

# THE ECONOMIC IMPACT OF THE MEGA METALS FIRE

*February 20, 2014*



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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 the Mega Metals fire on February 20, 2014. This commercial fire had the potential to additionally affect four other neighboring commercial businesses.
- An estimated 331 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 Mega Metals fire.
- If government and farm sector employment is included, the total employment impact could have increased to 344 jobs over the course of just one year in the State of Arizona.
- Maricopa County, as the host county, could have suffered most of the estimated job losses, including 324 total private non-farm jobs over the course of one year.
- Gross State Product (GSP) could have been lower by over \$33.8 million (2015 \$) throughout the State of Arizona, and real disposable personal income by \$16.5 million (2015 \$), without the City of Phoenix Fire Department's successful intervention at the Mega Metals commercial fire.
- The City of Phoenix Fire Department is therefore estimated to have exerted a significant impact on the local economy at both a state and county level, due to its successful intervention at the Mega Metals fire in February 2014.

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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.

It 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 business had not been saved, plus \$20 million Gross State Product (GSP) and \$9 million real disposable personal income (2011 \$).

Surprised by the magnitude of these impacts, the Seidman Research Institute also quantified the economic impact of successful fire interventions at forty-two commercial establishments over a twelve-month time horizon, June 1, 2012 to May 31, 2013. This assessment exclusively focused 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. Each commercial fire studied was in a post-incipient phase.<sup>1</sup>

Using a REMI model, Seidman estimated that:

- 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.

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<sup>1</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).

- GSP could have been 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 forty-two commercial fires.

In spring 2016, the City of Phoenix Fire Department requested a third estimate of economic impact for its successful intervention at the Mega Metals commercial fire on February 20, 2014.

Consistent with the previous studies, the estimated impacts in this latest study include the direct effects of every commercial property benefitting from the successful intervention by the City of Phoenix Fire Department, 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 estimated in this current study include total employment, GSP, and real disposable personal income (RDPI). All impacts in the current report are expressed in 2015 dollars (2015 \$).

Section 2 summarizes the economic impact method and the primary data used in the estimations.

Simulation results for Maricopa County and the State of Arizona are offered in Section 3.

Conclusions 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 commercial organization’s suppliers hire staff and make purchases from their own suppliers. Induced effects occur when workers either directly or indirectly associated with a commercial business spend their incomes in the local economy. 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>2</sup> The cumulative impacts or ripples of expenditures are known as the multiplier effect in economics.

Whenever a commercial business or organization is adversely affected by fire, causing a temporary or permanent cessation of trade or potentially even relocation, this has an effect on 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 affects key economic variables such as employment, GSP, and RDPI.

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

Please note that this study only considers the potential economic losses arising from Mega Metals and neighboring commercial businesses being forced to temporarily or permanently close down due to the commercial fire of February 20, 2014. No consideration is given to the potential construction impacts arising from an unsuccessful intervention. Consistent with the previous studies, the traffic delays and disruption caused by the Mega Metals fire have also been excluded from the current analysis.

## **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.

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<sup>2</sup> For example, in the form of savings, or as payments for goods and services produced outside of a state.

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 businesses 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, thereby estimating the “leakage” of economic impacts into other counties in the State of 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 Maricopa County and State of Arizona economies 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 included in the analysis continue to operate throughout the study period without the occurrence of a fire.
- 2. Develop policy scenario:** This describes the *direct* economic impacts generated by the loss of a commercial business and any adjoining business for up to one year if the City of Phoenix Fire Department had been unable to successfully intervene at a fire.
- 3. Compare the baseline and policy scenario forecasts.**
- 4. Produce delta results:** Differences between the future values of each variable in the BAU and policy scenario forecasts estimate the magnitude of the losses for the local economy.

The economic impacts measured in the current 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, RDPI 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.

## 2.2. Data Inputs

On February 20, 2014, the City of Phoenix Fire Department successfully intervened at a commercial fire at Mega Metals, N 22<sup>nd</sup> Avenue, Phoenix. This fire was in the post-incipient phase - that is, the fire was either growing in intensity or fully developed (the hottest and most dangerous phase of any fire).

The fire at Mega Metals directly affected an additional four neighboring businesses. Production capability and business operations could have been lost for up to one year at all five local businesses without the successful intervention of the City of Phoenix Fire Department.

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 the sharing of commercially sensitive information.

The five commercial businesses directly benefiting from the City of Phoenix Fire Department fire intervention were drawn from several sectors. These were recycling; electrical equipment and appliance manufacturing; furniture and related product manufacturing; beverage product manufacturing; and wood product manufacturing.

Cumulatively accounting for 90 employees and annual revenue of over \$26.2 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 a twelve month time horizon if the City of Phoenix Fire Department had been unable to successfully intervene and extinguish the Mega Metals fire on February 20, 2014.

### **3. SIMULATION RESULTS**

Table 1 illustrates the total employment and total private non-farm employment job impacts for a twelve month time horizon if the City of Phoenix Fire Department had been unable to successfully intervene at the Mega Metals commercial fire on February 20, 2014. 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>3</sup>

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<sup>3</sup> A job year is equivalent to one person having a full-time job for exactly one year.

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

	Total Employment Losses (Job Years)	Total Private Non-Farm Employment Losses (Job Years)
State of Arizona	344	331
Maricopa County	336	324
Host County as Percentage of Arizona	97.6%	97.7%

*Source: Author's calculations*

Reading from Table 1, approximately 331 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 Mega Metals fire on February 20, 2014. If the government and farm sectors are also included, the employment impact could potentially increase to 344 full-time (or equivalent) job losses over the course of one year in the State of Arizona. Almost 98% of these full-time (or equivalent) job losses could have occurred in Maricopa County, the host county of the commercial fire studied.

The 331 private non-farm jobs potentially saved by the City of Phoenix Fire Department's successful intervention at Mega Metals consisted of 87.5 direct jobs <sup>4</sup> and 243.5 indirect or induced jobs for the twelve month time horizon.

Table 2 estimates the distribution of job losses for the same twelve month time horizon across all private non-farm employment sectors if the City of Phoenix Fire Department had been unable to successfully intervene at the Mega Metals fire. Reading from Table 2, the five sectors losing the greatest number of jobs in the State of Arizona if there had been a loss of production or operational capability at all five commercial businesses could have been manufacturing (40.6%); construction (10%); retail trade (7%); health care and social assistance (5.8%); and professional, scientific and technical services (4.8%).

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<sup>4</sup> This direct job years figure is lower than the total annual direct employment (90 jobs) at all five commercial businesses saved, because one firm indicated that they would only close for six months. As a result, a pro-rata input has been used in the total direct calculation.

**Table 2: Distribution of Private Non-Farm Employment Losses by Industry Sector for One Year<sup>5</sup>**

Sector	Jobs Lost in Arizona	Jobs Lost in Maricopa County
Forestry, Fishing, Related Activities, and Other	0.3	0.2
Mining	1.4	1.2
Utilities	0.8	0.8
Construction	33.1	32.1
Manufacturing	134.5	133.4
Wholesale Trade	11.6	11.4
Retail Trade	23.1	22.4
Transportation and Warehousing	7.7	7.4
Information	3.4	3.2
Finance and Insurance	13.9	13.7
Real Estate and Rental and Leasing	11.1	10.8
Professional and Technical Services	16.1	15.8
Management of Companies and Enterprises	5.3	5.3
Administrative and Waste Services	14.6	14.3
Educational Services	3.5	3.3
Health Care and Social Assistance	19.2	18.4
Arts, Entertainment, and Recreation	4.7	4.3
Accommodation and Food Services	12.5	12.1
Other Services, except Public Administration	14.5	13.6
<b>Total</b>	<b>331.2</b>	<b>323.5</b>

Source: Author's calculations

Table 3 estimates the GSP and RDPI losses potentially emanating from a non- or unsuccessful intervention by the City Phoenix Fire Department at the Mega Metals fire. The table estimates that the State of Arizona could have lost over \$33.8 million GSP (2015 \$) over the following twelve months if the City of Phoenix Fire Department had failed to successfully intervene at the Mega Metals fire. Approximately 98.3% of the losses could have taken place in Maricopa County.

Table 3 also estimates that RDPI in the State of Arizona could have fallen by \$16.5 million (2015 \$) without the successful fire intervention. Maricopa County could again have suffered almost all of the estimated losses (96.4%).

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<sup>5</sup> The total figures may not tally exactly due to rounding-up.

**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 2015 \$)</b>	
Arizona	33.8
Maricopa County	33.3
Host County as Percentage of Arizona	98.3%
<b>Real Disposable Personal Income (Millions 2015 \$)</b>	
Arizona	16.5
Maricopa County	15.9
Host County as Percentage of Arizona	96.4%

*Source: Author's calculations*

## **4. CONCLUSION**

The goal of this study has been to estimate the economic impact of the City of Phoenix Fire Department's successful commercial fire intervention at Mega Metals on February 20, 2014.

Focusing on both Mega Metals and four neighboring commercial businesses, the study has estimated the impacts for the economies of Maricopa County and the State of Arizona in terms of employment, GSP, and RDPI.

If the City of Phoenix Fire Department had been unable to successfully intervene at the Mega Metals commercial fire, the State of Arizona could have lost up to 344 full-time (or equivalent) jobs - including government and farm workers - over the subsequent year. The State of Arizona could also have lost over \$33.8 million GSP, and \$16.5 million RDPI (both 2015 \$).

Maricopa County, as the host county, could have suffered the biggest proportion of these losses. Estimated losses over the twelve month time horizon for the county could have included up to 336 full-time or equivalent jobs for all sectors (including government and farm workers), \$33.3 million GSP, and \$15.9 million RDPI (both 2015 \$).

It is reasonable to conclude, therefore, that the City of Phoenix Fire Department's successful intervention at the Mega Metals fire has had a significant impact on the local economies of Maricopa County and the State of Arizona.

The inclusion of the cost of freeway and street traffic delays and disruptions will almost certainly increase the magnitude of the economic impact estimates presented in this study. This information will be sourced from Arizona Department of Transportation in due course, and added to the current report in the future.

## APPENDIX

### A.1. Inputs Provided by Client

The following data has been sourced by the City of Phoenix Fire Department’s investigators after their successful intervention at the Mega Metals commercial fire.

Sector	Annual Direct Full-Time (or Equivalent) Employment	Total Revenue/Sales (2015 \$)
All Five Commercial Businesses	90	\$26,200,000

*Source: City of Phoenix Fire Department*

All five businesses potentially directly affected by the Mega Metals fire supplied commercially sensitive data. To respect data confidentiality, the table above only displays a total for all five businesses.

### A.2. The REMI Model

REMI is an economic-demographic forecasting and simulation model developed by Regional Economic Models, Inc. It 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 or events. 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 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 1.7.2 of the Arizona economy (at the county level).

### **A.3. Effects Not Incorporated into the Analysis**

The author has not included the impact of traffic disruptions and delays directly caused by the Mega Metals fire within the economic impact estimates. This is consistent with the previous City of Phoenix Fire Department analyses produced by Seidman.



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