods and services produced for the state or county's final demand, but excludes the value of intermediate goods and services purchased as inputs to final production. It can also be defined as the sum of employee compensation (wages, salaries and benefits, including employer contributions to health insurance and retirement pensions), proprietor income, property income, and indirect business taxes.
- **Real disposable personal income (RDPI):** This is an estimate of the total after-tax income received by any person residing in the state or county, deflated by the Personal Consumption Expenditure (PCE)-Price Index, but available for spending or saving. Technically speaking, real disposable personal income is the sum of wage and salary disbursements, supplements to wages and salaries, proprietors' income, rental income of persons, personal dividend income, personal interest income, and personal current transfer receipts, less personal taxes and contributions for government social insurance.
- **State Tax Revenue:** This is an estimate of general sales tax, selective sales tax, license taxes, individual and corporate income taxes, other taxes, miscellaneous general revenue, utility revenue, liquor store revenue, insurance trust revenue, intergovernmental revenue and current charges.

2.2. Data Inputs

Between June 1 and August 31, 2012, the City of Phoenix Fire Department successfully intervened at thirteen post-incipient commercial fires - that is, fires that were either growing in intensity or fully developed (the hottest and most dangerous phase of any fire).

Two of the interventions were at vacant commercial premises, and therefore excluded from the current analysis. The businesses and organizations at three commercial fire locations declined to participate in the study. The remaining eight interventions directly affected thirteen local businesses. Production capability and business operations could have been lost for at least one year at eleven of these local businesses without the successful intervention of the City of Phoenix Fire Department. Commercial activity at the remaining two local businesses could have been compromised for at least three months if their fires had not been successfully controlled.

Each commercial business or organization was asked to complete a brief survey as part of a follow-up fire incident investigation to supply the following data:

- Industry type
- Industry NAICS code/description
- Number of full-time (or equivalent) employees
- Annual total revenue/sales
- Average employee salary
- Extent of actual disruption to business operations
- Estimated extent of disruption without successful intervention

Anonymity was guaranteed in return for their sharing of commercially sensitive information. The industries directly benefiting from the City of Phoenix Fire Department interventions included construction, manufacturing, retail, finance, administrative and support services, and other services (except public administration).

Cumulatively accounting for 545 employees and annual salaries of almost \$19.6 million, the inputs supplied by each business or organization have been used to estimate the economic impact for the State of Arizona and Maricopa County for one entire year if the City of Phoenix Fire Department had been unable to successfully intervene and extinguish the fires.

3. Simulation Results

Table 1 illustrates the total employment and total private non-farm employment job impacts for one full calendar year if the City of Phoenix Fire Department had been unable to intervene at the eight commercial fires. The distinction between the two employment measures is important. Total employment refers to any job in the public or private sector, including government jobs and farm workers. Total private non-farm employment simply refers to the private sector, and therefore excludes government jobs, and any impacts associated with farming. The unit of measurement for each impact is job years.⁵

This table estimates that approximately 2,173 total private non-farm full-time (or equivalent) jobs could have been lost in the State of Arizona over the course of one year if the City of Phoenix Fire Department had not successfully intervened at the eight commercial fires. If the government and farm sectors are included, this could increase to 2,322 full-time (or equivalent) job losses over the course of one year in the State of Arizona. Approximately 98% of these full-time (or equivalent) job losses could have taken place in Maricopa County – the host county in which the commercial fires occurred.

Table 1: Employment Impacts of the 8 Commercial Fire Interventions for One Year

	Total Employment Losses (Job Years)	Total Private Non-Farm Employment Losses (Job Years)
Arizona	2,322	2,173
Maricopa County	2,280	2,137
Host County as Percentage of Arizona	98.2%	98.4%

Source: L. William Seidman Research Institute, W. P. Carey School of Business, Arizona State University

⁵ A job year is equivalent to one person having a full-time job for exactly one year.

The 2,173 private non-farm jobs saved by the City of Phoenix Fire Department's successful intervention at eight commercial fires consisted of 495 direct jobs⁶ and 1,678 indirect or induced jobs.

Table 2 estimates the distribution of job losses for one year across the private non-farm employment sectors if the City of Phoenix Fire Department had been unable to successfully intervene, resulting in a loss of production or operational capability at the 13 commercial businesses or organizations. This table suggests that the five sectors that could lose the greatest number of jobs are retail trade, construction, manufacturing, administrative and waste services, and health care and social assistance.

Table 3 estimates the gross state product (GSP) and real disposable personal income (RDPI) losses potentially emanating from the non- or unsuccessful intervention of the City Phoenix Fire Department. The table estimates that the State of Arizona could have lost approximately \$196 million GSP (2012 \$) in just one year if the City of Phoenix Fire Department had failed to successfully intervene at the eight commercial fires. Approximately 98.4% of the loss could have taken place in Maricopa County.

Table 3 also estimates that RDPI in the State of Arizona could fall by \$94.6 million (2012 \$) without the successful fire interventions. Maricopa County again could suffer almost all of the loss (95.8%).

Table 4 estimates the adjusted state tax/revenue losses for one year if the City of Phoenix Fire Department had not successfully intervened at the commercial fires. The losses could amount to \$10.56 million in the State of Arizona – that is, 96% in Maricopa County, with the balance in Pinal and Pima Counties.

⁶ This direct job years figure is lower than the total annual direct employment (545 jobs) at the 13 commercial business or organizations saved, because 2 of the companies indicated that they would only close for 3 months. As a result, a pro-rata input for these 2 companies has been used in the total direct calculation for all 13 businesses or organizations.

Table 2: Distribution of Private Non-Farm Employment Losses across Industry Sectors for One Year

Sector	Jobs Lost in Arizona	Jobs Lost in Maricopa County
Forestry, Fishing, Related Activities, and Other	0.53	0.4
Mining	2.99	1.3
Utilities	6	5.9
Construction	486.77	485.2
Manufacturing	248.03	244.48
Wholesale Trade	70.43	69.76
Retail Trade	578.34	574.34
Transportation and Warehousing	26.01	24.77
Information	16.56	15.93
Finance and Insurance	69.09	67.23
Real Estate and Rental and Leasing	50.11	48.49
Professional and Technical Services	114.53	111.57
Management of Companies and Enterprises	10.77	10.53
Administrative and Waste Services	134.7	133.18
Educational Services	19.24	18.59
Health Care and Social Assistance	123.29	119.19
Arts, Entertainment, and Recreation	22.58	21.12
Accommodation and Food Services	70.56	68.27
Other Services, except Public Administration	122.12	116.97
Total	2,173	2,137

Source: L. William Seidman Research Institute, W. P. Carey School of Business, Arizona State University

Table 3: Summary of Gross State Product and Real Disposable Personal Income Impacts for One Year

Impact Type	Initial Year Impact
Gross State Product (Millions 2012 \$)	
Arizona	196.0
Maricopa County	193.0
Host County as Percentage of Arizona	98.4%
Real Disposable Personal Income (Millions 2012 \$)	
Arizona	94.6
Maricopa County	90.6
Host County as Percentage of Arizona	95.8%

Source: L. William Seidman Research Institute, W. P. Carey School of Business, Arizona State University

Table 4: Summary of Adjusted State Revenue Impacts for One Year

	Income Tax (Millions 2012 \$)	General Sales Tax (Millions 2012 \$)	Selective Sales Tax (Millions 2012 \$)	Corporate Income Tax (Millions 2012 \$)	Rest⁷ (Millions 2012 \$)	Total (Millions 2012 \$)
Arizona	1.94	3.50	0.99	0.42	3.71	10.56
Maricopa County	1.85	3.41	0.96	0.41	3.53	10.16

Source: L. William Seidman Research Institute, W. P. Carey School of Business, Arizona State University

4. Conclusions and Recommendations

The goal of this study has been to estimate the impact of the City of Phoenix Fire Department's successful commercial fire interventions on the local economy at a state and county level.

Focusing on eight fire interventions affecting at least thirteen commercial businesses from June 1 to August 31, 2012, the study has estimated the impacts for the local economy in terms of employment, gross state product, real disposable income, and adjusted state tax revenues.

If the City of Phoenix Fire Department had been unable to successfully intervene at these eight commercial fires, the State of Arizona could have lost up to 2,322 full-time (or equivalent) jobs - including government and farm workers - over the subsequent 12 months. The State of Arizona could also have lost approximately \$196 million GSP, \$94.6 million RDPI, and \$10.6 million in adjusted state tax revenues.

Maricopa County, as the host county, could have suffered the most. Estimated losses over the year could include up to 2,280 full-time (or equivalent) jobs for all sectors, including government and farm workers, approximately \$193 million GSP, \$90.6 million RDPI, and \$10.2 million in adjusted state tax revenues.

⁷ Rest includes license taxes, other taxes, miscellaneous general revenue, utility revenue, liquor store revenue, insurance trust revenue, intergovernmental revenue and current charges.

If this three month time horizon is representative of the number and type of City of Phoenix Fire Department commercial fire interventions for a full calendar year, it is reasonable to conclude that the Fire Department exerts a significant impact on the local economy at both a state and county level. Seidman therefore recommends additional economic analysis of commercial fire interventions for other three-month time horizons to ensure the representativeness of the study sample, prior to the inclusion of an economic KPI to further demonstrate the Fire Department's value to City officials and the wider community.

The City of Phoenix Fire Department also offers much more than commercial fire interventions. The sourcing of appropriate data inputs from successful single-family and multi-family residential fire interventions for economic analyses poses greater challenges than commercial interventions. However, if an appropriate solution or way forward can be found, the economic impact of the City of the Phoenix Fire Department's successful interventions could be even greater.

Appendix

A.1. Inputs Provided by Client

The following data was sourced by the City of Phoenix Fire Department’s investigators after their successful commercial fire interventions. The responses from all thirteen businesses and organizations affected by the fires have been grouped by industry or sector. Four of the thirteen businesses and organizations failed to disclose their average salary. REMI’s pre-programmed average salary for those types of company in Maricopa County has therefore been applied to enable quantification of the impacts.

Sector	Annual Direct Full-Time (or Equivalent) Employment	Average Salary per Employee (2012 \$)	Total Revenue/Sales (2012 \$)
Administrative and Support Services	<i>Not available for public disclosure due to the commercially sensitive nature of the data</i>		
Construction			
Food Manufacturing			
Membership Associations and Organizations			
Monetary Authorities			
Personal and Laundry Services			
Primary Metal Manufacturing			
Retail Trade			
Wood Product Manufacturing			
Total			

Source: City of Phoenix Fire Department

A.2. The REMI Model

REMI is an economic-demographic forecasting and simulation model developed by Regional Economic Models, Inc. REMI is designed to forecast the impact of public policies and external events on an economy and its population. The REMI model is recognized by the business and academic community as the leading regional forecast/simulation tool available.

Unlike most other regional economic impact models, REMI is a dynamic model that produces integrated multi-year forecasts and accounts for dynamic feedbacks among its economic and demographic variables. The REMI model is also an "open" model in that it explicitly accounts for trade and migration flows in and out of the state. A complete explanation of the model and discussion of the empirical estimation of the parameters/equations can be found at www.remi.com.

The operation of the REMI model has been developed to facilitate the simulation of policy changes, such as a tax increase for example, or many other types of events – anything from the opening of a new business to closure of a military base to a natural disaster. The model's construction includes a large set of policy variables that are under the control of the model's operators. To simulate the impact of a policy change or other event, a change in one or more of the policy variables is entered into the model and a new forecast is generated. The REMI model then automatically produces a detailed set of simulation results showing the differences in the values of each economic variable between the control and the alternative forecast.

The specific REMI model used for this analysis was Policy Insight Model Version PI⁺ version 1.3.13 of the Arizona economy (at the county level) leased from Regional Economic Models Inc. by a consortium of State agencies, including Arizona State University, for economic forecasting and policy analysis.

A.3. Effects Not Incorporated into the Analysis

No major commercial impacts were omitted.



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