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CROWDING OUT IN NEW ORLEANS: Relief-Related Wage Effects on Investment?

By Nicole L. Cornell Sadowski

MERCATUS CENTER
GEORGE MASON UNIVERSITY

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Abstract

There are varying viewpoints on the level to which relief agencies should be involved in the rebuilding efforts of areas which have been affected by a natural disaster. Above-average wages paid by relief agencies in the wake of Hurricane Katrina in the New Orleans metro area have highlighted the potential for government to crowd out local businesses—via employment in the short-term and investment in the long-term. This study analyzes the effect of wage increases on investment in New Orleans pre-Katrina, the extent of overall wage increases following the storm, and their estimated effects on employment and investment. Using the REMI model, relief withdrawal strategies are also explored.

* Business Administration Department, York College of Pennsylvania, York, PA 17405; Email: ncornell@ycp.edu; Phone: 717-815-1952

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I. Introduction

January 2008 figures for the recovery of the greater New Orleans area following Hurricane Katrina in 2005 suggest that New Orleans is making economic strides. Unemployment is at a three-year low. Grants have been approved for the repair of civic buildings and to provide incentives for private investors in targeted recovery and rebuilding areas. Public school enrollments are at 74 percent of pre-Katrina levels (Liu and Plyer, 2008).

However, these recent successes could be impacted by slowing repopulation growth. An extreme shortage of workers exists for some occupations associated with continued recovery, as well as for many important to the tourism economy. As of the second quarter of 2007, occupation vacancy rates in architecture and engineering were 19.4 percent. Fourteen percent of all installation, maintenance, and repair positions were unfilled, as were 13.4 percent of those in food preparation and service (Liu and Plyer, 2008).

Why are employers unable to fill these positions? Clearly, the immediate decrease in population of over a quarter of a million people in the New Orleans metro area following the hurricane (U.S. Census Bureau, 2008) plays a very large role. U.S. Postal data suggests that New Orleans population is currently at 66 percent of pre-Katrina levels. However, have the very efforts to rebuild the city contributed to this labor shortage in specific, critical areas?

Chamlee-Wright (2007) discusses what is termed the "FEMA Economy," stating that local businesses attempting to recover from Hurricane Katrina have found it difficult to attract employees due to higher wages paid by relief agencies; that they have been "crowded out." Crowding out will affect employment and rebuilding in the short-term and investment and sustainability in the long-term.

The purpose of this paper is to first attempt to measure whether, given historical New Orleans data, increases in wages have been associated with decreases in nonresidential investment. The next step is to determine whether there actually have been unexpected increases in wages, once the decrease in population has been accounted for. The assumption for this analysis is that any such increases are due to relief-agency wage intervention. Further, have these increases likely lead to a greater decline in nonresidential investment, beyond what would be expected following a disaster of this magnitude?

What must be well accounted for with such an analysis is that—as suggested by data, anecdotal evidence, and personal observation—New Orleans is changing. When studying the change in the number of business establishments since Hurricane Katrina, it must be acknowledged that the overall change involves old businesses closing and new ones opening. When studying the number of addresses receiving mail, it must be acknowledged that it is not necessarily the same

people living in those houses as prior to the hurricane. The repopulation of New Orleans is currently a widely studied topic. The only things that are certain are that some previous residents and businesses are returning and reopening, while others are not, and that new people and businesses are arriving; whether they become permanent fixtures of the community remains to be seen. Therefore, any analysis using historical data and relationships should be well-noted that how much of "the same city" we are actually studying and attempting to forecast is still a much unanswered question.[1]

The remainder of this study is organized as follows: Section 2 is a discussion of Hurricane Katrina facts and the role of FEMA from the literature on this topic. Section 3 is an overview of employment and wage statistics, pre- and post-storm. Section 4 is an estimation of nonresidential investment using traditional econometrics, aimed at providing a reference for pre-Katrina investment in New Orleans. Section 5 consists of forecasting using regional economic modeling software. Section 6 offers a brief conclusion.

II. Discussion of Related Literature

Hurricane Katrina was a disaster of nearly unimaginable proportions. 80 percent of New Orleans was flooded (Johnson 2006). The American Red Cross estimates that more than 350,000 homes along the Gulf Coast were destroyed (Kirchhoff 2005). Direct fatalities from the storm are estimated near 1,500, with 1,300 of those in Louisiana alone. Damages are expected to exceed $100 billion (Knabb, Rhome, Brown 2006). The magnitude of the storm brings to light several areas of concern within current natural hazard discussion: global climate change and resulting hazard phenomena, appropriate land use and increasing populations in vulnerable areas, as well as the response of both government and the insurance industry to such disasters.

The Federal Emergency Management Agency (FEMA) was organized in 1978 under President Carter with the idea that, by bringing many different aspects of emergency management under one umbrella, it would create synergistic effects (Wamsley and Schroeder, 1996). FEMA's responsibility is to help the United States government protect the lives and property of its citizens by taking the lead role in coordinating major emergencies and disasters. It is tasked with providing guidance and leadership, as well as financial aid when needed (Giuffrida, 1985).

The federal government pledged $116 billion for gulf coast recovery, of which 65 percent was spent on emergency relief. Of the remaining 35 percent, much has not yet reached communities (Liu and Pryor 2008). A poll reported by CNN on September 19, 2005 stated that only 41

[1] For example, Liu and Plyer (2008) state that there have been increases in the number of children with limited English proficiency enrolled in public schools throughout all parishes in the New Orleans metro area, showing a demographic change in the population.

percent of Americans approved of the federal government's handling of Hurricane Katrina. When news stories focus on firefighters still living in trailers adjacent to uninhabitable fire stations two and a half years after the storm (Callebs, 2008), it is easy for the American public to feel its government has not done enough. Other recent headlines have highlighted the General Accountability Office's conclusion that FEMA misspent $30 million in 2006, half of which was due to not awarding work to contractors with the lowest bids (Hsu, 2007). In such cases, it is also easy for the American public to conclude that what has been spent has not been done so wisely.

However, this perception of FEMA is not a new phenomenon associated with Hurricane Katrina. Schneider (1992) chronicled other disasters, such as the Loma Prieta Earthquake in California and Hurricane Hugo in South Carolina, in which public perception following the immediate response was that the government (FEMA) was either ineffective or was not doing all it could to help victims. This perception is prominent when there is a difference between the government's planning, expectations, and standard procedures versus the public's behavior and expectations. This usually occurs with particularly complicated or unexpected disasters (Schneider 1992). Hurricane Katrina can be described as both.

As stated in Johnson (2006), New Orleans had every reason to fear "the Big One." Much of the city is below sea level, was built by draining wetlands, and is protected by levees. However, after centuries of having been spared, everyone may have adopted the mentality that "the Big One" would never happen. No one expected hearing the Army Corps of Engineers' admission that the levees were defective (Johnson 2006).

Not only does Hurricane Katrina fall into the category of unexpected, it is also complicated. Prior to the storm, the city's unemployment rate was nearly 12 percent, twice the national average, with the African-American community hit the hardest. Poverty was 23 percent, nearly 10 percent higher than the national average (Holzner and Lerman 2006). More than 100,000 people were unable or unwilling to evacuate when Hurricane Katrina was approaching (Manuel 2006).

Some experts have asserted that rebuilding the New Orleans labor market after the hurricane creates an opportunity for policymakers to upgrade returning workforce skills and improve the quality of jobs in the city. Some feel that higher-wage cleanup and rebuilding jobs should be made accessible to former New Orleans residents via government programs to help the disadvantaged become employed (Holzer and Lerman 2006). This is disparate from the traditional role of emergency management and relief agencies. The function of emergency management is mitigation, preparedness, response, and recovery. Recovery is to stop short of reconstruction (Waugh 1994).

Chamlee-Wright (2007) asserts that "employment of local workers by relief agencies should not be with the aim of creating jobs. Rather, such employment (and any wage premium associated with it) should be offered with respect to the priority of the task at hand and on a short-term basis." Any labor-market intervention aimed toward reconstruction is termed "signal noise," as it diminishes market signals and incentives that would ordinarily allow the local economy to correct itself.

The next section will examine descriptive employment and wage statistics to begin to determine whether there is a "FEMA Economy" occurring in the New Orleans metro area in the aftermath of Hurricane Katrina.

III. Discussion of Employment and Wages Statistics

As was noted previously, the New Orleans-Metairie-Kenner MSA[2], and specifically the City of New Orleans, was not without employment and wage problems prior to Hurricane Katrina. The Bureau of Labor Statistics (BLS) annually publishes its Occupational Employment Statistics (OES) data. This data contains figures for total employment and wages for over 800 individual occupations. The data illustrates that, over the six-year period prior to Hurricane Katrina, total employment increased at an annual rate of 0.0375 percent in the New Orleans metro area—twelve times lower than the national average. Both employment and income in many higher-paying industry sectors in New Orleans were disparate from national figures. Employment in science occupations, for example, increased at the national level (4.61 percent), but decreased in New Orleans (-0.29 percent). Income for management occupations increased 5.13 percent over this time nationally, but only 3.68 percent in New Orleans. Median income in the metro area experienced an average annual increase of 1.90 percent, compared to 2.13 percent nationally.

These existing problems were, however, exacerbated by the occurrence of the hurricane. Statistics show that, due to Hurricane Katrina, New Orleans saw not only changes to employment and wages—but large changes. Between 2005 and 2006 (the first year following Hurricane Katrina), BLS statistics indicate an employment decrease in 85 percent of surveyed occupations (an average change of -17.19 percent)—amounting to an overall decrease in employment of over 24 percent. 60 percent of all occupations saw fluctuations in employment larger than +/- 20 percent. Over the same time period, average employment increased 4.37 percent nationally, with only 2.39 percent of occupations seeing fluctuations larger than +/- 20 percent.

[2] For the remainder of this paper, the area analyzed will be the New Orleans-Metairie-Kenner Metropolitan Statistical Area (MSA). An MSA consists of one or more counties, including a core area and adjacent communities. The adjacent communities have strong economic and social integration with the core. An MSA must have a core, urbanized area with at least 50,000 inhabitants (Bureau of Labor Statistics, 2008).

Surprising figures also exist for wages. 70 percent of all New Orleans occupations saw an increase in wages, with an average increase of 6.89 percent—more than twice the national average during this time. More than 10 percent of all occupations experienced wage fluctuations greater than +/-20 percent, compared to 0.24 percent nationally. The statistics show that in the first year following Katrina, employment decreased and wages increased. But is the *extent* of these changes to be expected following a disaster of this magnitude? This will be analyzed in section V.

Appendix table A shows the ten occupations with the largest changes in total employment over this time period. The occupations with the largest increases are those directly involved with the physical cleanup and rebuilding process. Hazardous material workers (171 percent), plasterers and stucco masons (105 percent), and cabinetmakers (57 percent) make the list. Unfortunately, some of those making the list for the largest decreases are occupations that make day-to-day living in New Orleans truly possible: radiation therapists (-75 percent), loan counselors (-60 percent), and medical secretaries (-59 percent). Appendix table B shows the ten occupations with the largest changes in average hourly wages following Hurricane Katrina. Again, those occupations associated with rebuilding saw some of the largest increases: health and safety inspectors (58 percent), truck and tractor operators (57 percent), and plasterers and stucco masons (45 percent).

The Quarterly Census on Employment and Wages published by the BLS provides first-quarter 2007 data for several major industry sectors, categorized by public or private ownership. This data shows that the decrease in employment and increase in wages seen in the first year after the storm have been persistent. The overall loss in employment is roughly 15 percent (over 88,000 jobs). Most of the loss for private businesses has been in service sectors—a 16 percent decrease when compared to pre-Katrina levels. Specifically, leisure and hospitality occupations show a decrease of over 20,000 jobs (24 percent). Average weekly wage data shows a 20 percent increase, when compared to pre-Katrina levels. This number is slightly higher for those jobs at privately owned businesses (22 percent), with some of the largest increases in leisure and hospitality (31 percent).

First quarter 2007 BLS data also exists for the number of businesses. There has been a 7.88 percent decrease in the total number of establishments since third quarter 2005. There have been, however, increases in the number of federal- and state-owned establishments during this time (3.31 percent and 7.04 percent, respectively). An 8.08 percent decrease in the number of privately owned establishments occurred, with most of that loss in the service sectors (-10.18 percent).

The above statistics illustrate that there has been a large, persistent loss in employment and private establishments, with the largest losses experienced in those areas vital to the tourism

economy—leisure and hospitality. Concurrently, there has been an increase in government-owned businesses, coupled with an increase in both employment and wages for occupations most directly associated with recovery, cleanup, and rebuilding as relief aid has made its way to the area. These statistics appear to coincide with Chamlee-Wright's (2007) assertion that "private businesses trying to get back on their feet have found it difficult to attract employees…the premium wage relief agencies pay low-skilled workers crowds out private employers from the labor market." But what, if any, are the long-term effects?

IV. Econometric Specification and Results

It is evidenced by the descriptive data in the previous section that wage rates, in general, have increased in the New Orleans metro area since Hurricane Katrina, likely leading to the "crowding out" of private business in terms of employment. This section outlines the longer-term effects of this increase in wage rates.

Alesina et. al. (2002) conclude that increases in public spending increase labor costs and, therefore, profits—leading to a decrease in investment. Their study found that an increase of one percentage point in the ratio of government spending to total output leads to a decrease in investment of 0.15 percentage points immediately and 0.74 percentage points over five years. They found that the effects were particularly strong when the spending increases were on wages, with an immediate decrease of 0.48 and 2.56 over five years.

The main relationship of interest in this study is whether the increase in wage rates, established through descriptive statistics in the previous section, would be expected to ultimately lead to a decrease in investment. Therefore, an historical analysis (i.e. pre-Katrina) is needed to establish a baseline relationship between wages and investment in the New Orleans metro area.

Variable Definitions and Specification

In their study, Alesina et.al. (2002) used variables such as government wages paid, income taxes, and business taxes to model investment over time. Bernanke (1983) concluded that capital stock, the after-tax price of capital goods, and the physical depreciation rate are all determinants of business fixed investment. This analysis noted that previous studies on investment have concentrated on the effect of output, sales, and profits.

Using the logic of the literature, this study models nonresidential investment in the New Orleans-Metairie-Kenner MSA as follows:

$$Investment_t = \beta_0 + \beta_1 * Capital\ Costs_t + \beta_2 * Depreciation_t + \beta_3 * TWages\ Paid_t + \beta_4 * Capital\ Stock_t$$

$$+ \beta_5 * Disposable\ Income\ PC_t * \beta_6 * Time + \varepsilon_t$$

(1)

Investment is nonresidential investment in millions of dollars. *Capital Costs* is a measure of the industry capital cost in the New Orleans metro area, relative to the rest of the United States. This measures, for example, the cost of investment inputs, as well as property and business taxes. *Depreciation* is the national, nonresidential investment depreciation rate. *TWages Paid* represents total compensation to employees in millions of dollars. *Capital Stock* is the total value of current, existing, nonresidential investment, in millions of dollars. *Disposable Income PC* is real disposable per capita income, in thousands of dollars. *Time* is an integer value representing a three-month time period within the study.

With the exception of *Depreciation* and *Capital Costs*, which are yearly values, all data are quarterly, spanning 1990–2005, for a total of sixty-four observations. Again, pre-Katrina data is used to obtain a baseline reference for the relationship of interest. Data for *Capital Costs* and *Depreciation* were acquired from Regional Economic Models, Inc (REMI). The remaining variables were obtained from the Bureau of Economic Analysis (BEA).

One item should first be noted regarding variable selection. *Disposable Income PC* and *TWages Paid* appear to be similar measures. However, two measures were needed: (1) a variable to measure wages at as micro-level as possible—this is the independent variable of interest; (2) a variable to measure the number of individuals employed at various levels of the wage-rate scale. The first is, obviously, a measure of individual wages themselves, while the latter indicates the purchasing power of the city as a whole. In an effort to reduce correlation between these measures (as well as indirectly account for personal income taxes), real disposable income per capita was used, as opposed to average annual compensation or hourly wages. This also ensures that any increase in this measure is due to increased wage rates, as opposed to inflation. Personal taxes are assumed constant. Correlation between these measures is 28 percent.[3]

As increases in capital costs increase the cost of investment, the *Capital Costs* index is included in the estimation. This measures costs in the New Orleans metro area relative to the rest of the United States. If an observation is less than 1, it indicates that capital costs are relatively less in the metro than in the United States; vice versa should the observation be greater than 1. Hence, there is an expected negative estimated coefficient for *Capital Costs*. As relative capital costs decrease, investment will be attracted to the area. Depreciation, the decrease in the economic value of capital stock, either through physical depreciation, obsolescence, or changes in demand, affects private industry's level of investment. As the rate of depreciation increases, firms would

[3] It should be noted that there is some degree of correlation (56%) between the *Capital Costs* and *Wages* variables. However, as *Capital Costs* is a relative value, as opposed to absolute measure, both were kept in the model.

be less inclined to expend additional dollars. There is an expected negative estimated coefficient for *Depreciation*.

TWages Paid, which measures total compensation to employees, is used to measure demand for goods and services, given the local population. If compensation rates increase (indicating a wealthier population) or if population increases (indicating larger domestic demand for goods and services), *TWages Paid* will increase. If total compensation to residents increases, the assumption is investment by local industries will increase, as well. There is an expected positive estimated coefficient for *TWages Paid*. *Capital Stock* is a measure of the total, existing nonresidential investment—a measure of wealth for local industries. As the existing stock of wealth is likely to make future investment more feasible, there is an expected positive estimated coefficient for *Capital Stock*.

Disposable Income PC is a measure of real, disposable per capita income. An increase in this measure will lead to higher demand by consumers and likely more investment by local industries. Thus, a positive estimated coefficient for *Disposable Income* could be expected. However, the main focus of this analysis is to test whether wage increases and the associated increase in difficulty and the cost of doing business will over overpower the preceding effect and put downward pressure on investment. If so, a negative estimated coefficient would be seen for *Disposable Income PC*. *Time* is included in the model to capture trends in nonresidential investment in the New Orleans metro area not otherwise measured.

Results

The model was estimated using traditional ordinary least squares methodology. The results are presented in table 1. The adjusted r-squared is 0.88.[4] Relative capital costs, total wages paid, and capital stock are positively correlated with nonresidential investment. For every 1 percent less expensive than the national average nonresidential investment in the New Orleans metro area becomes, it would be expected to increase by roughly $30 million. For each $1 million increase in total wages paid, indicating a larger, wealthier population with more demand for goods and services, investment would be expected to increase by roughly $162,000. The existing capital stock also has a positive, though smaller, impact on the level of new investment.

The depreciation rate, time, and disposable income per capita, are negatively correlated with nonresidential investment. The depreciation rate is highly correlated. And, all other things held equal, the estimation suggests investment has been decreasing in the New Orleans metro area by approximately $5.75 million per quarter.

[4] Again, it should be noted that there is some degree of correlation between *Capital Costs* and *Wages*. The r-squared has likely been pushed higher due to this correlation.

The estimation also suggests that an increase in real, disposable income per capita will be associated with a decrease in nonresidential investment. For each one thousand dollar increase, nonresidential investment is expected to decrease by approximately $3.6 million. Therefore, historically, an increase in wages in the New Orleans metro area has "crowded out" investment, implying that current wage rates increases would do the same. Increases in the overall amount of wages paid, however, have had moderately positive results—suggesting that measures to increase the level of employment would be beneficial.

As the relationship between wages and investment for New Orleans has been established, the next section of this study will employ regional economic modeling for forecasting. It is used to estimate both (1) whether the increase in wages discussed in section II is expected or unexpected following a disaster of Hurricane Katrina's magnitude; and (2) the expected impact of these wage increases on investment in the New Orleans metro area over time.

V. The REMI Policy Insight Model

The REMI Policy Insight model is a forecasting and policy analysis tool. Regional Economic Models, Inc. (REMI) "constructs models that reveal the economic and demographic effects of policy initiatives or external events on a local economy." REMI is used within higher education, at consulting firms, and throughout levels of government. The REMI model is custom-built for a specific area, using data from a variety of public sources (REMI Policy Insight User Guide, 2007). Treyz, Rickman, and Shao (1991) state that simulations with the model can be used to estimate the economic and demographic effects of state and local tax changes, economic-development programs, and infrastructure investments, among others.[5] In addition to econometrics, the model includes input-output, general equilibrium, and economic geography methodologies.[6]

The model includes five "blocks" of variables: output, labor and capital demand, population and labor supply, wages/prices/costs, and market shares. Included in the blocks for the New Orleans metro area model are data for nineteen major industry sectors, comprised of seventy individual sectors, classified according to NAICS (North American Industry Classification System) codes. The REMI model has a default baseline forecast, including values for variables such as total employment in the seventy industry sectors, gross regional product and its components, compensation, and population demographics. By making changes to historical data or estimating future changes, a user can create an updated forecast (REMI Policy Insight User Guide, 2007).

[5] Mill (1993) notes that REMI is a widely used tool, used perhaps more than any similar model. Included is a discussion of billion-dollar projects the model has been used to analyze—such as a convention center in Chicago, a proposed expansion of Logan airport, and highway projects.

[6] For a complete discussion of the REMI model methodology, see the Model Documentation (REMI 2007) and Treyz, Rickman, and Shao (1991).

REMI Model Analysis—Employment Decreases: Expected or Unexpected?

REMI's data on employment, compensation, and population, among others, are taken from the figures made available by the BEA. The most recent version of the REMI model includes data through 2005, matching that made publicly available by the BEA. Based on the U.S. Census Bureau's annual estimate, the REMI model's baseline forecast first needed to be updated for the large loss of population due to Hurricane Katrina. [7]

That being said, REMI is a general-equilibrium model. Population clearly plays an integral role in its forecasting. As mentioned previously, the repopulation of the New Orleans metro area is widely researched and still unclear at this time. Many factors such as degree of damage sustained from Hurricane Katrina, homeownership, personal ties to the area, socioeconomic status, and race have been suggested as variables playing a role in an individual's choice of whether or not (and when) to return to New Orleans (Paxson and Rouse, 2007). Therefore, it should be noted that all forecasts discussed throughout this section rely on the REMI model's repopulation estimates.

The main relationship of interest is the effect of increased wages during the cleanup and rebuilding on nonresidential investment. The first test, then, is to establish whether, according to the REMI model, the increase in wages seen throughout the area is unexpected or if they are reasonable given the magnitude of the disaster. By comparing actual 2006 wage data to the REMI model's forecast for 2006 wages (once population was updated), any difference would illustrate an effect unexpected by the REMI model. For this analysis, the working assumption is that any such difference is the effect of wage intervention by relief agencies (such as FEMA). The "updated population" estimates for compensation were compared to actual 2006 data.[8] There were differences between the two, indicating that the extent of wage increases is, indeed, unexpected—even once accounting for the loss of population. Lastly, actual 2006 wage data was introduced into the model to create another, updated forecast.[9]

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[7] It should be noted that when a REMI model is built for an MSA, it can only be worked with as an aggregate of the counties it comprises – it is not possible to decompose the model into the individual counties. Therefore, the decrease in population is considered a decrease over the entirety of the MSA. There is no way to account for the fact that most of the population loss was in Orleans and St. Bernard Parishes.

[8] Annual compensation *rate* data by sector would be the optimal measure for testing the effects of an increase in wage rates. Unfortunately, this data was not available through the BEA (the source for REMI data) for 2006. As stated in section two, the BLS publishes a database on employment and compensation values for individual occupations, as well. This data, however, aggregates occupations and industry sectors differently than the BEA. So, there was no way to update the REMI model with actual 2006 wage rates (actual employment by sector was not available from the BEA, either or it would have been updated, as well).
However, BEA data was available for *total* compensation amounts for roughly 70 percent of the seventy industry sectors in the REMI model. Therefore, this is the value used to represent a change in wage rates.

[9] After several adjustments to the data, the REMI model was able to be manipulated so that it reproduced the actual 2006 total compensation data in these sectors to within roughly $26,000—a very small percentage of total compensation. For those sectors without 2006 total compensation data available via the BEA, estimates were made

Discussing the disparity in the New Orleans economy now versus what it could have been without the occurrence of Hurricane Katrina is futile. However, there is value in comparing 2005 employment data to data in (1) the 2006 REMI baseline forecast; (2) the 2006 REMI forecast, updated for population; and (3) the 2006 REMI forecast, updated for both population decrease and unexpected wages. Table 2 shows percent-change comparisons between 2005 data versus the three REMI forecasts for nineteen major industry sectors. Column 1 compares 2005 data with the 2006 REMI baseline forecast, to show the expected change in employment in these sectors had Hurricane Katrina not taken place. Column 2 compares 2005 data with the 2006 REMI forecast with updated population, illustrating what REMI estimates given Hurricane Katrina—but without any labor-market intervention. Column 3 compares 2005 data with the 2006 REMI forecast, given both the population and labor market effects.

Column 1 shows that REMI predicted employment would have decreased in eleven of the nineteen major industry sectors—even without Hurricane Katrina. Column 2 points out that employment (expectedly) would decrease by a much larger amount in these sectors once Hurricane Katrina was accounted for. Column 3 shows that expected employment is lowered further in each case by the labor-market intervention. The other eight industries had initially been expected to show moderate employment growth. In each case, updating population lowered growth estimates. Forecasts were decreased further once the labor-market intervention was considered.

REMI Model Analysis—Investment

Most important to the purpose of this analysis are the estimates of nonresidential investment given in tables 3 and 4. Table 3 shows the differences in investment percentage growth rates from 2005 for each of the three forecasts: 2006 REMI baseline forecast, 2006 REMI forecast with updated population, 2006 REMI forecast with updated population and wages. Table 4 shows dollar value estimates for nonresidential investment in each of the three forecasts. Investment in the labor-market intervention forecast is $10.23 million lower than what was estimated with just Katrina's impact on population. It is reasonable to conclude that increased wage rates due to labor-market interventions following Hurricane Katrina decreased nonresidential investment in the New Orleans metro area by slightly more than 1 percent in 2006.

REMI Model Analysis - Forecasting Outcomes on the Length of Labor-Market intervention

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based on data published the BLS. Those sectors requiring estimation were very much spread across the major sectors.

It is, obviously, not just the year 2006 that matters in the recovery from Hurricane Katrina and the rebuilding of the New Orleans metro area. Labor-market intervention by relief agencies did not go away with the end of 2006 and there are varying opinions for how long it may continue. Therefore, the total amount of crowding out over time should be estimated. Here, four scenarios have been tested against a "no labor-market intervention" (LMI) strategy: current labor-market interventions remaining in place through 2010, current measures remaining through 2012, a gradual decrease of intervention through 2010, and a gradual decrease through 2012.

Table 5 shows the effects of each possibility, most importantly, on nonresidential investment. As stated previously, the REMI model forecasts $10.23 million of crowding out in 2006 due to labor-market intervention. In terms of investment, the apparent best strategy for wage intervention withdrawal is a gradual decrease through 2010. This is consistent with Chamlee-Wright's (2007) assertion that once immediate needs are met, the economic and social systems will rebound best if relief is scaled back as soon as possible. It should be noted that even this strategy produces a total investment value $31.50 million lower over the forecast period than if there had been no intervention.

A gradual decrease of intervention through 2010 is also the consistent best option throughout the remainder of variables forecasted: employment, labor market participation, total gross regional product, and 4 categories of consumption important to the New Orleans tourism economy. The forecasts suggest that total employment was lower by roughly 7,700 individuals in 2006 with interventions in place than if they had been absent. The last column in this category shows average yearly employment over this time; the no intervention scenario would have produced an annual average 2,600 employees higher than even the intervention scenario with the most optimal withdrawal strategy. In terms of labor-force participation, the no intervention scenario forecast produces higher participation rates in each year.

For gross regional product, the no intervention scenario produced values roughly $389 million higher for 2006. Beginning in 2011, several of the intervention scenarios begin to surpass the no LMI scenario. However, considering total gross product over the forecast time period, the no intervention scenario is approximately $509 million higher than the intervention scenario with the most optimal withdrawal strategy—with a large majority of that difference occurring at the beginning of the rebuilding phase.

Table 6 shows the same scenarios for four major categories of consumption: food/beverage, clothing/shoes, transportation, and other services. Total consumption estimates in each category are higher without labor-market intervention than the best alternative among those with; the largest difference being in food and beverage (a difference over the forecast period of $277 million).

VI. Conclusion

The American public wants the government to protect its citizens and their property by wisely utilizing public resources in the rebuilding efforts following Hurricane Katrina, as well as any other disaster. Yet there are conflicting ideas as to the *extent* of government involvement, in both a physical and social sense. Is it best for the government to leave reconstruction to the private market? Or should it try to upgrade the labor market through reconstruction efforts? The government, through contracting with local and visiting businesses in the New Orleans metro area, has paid high wages to workers involved in the cleanup and recovery, which, in turn, has made it difficult for local businesses to compete (Chamlee-Wright 2007).

Using REMI (Regional Economic Models, Inc.) software, as well as a general discussion of employment and wage statistics, it appears as though wages in the New Orleans metro area have increased more than what would be expected following a disaster of Katrina's magnitude. Using historical data on the New Orleans-Metairie-Kenner MSA for 1990-2005, this study finds that increases in wages are associated with decreases in private, nonresidential investment. The increase in wages, according to REMI's forecasts, has likely led to a decrease in nonresidential investment of roughly $10 million in 2006 alone. Private investment is generally considered necessary for sustainability in the long term.

Using REMI's forecasting techniques, four scenarios for relief agency withdrawal from the labor market were tested. A gradual decrease through 2010 appears to result in the lowest levels of investment crowding-out, as well as producing the most favorable outcomes for other economic measures. This corresponds with Chamlee-Wright's (2007) assertion that once immediate needs are met, social and economic systems will recover best if relief is reduced as soon as possible.

As the repopulation of the New Orleans metro area continues to change the size, shape, and face of the labor market, studies should continue to investigate this issue. Continued study and exploration of FEMA's interaction in the labor market in New Orleans and its long-term effects will hopefully help to create a more unified national idea of what is and should be expected of our emergency management systems.

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Table 1: Estimation Results: Nonresidential Investment

	Coefficient Estimate	Standard Error
Intercept	-2765 ***	260.41
Capital Costs	3072 ***	254.78
Depreciation	-7781 ***	1968
TWages Paid	0.1616 **	0.0239
Capital Stock	0.0065 ***	0.0025
Disposable Income PC	-3.6392 ***	0.7817
Time	-5.7538 ***	0.9292

***** indicates 99 percent statistical significance**

**** indicates 95 percent statistical significance**

Table 2: % Differences - 2006 Employment Forecasts vs. 2005 Data, by Major Industry Sector

	Baseline REMI '06 forecast vs. 2005 data	Updated Pop REMI '06 forecast vs. 2005 data	Updated Pop & Wages REMI '06 forecast vs. 2005 data
Forestry/Fishing/Other	-1.8408%	-2.5505%	-2.9275%
Mining	1.2881%	1.0305%	1.0206%
Utilities	-1.1814%	-5.7152%	-6.2899%
Construction	-2.7428%	-11.6590%	-13.6210%
Manufacturing	-1.7950%	-3.0328%	-3.3718%
Wholesale Trade	-2.7918%	-5.2246%	-5.9464%
Retail Trade	-1.2887%	-5.0112%	-6.9866%
Transp/Warehousing	1.9721%	0.7669%	0.5575%
Information	-1.5094%	-4.3208%	-5.2662%
Finance/Insurance	-1.0937%	-4.1581%	-5.4211%
Real Estate/Rental	-2.5060%	-5.4423%	-7.5673%
Profess/Tech Services	0.9340%	-2.1352%	-2.8891%
Mgmt of Corp/Enter	-1.3869%	-2.9635%	-3.4732%
Admin/Waste Services	0.8789%	-3.1428%	-3.9904%
Educational Services	3.3506%	2.1509%	1.1323%
Health/Social Assist.	0.3223%	-5.1263%	-6.5806%
Arts/Ent/Recreation	1.5205%	0.3258%	-0.4838%
Accomm/Food Service	1.1228%	-0.3584%	-1.7980%
Other Services	-1.2257%	-5.5180%	-7.0125%

Table 3: Percentage Differences - 2006 Nonresidential Investment Forecasts vs. 2005 Data

	Baseline REMI '06 forecast vs. 2005 data	**Updated Pop REMI '06 forecast vs. 2005 data**	**Updated Pop &Wages REMI '06 forecast vs. 2005 data**
Nonresidential Investment (percent change)	4.0230%	3.2513%	2.2356%

Table 4: Estimates – 2006 Nonresidential Investment

	Baseline REMI '06 forecast	**Updated Pop REMI '06 forecast**	**Updated Pop &Wages REMI '06 forecast**
Nonresidential Investment (dollars)	1,047,608,256	1,039,837,122	1,029,608,130

Table 5: REMI Model Forecasts

		2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**Total *or Average***
NR Investment	No LMI	1.040	1.176	1.219	1.260	1.251	1.243	1.237	1.233	9.658
(billions $)	Current LMI – ‘10	1.030	1.163	1.205	1.246	1.238	1.241	1.236	1.236	9.595
	Current LMI – ‘12	1.030	1.163	1.205	1.246	1.238	1.230	1.225	1.233	9.569
	Gradual LMI – ‘10	1.030	1.164	1.211	1.256	1.249	1.243	1.238	1.235	9.627
	Gradual LMI – ‘12	1.030	1.164	1.210	1.254	1.248	1.242	1.237	1.235	9.620
Employment	No LMI	696.98	708.47	714.45	717.32	720.07	723.41	726.30	729.48	717.06
(thousands)	Current LMI – ‘10	689.30	700.70	706.95	710.19	713.38	724.03	727.38	730.81	712.84
	Current LMI – ‘12	689.30	700.70	706.95	710.19	713.38	717.15	720.46	730.65	711.10
	Gradual LMI – ‘10	689.30	701.46	711.02	715.85	719.70	724.03	727.04	730.24	714.83
	Gradual LMI – ‘12	689.30	701.46	710.35	715.12	719.11	723.23	726.59	730.30	714.43
LF Participation	No LMI	71.76	72.83	73.52	73.88	74.09	74.23	74.45	74.64	73.67
(percent)	Current LMI – ‘10	71.73	72.76	73.42	73.77	73.96	74.12	74.37	74.59	73.60
	Current LMI – ‘12	71.73	72.76	73.42	73.77	73.96	74.10	74.31	74.52	73.57
	Gradual LMI – ‘10	71.73	72.77	73.44	73.81	74.03	74.19	74.42	74.63	73.63
	Gradual LMI – ‘12	71.73	72.77	73.44	73.81	74.02	74.18	74.41	74.62	73.62
GRP	No LMI	42.170	42.770	44.160	45.438	46.571	47.754	48.944	50.168	325.805
(billions $)	Current LMI – ‘10	41.781	42.379	43.773	45.060	46.209	47.790	49.005	50.242	324.458
	Current LMI – ‘12	41.781	42.379	43.773	45.060	46.209	47.407	48.613	50.237	323.678
	Gradual LMI – ‘10	41.781	42.418	43.984	45.361	46.552	47.788	48.985	50.210	325.296
	Gradual LMI – ‘12	41.781	42.418	43.949	45.322	46.520	47.743	48.959	50.214	325.125

Table 6: REMI Model Forecasts

		2006	2007	2008	2009	2010	2011	2012	2013	Total
Food/Beverage C	No LMI	2.4310	2.4901	2.5514	2.5750	2.5750	2.5761	2.5871	2.6003	20.3860
(billions $)	Current LMI – '10	2.3252	2.3871	2.4502	2.4757	2.4778	2.5760	2.5870	2.6011	19.8802
	Current LMI – '12	2.3252	2.3871	2.4502	2.4757	2.4778	2.4810	2.4937	2.6010	19.6919
	Gradual LMI – '10	2.3252	2.3974	2.5056	2.5521	2.5637	2.5761	2.5875	2.6010	20.1086
	Gradual LMI – '12	2.3252	2.3974	2.4965	2.5424	2.5557	2.5650	2.5809	2.6010	20.0641
Clothing/Shoes C	No LMI	0.8430	0.8978	0.9519	0.9991	1.0146	1.0310	1.0508	1.0712	7.8595
(billions $)	Current LMI – '10	0.8063	0.8605	0.9140	0.9604	0.9762	1.0309	1.0507	1.0715	7.6707
	Current LMI – '12	0.8063	0.8605	0.9140	0.9604	0.9762	0.9929	1.0127	1.0714	7.5945
	Gradual LMI – '10	0.8063	0.8643	0.9347	0.9902	1.0102	1.0311	1.0509	1.0715	7.7590
	Gradual LMI – '12	0.8063	0.8643	0.9313	0.9864	1.0070	1.0266	1.0482	1.0715	7.7415
Transportation C	No LMI	0.5736	0.5865	0.5988	0.6082	0.6161	0.6247	0.6345	0.6439	4.8863
(billions $)	Current LMI – '10	0.5646	0.5778	0.5903	0.5998	0.6079	0.6250	0.6347	0.6443	4.8443
	Current LMI – '12	0.5646	0.5778	0.5903	0.5998	0.6079	0.6167	0.6265	0.6444	4.8278
	Gradual LMI – '10	0.5646	0.5787	0.5950	0.6063	0.6153	0.6249	0.6346	0.6441	4.8634
	Gradual LMI – '12	0.5646	0.5787	0.5942	0.6054	0.6146	0.6239	0.6341	0.6441	4.8596
Other Services C	No LMI	3.3334	3.4695	3.5882	3.6515	3.7176	3.7850	3.8592	3.9381	29.3426
(billions $)	Current LMI – '10	3.1885	3.3265	3.4464	3.5112	3.5780	3.7854	3.8591	3.9394	28.6344
	Current LMI – '12	3.1885	3.3265	3.4464	3.5112	3.5780	3.6459	3.7204	3.9396	28.3564
	Gradual LMI – '10	3.1885	3.3408	3.5242	3.6193	3.7015	3.7852	3.8597	3.9391	28.9585
	Gradual LMI – '12	3.1885	3.3408	3.5114	3.6055	3.6901	3.7689	3.8500	3.9391	28.8944

Appendix Table A: Total Employment, following Hurricane Katrina – Occupations with Largest Changes

Occupation	***% Change***
Radiation Therapists	-75.00
Landscape architects	-70.00
Concierges	-66.67
Protective service workers, all other	-63.64
Loan Counselors	-60.00
Food Batchmakers	-59.52
Medical Secretaries	-58.59
Motorboat Operators	-58.33
Chefs and Head Cooks	-57.89
Vocational Education Teachers, Postsecondary	-57.14
Hazardous Materials Removal Workers	170.59
Plant and system operators, all other	133.33
Plasterers and Stucco Masons	105.26
Computer specialists, all other	100.00
Medical Equipment Repairers	100.00
Tile and Marble Setters	87.50
Millwrights	65.00
Electrical and Electronics Repairers, Commercial & Industrial Equipment	62.96
Environmental Scientists and Specialists, Including Health	60.00
Cabinetmakers and Bench Carpenters	57.14

Appendix Table B: Average Hourly Wage, following Hurricane Katrina – Occupations with Largest Change

Health diagnosing and treating practitioners, all other	-35.92
Chefs and Head Cooks	-31.94
Appraisers and Assessors of Real Estate	-28.39
Motor vehicle operators, all other	-27.79
Law Clerks	-23.50
Helpers—Brick/Block/Stonemasons, and Tile and Marble Setters	-21.37
Producers and Directors	-19.83
Legal support workers, all other	-17.00
Tile and Marble Setters	-16.21
Physicians and surgeons, all other	-14.88
Therapists, all other	100.63
Graders and sorters, agricultural products	73.68
Computer specialists, all other	68.37
Internists, General	61.37
Occupational health and safety specialists	57.97
Industrial Truck and Tractor Operators	57.12
Funeral Directors	51.02
Plasterers and Stucco Masons	44.84
Audio and Video Equipment Technicians	44.39
Agricultural Inspectors	40.61