

# THE ECONOMIC IMPACT OF SUCCESSFUL COMMERCIAL FIRE INTERVENTIONS

*PHOENIX FIRE DEPARTMENT  
JUNE 1, 2012 – MAY 31, 2013*



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## **L. WILLIAM SEIDMAN RESEARCH INSTITUTE**

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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 forty-two fires, June 1, 2012 to May 31, 2013, affecting fifty-one commercial businesses or organizations.
- Approximately 6,951 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 forty-two commercial fires studied.
- If government and farm sector employment is included, the total impact could increase to 7,446 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 3,023 full-time direct jobs.
- Gross state product could be lower by almost \$650 million (2012 \$) throughout the State of Arizona, and real disposable personal income by \$295.6 million (2012 \$), without the City of Phoenix Fire Department's successful interventions at these forty-two commercial fires.
- State tax revenues could also fall by over \$35 million (2012 \$) throughout the State of Arizona if the commercial 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 over a twelve month time horizon, exclusively based on their successful commercial fire interventions.
- With successful commercial fire interventions accounting for only 3% of the City of Phoenix Fire Department's annual workload, the study estimates are in all probability a conservative measure of the Fire Department's total annual economic impact for Maricopa County and the State of Arizona.

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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 FY2011-12, it took a total of 165,104 calls, and attended 13,761 fires.<sup>1</sup>

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, evaluating the economic impact of the City of Phoenix Fire Department 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 twelve-month time horizon. This assessment exclusively focuses on any commercial 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.

In January 2013 and August 2013, Seidman issued preliminary reports focusing on successful commercial fire interventions up to August 31, 2012, and December 31, 2012 respectively. This latest and final

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<sup>1</sup> Source: [http://phoenix.gov/webcms/groups/internet/@inter/@dept/@fire/documents/web\\_content/fire\\_facts.pdf](http://phoenix.gov/webcms/groups/internet/@inter/@dept/@fire/documents/web_content/fire_facts.pdf). This is the latest publically-available figure.

report updates the study to a complete twelve-month time horizon of successful commercial fire interventions.

The interventions included in this analysis occurred between June 1, 2012, and May 31, 2013. Each fire was in a post-incipient phase.<sup>2</sup>

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 Maricopa County and State of Arizona economies. The economic impacts assessed include total employment, gross state product (GSP), real disposable personal income (RDPI) and state/local tax revenue losses. 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 Maricopa County and the State of Arizona 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

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<sup>2</sup> 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).

company makes purchases from suppliers to support its operation. Induced effects also 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 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.<sup>3</sup> 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.<sup>4</sup>

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, and other City of Phoenix Fire Department activities are also excluded from the analysis.

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

<sup>4</sup> 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 impact.

## 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 Maricopa County and the State of Arizona.

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 Maricopa County and the State of Arizona. 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 Maricopa County and the State of Arizona 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 Maricopa County and the State of Arizona, 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 Maricopa County and the State of Arizona, 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 Maricopa County and the State of Arizona. It represents the dollar value of all goods and services produced for the county or state'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 Maricopa County and the State of Arizona, 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, 2012, and May 31, 2013, the City of Phoenix Fire Department successfully intervened at fifty-five 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 these interventions were at vacant commercial premises, and subsequently excluded from this analysis. A third was at a local Church staffed by volunteers, and also excluded from the analysis. The businesses and organizations at seven commercial fire locations declined to fully provide the data required to participate in the study, and therefore omitted from the analysis. An eleventh successful intervention on a passenger plane was excluded, as the service could have been provided by a subsequent plane without any loss of business. The businesses of two other successful interventions ceased trading not long after the fires, and were therefore also excluded because it is not clear to what extent (if any) these closures were prompted by the fires.

The remaining forty-two interventions directly affected fifty-one local businesses. Production capability and business operations could have been lost for at least one year at forty-nine 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 were drawn from 21 sectors including accommodation and food services, construction, manufacturing, retail, finance, administrative and support services, and other services (except public administration).

Cumulatively accounting for 3,073 employees and annual salaries of almost \$106.6 million, the inputs supplied by each business or organization have been used to estimate the economic impact for Maricopa County and the State of Arizona for one full calendar year if the City of Phoenix Fire Department had been unable to successfully intervene and extinguish the forty-two commercial 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 successfully intervene at the forty-two commercial fires affecting fifty-one businesses. 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.<sup>5</sup>

**Table 1: Employment Impacts of the 42 Successful Commercial Fire Interventions for One Year**

	<b>Total Employment Losses (Job Years)</b>	<b>Total Private Non-Farm Employment Losses (Job Years)</b>
Arizona	7,446	6,951
Maricopa County	7,326	6,850
Host County as Percentage of Arizona	98.4%	98.5%

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

This table estimates that approximately 6,951 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 forty-two commercial fires. If the government and farm sectors are also included, this could increase to 7,446 full-time (or equivalent) job losses over the course of one year in the State of Arizona. Over 98% of these full-time (or equivalent) job losses could have occurred in Maricopa County – the host county in which the commercial fires studied occurred.

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

The 6,951 private non-farm jobs saved by the City of Phoenix Fire Department's successful intervention at forty-two commercial fires consisted of 3,023 direct jobs <sup>6</sup> and 3,928 indirect or induced jobs for one year.

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 fifty-one commercial businesses or organizations. This table suggests that the five sectors losing the greatest number of jobs in the State of Arizona could be retail trade (29%), construction (11.7%), accommodation and food services (11.2%), manufacturing (10.3%), and administrative and waste services (7.3%).

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 almost \$650 million GSP (2012 \$) in just one year if the City of Phoenix Fire Department had failed to successfully intervene at the forty-two commercial fires. Approximately 98.6% of the losses could have taken place in Maricopa County.

Table 3 also estimates that RDPI in the State of Arizona could fall by \$295.6 million (2012 \$) without the successful fire interventions. Maricopa County again could suffer almost all of the estimated losses (96.1%).

Table 4 estimates the state tax/revenue losses for one year if the City of Phoenix Fire Department had not successfully intervened at the forty-two commercial fires. The losses could amount to over \$35 million in the State of Arizona. An estimated 96.4% of these losses could occur in Maricopa County, with the balance primarily in Pinal County (2.3%).

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<sup>6</sup> This direct job years figure is lower than the total annual direct employment (3,073 jobs) at the fifty-one commercial business or organizations saved, because two of the companies indicated that they would only close for three months. As a result, a pro-rata input for these two companies has been used in the total direct calculation for all fifty-one businesses or organizations.

**Table 2: Distribution of Private Non-Farm Employment Losses by Industry Sector for One Year<sup>7</sup>**

<b>Sector</b>	<b>Jobs Lost in Arizona</b>	<b>Jobs Lost in Maricopa County</b>
Forestry, Fishing, Related Activities, and Other	3.3	2.4
Mining	5.2	2.8
Utilities	14.6	14.4
Construction	815.7	809.7
Manufacturing	716.4	708.3
Wholesale Trade	339.3	337.6
Retail Trade	2018.7	2008.1
Transportation and Warehousing	75.4	71.9
Information	56.4	54.4
Finance and Insurance	195.1	189.7
Real Estate and Rental and Leasing	169.6	163.8
Professional and Technical Services	337.8	328.9
Management of Companies and Enterprises	39.3	38.5
Administrative and Waste Services	509.1	504.3
Educational Services	66.2	64.0
Health Care and Social Assistance	389.0	377.0
Arts, Entertainment, and Recreation	75.3	70.8
Accommodation and Food Services	779.8	773.3
Other Services, except Public Administration	345.1	330.1
<b>Total</b>	<b>6951.3</b>	<b>6850.0</b>

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**

<b>Impact Type</b>	<b>Initial Year Impact</b>
<b>Gross State Product (Millions 2012 \$)</b>	
Arizona	649.7
Maricopa County	640.5
Host County as Percentage of Arizona	98.6%
<b>Real Disposable Personal Income (Millions 2012 \$)</b>	
Arizona	295.6
Maricopa County	284.0
Host County as Percentage of Arizona	96.1%

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

<sup>7</sup> The total figures may not tally exactly due to rounding-up.

**Table 4: State Tax Revenue Impacts of the 42 Successful Commercial Fire Interventions for One Year**

	<b>Income Tax (Millions 2012 \$)</b>	<b>General Sales Tax (Millions 2012 \$)</b>	<b>Selective Sales Tax (Millions 2012 \$)</b>	<b>Corporate Income Tax (Millions 2012 \$)</b>	<b>Rest<sup>8</sup> (Millions 2012 \$)</b>	<b>Total (Millions 2012 \$)</b>
Arizona	6.12	10.92	3.09	1.48	13.56	35.17
Maricopa County	5.85	10.66	3.02	1.46	12.93	33.92

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 over a twelve-month time horizon.

Focusing on forty-two fire interventions directly affecting fifty-one commercial businesses from June 1, 2012, to May 31, 2013, the study has estimated the impacts for the economies of Maricopa County and the State of Arizona in terms of employment, gross state product, real disposable income, and state tax revenues.

If the City of Phoenix Fire Department had been unable to successfully intervene at these forty-two commercial fires, the State of Arizona could have lost up to 7,446 full-time (or equivalent) jobs - including government and farm workers - over the subsequent year. The State of Arizona could also have lost almost \$650 million GSP, \$295.6 million RDPI, and over \$35 million in state tax revenues (all 2012 \$).

Maricopa County, as the host county, could have suffered the biggest proportion of these losses. Estimated losses over the year for the county could include up to 7,326 full-time or equivalent jobs for

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<sup>8</sup> Rest includes license taxes, other taxes, miscellaneous general revenue, utility revenue, liquor store revenue, insurance trust revenue, intergovernmental revenue and current charges.

all sectors (including government and farm workers), \$640.5 million GSP, \$284 million RDPI, and almost \$34 million in state tax revenues (all 2012 \$).

It is reasonable to conclude that the City of Phoenix Fire Department exerts a significant impact on the local economies of Maricopa County and the State of Arizona over a twelve-month time horizon through successful commercial fire interventions alone.

However, commercial fire interventions account for only 3% of the City of Phoenix Fire Department's annual workload,<sup>9</sup> which suggests the twelve-month estimates presented in this study are in all probability a conservative measure of the City of Phoenix Fire Department's actual annual economic impact.

The sourcing of appropriate data inputs from any other aspect of the City of Phoenix Fire Department's workload in an economic impact analysis poses greater challenges than commercial interventions. If an appropriate method can be found, the economic impact of the City of the Phoenix Fire Department is therefore almost certainly greater than the estimates presented in this study.

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<sup>9</sup> Based on data supplied by the City of Phoenix Fire Department.

## Appendix

### A.1. Inputs Provided by Client

The following data was sourced by the City of Phoenix Fire Department's investigators after their successful interventions at forty-two commercial fires.

Sector	Annual Direct Full-Time (or Equivalent) Employment	Average Salary (2012 \$)	Total Revenue/Sales (2012 \$)
Accommodation	<i>Not available for public disclosure due to the commercially sensitive nature of the data</i>		
Administrative and Support Services			
Construction			
Food Manufacturing			
Food Services and Drinking Places			
Furniture and Related Product Manufacturing			
Healthcare/Hospitals			
Internet Publishing and Information Services			
Membership Associations and Organizations			
Miscellaneous Manufacturing			
Monetary Authorities			
Motor Vehicles and Parts			
Personal and Laundry Services			
Plastics and Rubber Products Manufacturing			
Primary Metal Manufacturing			
Repairs and Maintenance			
Retail Trade			
Social Assistance			
Waste Management and Remediation Services			
Wholesale Trade			
Wood Product Manufacturing			
<b>Total</b>	<b>3,073</b>	<b>\$34,685</b>	<b>\$511,104,000</b>

Source: City of Phoenix Fire Department

The response from every business and organizations affected by a commercial fire has been grouped by industry or sector. Eight of the businesses and organizations studied 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.

## **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](http://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 the closure of a military base or 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 alternative forecasts.

The specific REMI model used for this analysis was Policy Insight Model Version PI<sup>+</sup> 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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