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The Effects of 9/11 on the Fire Fighter Labor Market

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I. Introduction

“I have no ambition in this world but one, and that is to be a fireman. The position may, in the eyes of some, appear to be a lowly one; but we who know the work which the fireman has to do believe that his is a noble calling. Our proudest moment is to save lives. Under the impulse of such thoughts, the nobility of the occupation thrills us and stimulates us to deeds of daring, even of supreme sacrifice.” ~Chief Edward F. Croker, FDNY (American-Firefighter.com)

On September 11, 2001, the threat of terrorism became real as the United States found itself amidst the devastation and destruction of the worst terrorist attack to ever occur on American soil. While news channels showed images of hundreds of survivors running for their lives away from the crumbling World Trade Center towers, it was the fire fighters in the New York City area that were the first to respond and run in the opposite direction - toward the danger and ruins – to pull those still hanging on to life out of the burning buildings and put out the flames.

Now, in the post-September Eleventh world that we live in, fire fighters are expected to do even more to save the lives of American citizens all over the country. As stated in the International Association of Fire Fighters’ (IAFF) *Fire Fighter Issues Book – 108th Congress First Session*, “Terrorism places additional pressures on the acute staffing shortage. In the past, fire fighters responded to isolated incidents. In this new world, our fire and emergency medical services need to be prepared for a coordinated, well-orchestrated series of attacks on American citizens” (IAFF, 2003). This means that, while fire fighting is already considered by the American Heart Association as one of the top twenty-five occupations in causing stress, there are now additional demands for fire protection services being placed on these fire fighters (Hoover, 1996).

The purpose of this study is to look at this apparent increase in demand for fire protection services in the theoretical framework of derived demand. The theory of derived demand tells us that the demand for labor in a certain field is determined by the demand for the goods or services produced by that labor (Freeman, 1972). More specifically, we should expect to see a shift to the right of the demand curve for fire fighters from the increased demand for fire protection services since September Eleventh. This should lead to greater employment levels and higher wages in the labor market for fire fighters.

Section II gives the background of the increased demand for fire protection services since September Eleventh. Section III will follow by presenting the theory of derived demand. This will set up the hypothesis that employment numbers and wages for fire fighters should have increased after September Eleventh from the increased demand for fire protection services. Section IV will layout the model and data that will be used to test this hypothesis and Section V will examine the results obtained by testing our model so that we can draw conclusions and policy implications from them. Such implications could be quite useful to the Department of Homeland Security as well as local governments as they work to improve the preparedness of first responders to respond to and recover from potential acts of terrorism.

II. Background: A Post-9/11 Increase in Demand for Fire Protection Services

It is argued here that there has been an increase in the demand for firefighters as a result of September Eleventh. In the months following the September Eleventh attacks, the Bush Administration created the Department of Homeland Security and announced its plan to use this new department's budget to accomplish five main objectives. One of these objectives was to support first responders in their preparation for future acts of terrorism. The federal government

planned to execute this through grants to state and local governments (Hobijn, 2002). The Office for Domestic Preparedness was incorporated under the Department of Homeland Security to provide grants to train fire fighters to respond to a variety of terrorism incidents (chemical, biological, radiological, nuclear and explosive) (IAFF, 2003). In 2002, the federal budget offered \$4.8 billion for local first responder and bioterrorism preparedness (Hobijn, 2002). In 2003, \$2.2 billion in grants was set aside for new equipment and technology for first responders. For fiscal year 2004, the First Responder Program was proposed as a way for the federal government to fund planning, training, equipment needs and exercises (IAFF, 2003).

This kind of funding for preparation indicates that these first responders would have to learn to provide more than their current level of services. The Federal Emergency Management Agency (FEMA) expects fire fighters to be able to respond to larger scale chemical or biological incidents and building collapses, but found in 2002 that only thirteen percent of departments were able to handle a chemical or biological attack in which ten or more people were injured and only eleven percent were prepared to respond to a building collapse involving more than fifty occupants (Hall, 2004). According to the Associate General President of the IAFF, Kevin O'Connor, in his testimony before Congress in April of 2005, the current National Response Plan holds that all emergency incidents within the United States should be dealt with at the lowest possible jurisdictional level (O'Connor, 2005). This means that fire fighters must be prepared to handle any and all national emergencies; terrorist, natural or otherwise. Fire fighters must be able to address all hazards, not just fires (O'Connor, 2005).

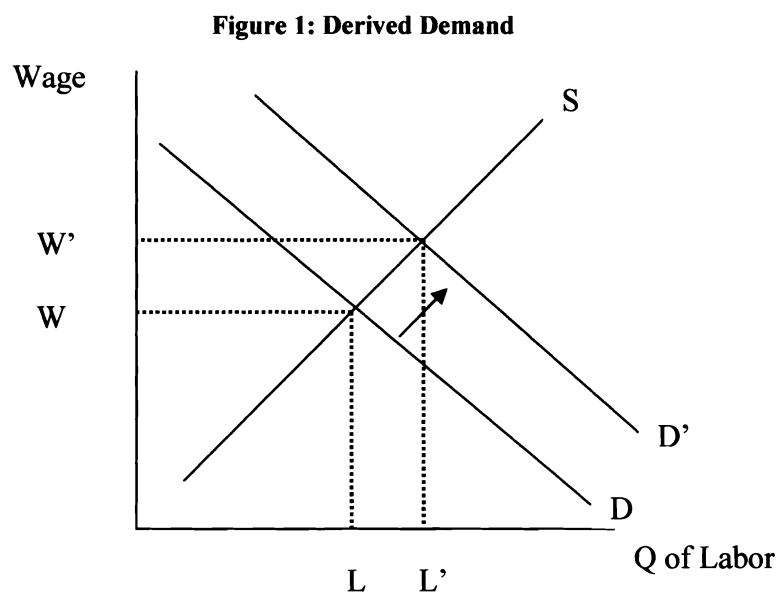
The World Trade Center and Pentagon incidents were also evidence that emergency incidents are no longer simply local matters. Instead, many potential emergencies are on a national scale and require response by several fire departments from many jurisdictions (IAFF,

2003). Past studies have found that there is a statistically significant difference between fatal and non-fatal incidents “in the average distance from an incident of the closest responding companies” (Rider, 1979). Greater fire protection implies a reduction in the number of fatalities, which in turn implies more fire departments in order to ensure that one is close to any emergency incident that may occur and that others are nearby to assist. To have more fire departments, there must be more fire fighters. In his study on the distribution of fire protection services, Kenneth Rider states that, “The more fire companies a city maintains, the better the chances that if a new incident breaks out a fire company will be available nearby to respond.” Companies that are not needed for a particular call will still be available to respond to additional calls, “providing coverage” (Rider, 1979). In order to provide this backup coverage, there must be more fire fighters employed so that there can be a full and efficient response to all calls.

In the post-September Eleventh world, the demand for fire protection services has clearly increased. Not only are fire fighters expected to provide an increased variety of fire protection services as indicated by the additional funding that has been set aside for new equipment, exercises and training, but they are also expected to maintain their old responsibilities and increase coverage. In addition, fire fighters cannot simply be sent away from their shift for the day to participate in training. When a fire fighter is absent for training, another fire fighter is needed to fill that position and respond to calls (O’Connor, 2005). All of this increased demand stems from the goal of making first responders better prepared to respond to future incidents of terrorism so that the American people are protected. However, many fire chiefs in cities all over the country are reporting that without more staff to cover these additional services, first responders will be unprepared to respond to future incidents and citizens will be left dangerously unprotected (Hall, 2004).

III. Theory

Increased demand for fire protection services and coverage is translated into higher employment levels and wages through the theory of derived demand in the labor market. As Richard Freeman states in *Labor Economics*, “The demand for labor is different from that for commodities. In the first place, employers [usually] do not hire labor for the intrinsic pleasure of having employees, the way consumers purchase goods or services. Workers are hired because they help produce goods for consumers” (Freeman, 1972). Demand for labor is derived from the demand for the goods or services that labor produces. When “demand for goods changes, all else being equal, the demand for labor changes in the same direction” (Freeman, 1972). Therefore, as the demand for fire protection services increases, *ceteris paribus*, the labor demand curve for fire fighters should shift to the right, increasing the equilibrium employment and wage levels (as illustrated in **Figure 1**).



The theory of derived demand appears to hold true for fire services as goods and fire fighters as labor. Since demand for fire protection services increased after September Eleventh, “the foremost need of the fire service is adequate personnel” (IAFF, 2003). The International Association of Fire Fighters estimated in 2003 that 75,000 new fire fighters were still needed to fulfill post-September Eleventh demands (IAFF, 2003). The Congressional Research Service has reported that while local responders have taken on a larger role in “homeland security activities,” without an increase in personnel, they will “have difficulties performing day-to-day operations and responding to homeland security emergencies” (Reese-CRS, 2005). This increased need and demand for fire personnel is derived from the increased demand for the services that these fire personnel provide. Kenneth O’Connor of the IAFF seemed to summarize why derived demand fits especially well with the fire fighter labor market in his testimony before Congress. O’Connor stated that, “The fire service is not like many occupations in which a person who is receiving training can simply be away from their desk for a day. When a fire department assigns a fire fighters to attend training, that fire fighter’s position must be ‘backfilled’ by another fire fighter” (O’Connor, 2005). In the field of fire fighting, you cannot continue to increase the demand for the labor’s services without increasing the number of personnel. If more personnel are not added, the fire fighters that are employed will not be able to take full advantage of the training and equipment being presented to them through federal grants (Grossman, 2003). Fire fighters will not be prepared to meet the post-9/11 demand.

While the fire fighter labor market seems to fit the theory of derived demand especially well, there is a problem. In the field of fire fighting, there are both paid professional and volunteer fire fighters. When looking at the demand for more fire fighters, we must determine which group of personnel to examine. In their study, Alexia Brunet, Larry DeBoer, and Keven

McNamara ask the question, “What determines a community’s choice between volunteer and professional fire protection?” (Brunet, 2001). The authors state that, “Volunteer and professional costs differ primarily in the pay, recruitment, training, and administration costs of fire fighters. To increase the level of fire protection, more fire fighters must be employed and paid” (Brunet, 2001). There is evidence that while volunteer departments are more cost effective for lower levels of fire protection, professional departments are more cost effective when more fire protection services and quicker response times are demanded (Brunet, 2001).

Because September Eleventh has produced an increased demand for more fire protection services, quicker response times and more coverage, the increase in employment should come in the form of an increased number of paid fire fighters. The increase in skills required to provide more services and expanded coverage also suggests an increase in demand for full-time, paid, and highly trained fire fighters. Therefore, in this study, we will assume a shift to the right in the derived demand for paid fire fighters, allowing us to hypothesize an increase in employment levels and wage. Since fire protection services are a public good, it must also be noted that our model is based on the assumption that political processes are working efficiently so that notional demand has become effective demand. With this assumption, the derived demand theory leads directly into our hypotheses that since September Eleventh, the increased demand for fire fighters caused a significant increase in wages and employment levels for fire fighters across the United States.

A final theory which must be kept in mind when examining the effects of September Eleventh on the fire fighter labor market is that of compensating wage differentials (Smith, 1995). Because September Eleventh made fire fighting an even riskier and more dangerous occupation, it is possible that while demand shifts to the right, supply will shift to the left. In this

case, wages may increase without an increase in the level of employment. Such wage increases may be due to compensating wage differentials – fire fighters must be paid more to compensate for increased risks simply to keep them in the labor market. Therefore, while it is hypothesized that both wage and employment will increase from increased demand for fire protection services and therefore fire fighters, it is possible that due to changes in supply and compensating wage differentials, we will only see increased wages since September Eleventh.

IV. Empirical Model

Data

The data used in this study comes from a couple different sources. The variables created using this data are briefly defined in *Table 1*.

Table 1: Variables and Descriptive Statistics

Variable	Definition	Mean	Std. Deviation
UASI	Populations of Urban Area Security Initiative cities in a state divided by the state population	0.038107	0.0790563
FFwageDD	Hourly wage for fire fighters in each state. Figures are deflated by CPI for each year with 1998 dollars as the base. A second deflation by each state's cost of living index evens out purchasing power from state to state.	\$14.924	2.77964
PerCapEmp	Per capita employment of fire fighters in each state	0.000967	0.00055314
StwageDD	The average state wage of all workers in each state deflated by CPI and state cost of living index	\$13.5418	1.75873
Unemp	Unemployment rate in each state for each year of the study	4.5469%	1.15809

Fire Fighter Employment and Wage

The hypotheses will be tested using mainly state level data obtained from the United States Bureau of Labor Statistics (BLS) and *Congressional Quarterly's State Fact Finder (1998-*

2004). BLS has created a database of wages by occupation and region. From this database, state level statistics on wages and employment for fire fighters (category does not include fire investigators) have been pulled for the years 1998 through 2004. Included in BLS's job "fire fighter" data are any persons who fit the following description:

"Control and extinguish fires. Protect life and property. Maintain equipment as employee of city, township, or industrial plant. Respond to fire alarms, direct stream of water or chemicals onto fire, position and climb ladders. May inspect buildings for fire hazards and compliance with fire prevention ordinances, issue forms to building owners listing fire regulation violations, drive and operate firefighting vehicles and equipment. May be assigned duty in marine division of fire department" (BLS.gov).

Among the reported statistics for fire fighters are two of the main variables used in this study, number of fire fighters employed and fire fighter average hourly wage. In order to level out the playing field for all states before using the data, however, a few alterations had to be made to the BLS figures. Past studies have found that it is more difficult to achieve a certain level of fire protection when there is a large population in an area (Brunet, 2001). This tells us that states with greater populations should already have more fire fighters employed and that employment numbers should increase with population. Because this study is looking at the effects of September Eleventh on employment levels and not population, the differences in state population numbers must be controlled for. In the model this will be achieved by dividing a state's fire fighter employment figures by the state's population, giving us the number of fire fighters per capita.

Transformations must also be performed on the fire fighter wage figures. First, because our wage data is taken from several different years, inflation must be controlled for. To control for inflation's effect on fire fighter wages, all wage figures have been divided by the national CPI using 1998 as the base year. Therefore, all figures will be deflated to 1998 dollars.

However, since our level of analysis is the state, a single deflation of wages is not enough to completely level out the playing field. The difference in purchasing power of wages from one state to another must also be leveled out so that wages are comparable across states. Therefore, the wage figures for each state are deflated a second time by the 1997 cost of living index for that state (from *CQ State Fact Finder*) in order to make sure that all states are starting out on the same level and that wages are worth the same in all states.

Other Variables

Target Variable: UASI

The goal of this paper is to determine how the increased risk of terrorist attacks that has led to increased demand for fire protection services since September Eleventh has influenced the employment of fire fighters in states. However, the change in risk varies across states. For example, the risk in New York State increased more than the risk in Montana post-9/11, leading to a greater demand for more fire protection services in New York than Montana. Therefore, when determining the effect 9/11 has had on the fire fighter labor market, it is desirable to use a proxy variable for the effect of September Eleventh that accounts for state to state differences in risk.

The solution is to use a variable entitled “UASI.” Values for the UASI (Urban Areas Security Initiative) variable are based on the populations of “high-threat, high-density urban areas” (ODP 2004) as indicated by the U.S. Department of Homeland Security after assessing threat levels, critical assets, vulnerabilities and population density of many U.S. cities (Chertoff 2005 and ODP 2004). While the UASI list changes each year, many of the areas chosen remain the same and the higher risk states highlighted by these areas rarely change. Therefore, for this

study, the FY 2005 list of UASI “high risk” cities is used and the populations of these cities for each year of the study were taken from United States Census data.

Because September Eleventh occurred towards the end of 2001, the UASI variable for the years 1998 through 2001 will have a value of zero. For the years 2002 through 2004, the value will be the ratio of the UASI “high risk” population in a state to total state population for that year. By using such a variable, the states that are at a greater risk and therefore should be more concerned with increasing their fire protection will be weighted more heavily (value closer to one). Those states that do not contain UASI “high risk” cities will maintain values of zero before and after September Eleventh because the likelihood of incidents requiring greater fire protection services occurring in that state has not increased a great deal and therefore the citizens and government of that state will not be as concerned with increasing fire fighter employment and wages. The regression results for the UASI variable will indicate whether September Eleventh had an effect on the number of fire fighters employed or fire fighter wages in the states where the need for increased fire protection is the greatest.

State Wage

The average state wage for all occupations was taken from *CQ's State Fact Finder* for each year of the study. The state wage variable is included for the supply equation in the model. Within the model, state wage acts as an alternative wage to that of fire fighters. Therefore, as state wage increases, members of the labor force are more likely to supply their labor to a job other than fire fighting. Like fire fighter wage, the state wage is deflated twice so that an even playing field is created across states and in terms of purchasing power across years.

Unemployment

The unemployment rate for each state from 1998 through 2004 was taken from *CQ's State Fact Finder*. This variable will be used as a control that affects both supply and demand for fire fighters, though is not endogenous to both supply and demand. The unemployment rate is argued to be a determinant of both the demand and supply of fire fighters. On the supply side, as unemployment increases, there will be more people looking for jobs and therefore more people supplying themselves as fire fighters. On the demand side, which we are most concerned with, unemployment rate acts as a proxy for the state of the economy. If the unemployment rate is low, the economy in that state is doing well and the municipal governments will be able to demand more fire fighters. Such an increase in demand is controlled for so that the effect of September Eleventh (UASI variable) on the demand for fire fighters can be better isolated. The unemployment, UASI, fire fighter wage, state wage, and per capita fire fighter employment data are all used to set up the empirical model to test the hypothesis that wage and employment of fire fighters should have increased with demand since September Eleventh.

Model

In the real world, we cannot assume that supply will always be held constant while demand shifts according to the theory of derived demand. Therefore, in order to test for September Eleventh's effects on demand within the fire fighter labor market as a whole, the empirical model needs to allow for changes in supply. This is accomplished by utilizing a two stage least squares regression. Since wage and quantity are determined simultaneously by supply and demand in the labor market, each is endogenous in the model for the other. Therefore, two stage least squares is used in estimating both models (Ramanathan 2002).

The first demand and supply model we will look at is for per capita fire fighter employment:

- 1) **Demand Equation to be Estimated:**
 $\text{PerCapEmp}_d = f(\text{FFwageDD} + \text{Unemp} + \text{UASI})$

Implicit Supply Equation:
 $\text{PerCapEmp}_s = g(\text{FFwageDD} + \text{Unemp} + \text{StwageDD})$

As you can see, in this supply and demand model for fire fighters, fire fighter wage is an endogenous variable. While unemployment is also in both models, it is exogenous. The target variable, UASI, and state wage are the other independent variables not included in both, making them exogenous variables. By estimating the two equations simultaneously, we are able to see what affect the UASI variable is truly having on per capita fire fighter employment.

A similar two stage least squares regression will be run for the fire fighter wage model. As seen in the following equations, fire fighter wage and per capita employment are simply switched in the demand equation and the supply equation:

- 2) **Demand Equation to be Estimated:**
 $\text{FFwageDD} = f(\text{PerCapEmp}_d + \text{Unemp} + \text{UASI})$

Implicit Supply Equation:
 $\text{FFwageDD} = g(\text{PerCapEmp}_s + \text{Unemp} + \text{StwageDD})$

By estimating these models simultaneously, we can better isolate the effect September Eleventh is having on fire fighter demand by controlling for the other factors that cause changes in both supply and demand in the market. The two stage least squares regression coefficients

will tell us whether fire fighter employment and wage levels have indeed increased since the demand for fire protection services by citizens increased post September Eleventh.

V. Results

Fire Fighter Employment

The two stage least squares regression results are shown in *Table 2*. From these results, we can see that the only variable in the fire fighter employment model that shows any significance is the unemployment variable with a significance value of .0343. The sign on the unemployment coefficient is the opposite of what was predicted. The positive coefficient tells us that the number of fire fighters per capita demanded increases as the unemployment rate increases in a state, which does not seem likely to happen since a government would need a strong economy and revenue from its citizens in order to demand more fire fighters. High unemployment rates are usually indicators of weaker economies. However, it is difficult to make strong conclusions about the effect of unemployment either way because the model as a whole is insignificant as indicated by the value of the F-statistic (1.81990).

The variable we are most concerned with in this model, the UASI variable, is not statistically significant. This tells us that, while there is evidence of increased demand for fire fighters since September Eleventh in the literature, the data show no evidence of a significant increase in employment in high risk states since 9/11. This is especially disturbing because fire protection services are labor intensive. It is difficult to increase protection without increasing manpower.

Table 2: Two Stage Least Squares Regression Results (t-statistic in parantheses)

Variable	Fire Fighter Employment Model	Fire Fighter Wage Model
UASI	0.002239 (.792)	6.460470* (2.289)
FFWageDD	-.000347 (-1.089)	
Unemp	.000103* (2.125)	.297037 (1.011)
PerCapEmp		-2884.7896 (-1.089)
Adj. R²	0.0072	0.05267
n	339	339

* Significant at .05

Fire Fighter Wage

The results in **Table 2** for the fire fighter wage model show us something different than the employment model. While per capita fire fighter employment and unemployment have no significant effect on fire fighter wage, the UASI variable tells us that September Eleventh does. After controlling for variables endogenous to both demand and supply, the UASI variable is significant at the .05 level with a significance value of .0227. Because the variable is significant, we can use the regression coefficient value to figure out the magnitude of the effect September Eleventh is having on fire fighter wage. By multiplying the regression coefficient value, 6.46047, by the actual value of the UASI variable, we get the predicted increase in wage since September Eleventh. At first glance, it may seem that the predicted hourly wage increase will be high - \$6.46 for every one unit increase in UASI value. However, because the values for the UASI variable are ratios between zero and one (and never equal to one), the predicted increase in

fire fighter wage will actually be much smaller. *Table 3* shows the predicted wage increase for all states after September Eleventh as well as the predicted increases for five high risk states including New York, California, Illinois, Florida, and Texas.

Table 3: Predicted Fire Fighter Wage Increases

	Predicted Wage Increase
National Average	\$0.57
New York	\$2.82
California	\$1.59
Texas	\$1.57
Illinois	\$1.47
Florida	\$0.69

The average predicted increase for all fifty states is around fifty-seven cents per hour in 1998 dollars. That adds up to around five dollars and thirteen cents per day for a nine hour work day. While this is not an extravagantly large increase in wage, it is a decent sized increase. The five high risk states highlighted in the chart show predicted increases greater than the national average (as they should since they are some of the states at the highest risk). The increase in wage in New York from September Eleventh is predicted to be around two dollars and eighty-two cents per hour in 1998 dollars. Florida has the smallest predicted increase in firefighter wage of the five states in *Table 3*, yet it still has a predicted increase of around sixty-nine cents per hour.

When we look at what has happened to wages in real life, we find that the predicted wage increase is higher than the realized change in fire fighter wages in most of our highest risk states. In California and Texas, the increase in wage from 2000 (the last full year before 9/11) to 2004 has been less then the predicted increase. In California, wages for fire fighters have actually

increased only fifty-one cents instead of the predicted one dollar and fifty-nine cent increase and in Texas, where the predicted increase is one dollar and fifty-seven cents, there has been only a sixty-five cent increase. In New York and Illinois, we see even more disturbing results. Instead of the predicted increases, wages have actually decreased by one dollar and fifty cents and one dollar and fifty-six cents respectively. Of the five states highlighted in *Table 3* the only state outperforming the predicted increase is Florida where the actual increase in wages has been three dollars and thirty-six cents.

Even though certain states have seen actual decreases in wage, we must return to what our model tells us. Our model predicts increases in wage ranging from sixty-nine cents per hour to two dollars and eighty-two cents per hour. If the states act according to the model, then these are pretty good sized increases since September Eleventh. However, it is disappointing to see that the model does not predict that employment numbers for fire fighters will increase as well. These results tell us that although the literature shows evidence of an increase in demand that would produce higher wages and employment numbers for fire fighters, in actuality only wage has increased. Such results lead us to three possible explanations for what has actually occurred in the fire fighter labor market since September Eleventh.

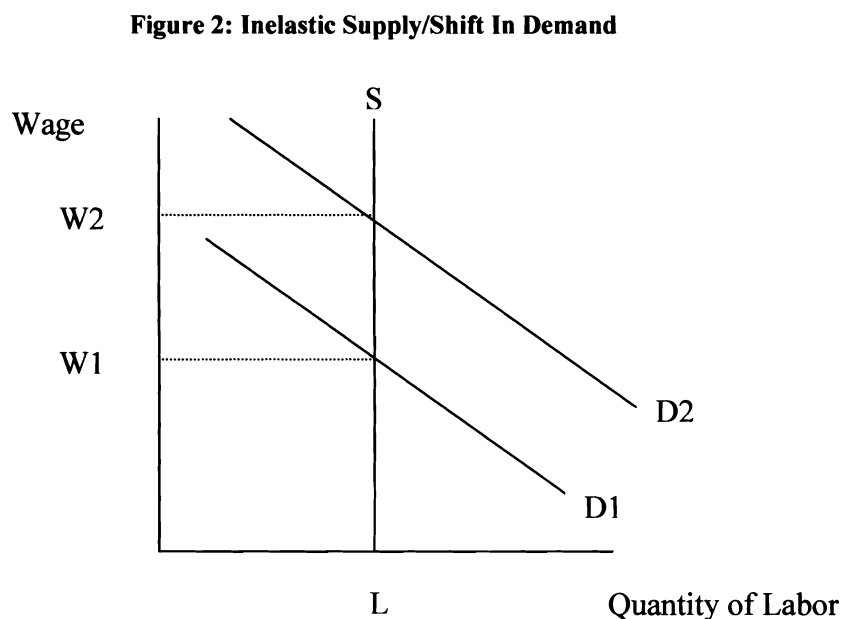
Possible Explanation One: Missing Shifter

The first possibility offered by an increase in fire fighter wage but not employment numbers is that of a missing shifter. The models set up for fire fighter demand and supply may be missing a factor, therefore changing the regression results by not allowing supply and demand to shift together as they are in the real market. Additional evidence for this lies in the adjusted R^2 for both the employment model and the wage model. As shown in *Table 2*, the value of the adjusted R^2 for the employment model is only .0072 and only .05267 for the wage model. This

means that each model as a whole is not explaining a great deal of the variance in employment or wage respectively. This means that it is quite possible that the inclusion of other shifters (possibly variables that get at the availability of budget funds for hiring fire fighters) could lead to differing results. However, because the UASI variable is highly insignificant in the employment model, it is not likely that the addition of shifters or controls to the model would make it any more significant.

Possible Explanation Two: Inelastic Supply

A second explanation for an increase in wage but not fire fighter employment is the presence of an inelastic supply curve in the fire fighter labor market. With an inelastic supply of fire fighters, demand could increase resulting in higher wages but not higher employment levels as shown in *Figure 2*.



The presence of an inelastic supply curve is a real possibility because only a few years have passed since September Eleventh. The supply of fire fighters may need time to build up because of the training it takes to become a fire fighter and enter the labor market. If those with fire fighting skills who have left the market and those who have retired are enticed back into the market, the supply curve would not necessarily be perfectly inelastic. However, without enough time to bring new generations of fire fighters into the market, we would see results similar to those for a perfectly inelastic curve. It would be interesting to do a follow up in another few years to see if employment levels have increased over an extended period of time. However, because we are limited to only a few years worth of data since September Eleventh, we are unable to know whether there is an inelastic supply curve that will flatten out with time or not.

Possible Explanation Three: Compensating Wage Differentials

The third possible explanation for finding an increase in fire fighter wage but not fire fighter employment levels has to do with government intervention. Because fire fighters can only be hired by the government, government processes must be working correctly for notional demand to become effective demand. It is possible that the government is acting to increase wages but not employment levels. This is likely the case if the wage increase is due to compensating wage differentials. With compensating wage differentials, fire fighter wages would have to be increased just to hold on to the current number of fire fighters with the new risks and responsibilities they have in the post-September Eleventh world. This could be why we see September Eleventh having an effect on wages but not employment. The government may simply be using its revenues to hold onto the fire fighters they have rather than devoting enough funds to realize the notional demand completely and increase employment levels as well.

The problem with the government only acting to increase wages as well is the other two possible explanations for our findings is that fire protection services are labor intensive and fire fighter employment levels are not increasing. The fact of the matter is, increasing wages will not keep American citizens better protected – only increased man power can do this. Therefore, no matter what the explanation for September Eleventh having an effect on fire fighter wages but not employment, a change must be made to increase fire fighter employment levels so that the United States can become better prepared to prevent and respond to future acts of terrorism.

VI. Conclusion

In the wake of the September Eleventh terrorist attacks, American citizens were looking for answers. Among the questions many wanted answers to was, “why were we not prepared?” Since the terrorist attacks on our nation, the demand for more preparedness has led to a greater demand on fire fighters. The literature reveals that citizens are demanding more fire protection services, better response capabilities and that more responsibilities be placed on first responders all over the nation. In order to achieve the level of preparedness and protection being demanded, more fire fighters are needed. Our statistical analysis, however, shows us that this increased demand for fire fighter employment is not being met by increased employment levels. In economic terms, there is notional demand that is not being made effective. So, the question is what is keeping this demand from being met?

The apparent answer to this question is government. We cannot assume, as we did in the beginning, that government processes are working efficiently to realize the increased notional demand or make notional demand equal effective demand. As Kevin O’Connor stated in his testimony before Congress, “The bottom line is that far too much of the money allocated by Congress never reaches the front line emergency responders” (O’Connor, 2005). Jeff Grossman

reported in the *Homeland Defense Journal Online* in 2003 that, “Much of the \$2.2 billion in grants slated for first responders in President Bush’s \$79 billion emergency wartime spending measure is focused on newer equipment and technologies for first responders.” In the mean time, “recent state and local budget shortfalls – estimated to be between \$70 and \$85 billion this year – have caused some first responder units to lay off personnel” (Grossman, 2003). This problem of failing to increase the number of fire fighters to meet increased demand is manifesting itself all over the nation. Slight increases possible in a few locales may be counteracted by growing budgetary problems leading to the reductions of fire fighters employed in other cities. *USA Today* in 2004, reported that, “at least two-thirds of the nation’s fire departments are understaffed” (Hall, 2004).

The answer to the problem of failing to meet demand for more fire fighters and even having to cut back on personnel in certain cities’ departments lies in new federal government policies. As of right now, the federal government is willing to pay for training, exercises and new equipment. However, the role of funding fire fighter personnel is left up to cities and locales. With cities already failing to achieve effective demand for more fire fighters and budget cuts only getting worse, it is becoming painfully evident that locales cannot be left on their own to fully fund fire fighter positions. New federal policies may not even require more money, but simply a redirection of money already in the appropriations bills. Funds can be reallocated from training and equipment to the build up of personnel until adequate levels are met. Assistance in funding or matching grant programs can be established so that locales and the federal government are sharing the costs of hiring new fire fighters. Future research focusing in on per capita statistics and differences between groups of states with similar characteristics could even lead to answers about where exactly funding should go in order to be most effective.

To the federal government's credit, it has begun the Staffing for Adequate Fire and Emergency Response (SAFER) grant program, but this may not be enough. In a June 9, 2005 *CRS Report For Congress*, it was still being reported that, "State and local government officials and emergency responders have stated that the hiring and retention of personnel is one of their principal homeland security needs" (Reese, 2005).

While increased demand for fire fighter services and therefore fire fighters is evident in the literature, statistical analysis shows that the increased demand for fire protection services and therefore fire fighters is not being met with increased employment. While fire fighter wage increases have been seen, if the government does not take a serious look at the problem of employment levels in a labor intensive industry and redirect its policies and funding to solve it, America will not be better prepared and will remain vulnerable to terrorist attacks like the one that took so many lives on September 11, 2001.

Works Cited

- American-Firefighter.com*. 11 November 2005. <<http://www.american-firefighter.com/quotes/edward-f-crocker.php>>.
- Brunet, A., et al. "Community Choice Between Volunteer and Professional Fire Departments." *Nonprofit and Voluntary Sector Quarterly*. 2001; 30(1):26.
- Fire Fighters Issues Book: 108th Congress First Session*. Published by International Association of Fire Fighters, AFL-CIO. 28 February 2003.
- Freeman, Richard B. *Labor Economics*. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1972.
- Grossman, Jeff. "Training First Responders." *Homeland Defense Journal Online*. 2003 2(9):1.
- Hall, Mimi. "Police, Fire Departments See Shortages Across USA." *USA Today.com*. 28 November 2004.
- Hobijn, B. "What Will Homeland Security Cost?" *Quarterly Review – Federal Reserve Bank of New York*. 2002; 8(2):21.
- Hoover, L., et al. "The Erosion of Police and Firefighter Wage Parity." *Monthly Labor Review*. 1996; 119(4):13.
- O'Connor, Kevin. "Overhauling First Responder Grants." House Homeland Security Committee – Capitol Hill Hearing Testimony. 14 April 2005.
- Reese, Shawn. "State and Local Homeland Security: Unresolved Issues for the 109th Congress." *CRS Report for Congress*. 9 June 2005.
- Rider, K. "The Economics of Distribution of Municipal Fire Protection Services." *The Review of Economics and Statistics*. 1979; 61(2):249.
- Smith, Robert S. "Compensating Wage Differentials and Public Policy: A Review." *Labor Economics Volume IV*. Orley C. Ashenfelter and Kevin F. Hallock, ed. Brookfield, Vermont: Edward Elgar Publishing Company, 1995.
- Data taken from:
- The Bureau of Labor Statistics* at www.bls.gov
- The CQ State Fact Finder* years 1999-2005