



NCCI Holdings, Inc.

# Gauging the Economy

February 2009

## Gauging Current Conditions: The Economic Outlook and Its Impact on Workers Compensation

The gauges below indicate the economic outlook for 2009 for factors that typically impact workers compensation. Each gauge also provides some context for the outlook, relative to a historical average of the previous five years.

### Ongoing Job Losses in 2009 Suggest Declines in Exposure and Downward Pressure on Claim Frequency

Employment has been declining consistently since December 2007, the “official” start of the current recession. Job losses have averaged nearly 430,000 a month in the three months ending December 2008, and further large losses are expected in 2009 according to forecasts by Moody’s Economy.com. The weak outlook for employment portends declines in exposure, especially in the more cyclically sensitive (and hazardous) manufacturing and construction sectors. Claim frequency is also likely to come under downward pressure, both from the loss of more hazardous jobs and because, in recessions, companies tend to lay off their least experienced workers first, which has the effect of increasing the skill-level of the remaining workforce.

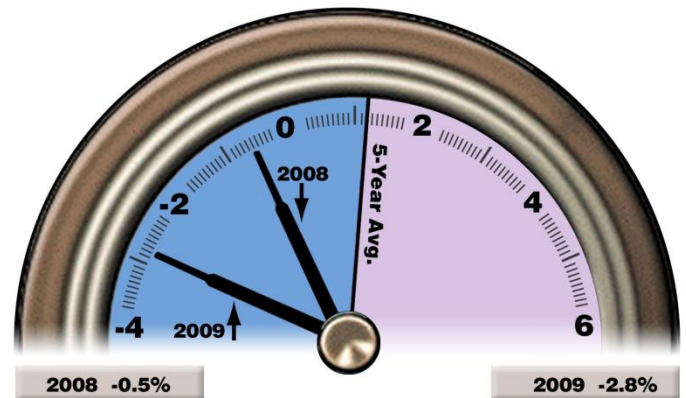


Exhibit 1—Weakening Private Sector Employment

### Moderating Wage Gains May Dampen Increases in Indemnity Severity

Wage gains are expected to slow in 2009, reflecting both weak labor demand and rising unemployment rates. Indeed, Moody’s Economy.com expects the unemployment rate to peak at nearly 9% in the first quarter of 2010. Its December 2008 level was 7.2%. The moderation in wage increases suggests some slowing in the rate of growth of indemnity severity, since changes in indemnity benefits are tied to wage movements in most states.

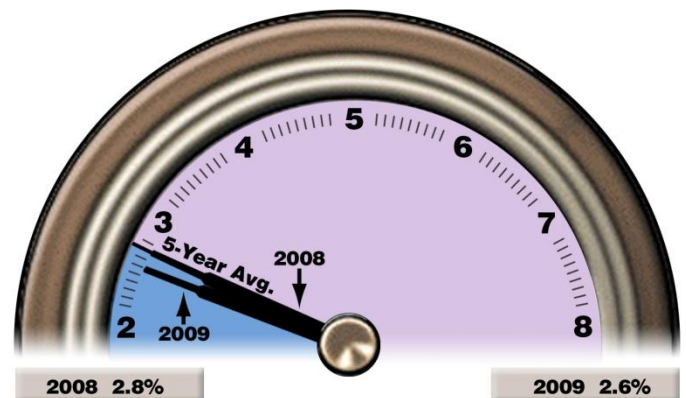


Exhibit 2—Moderating Average Weekly Wage Gains

### Accelerating Medical Care Price Increases Suggest Further Upward Pressure on Medical Severity

The Medical Care component of the Consumer Price Index is on course to increase 3.8% in 2008 from 4.4% in 2007. Some modest acceleration is expected in 2009, to 4.6%, according to forecasts from Moody's Economy.com. Higher medical care inflation will place further upward pressure on medical severity, which is also being impacted by substantial increases in utilization (reflecting both the quantity and mix of medical care goods and services).

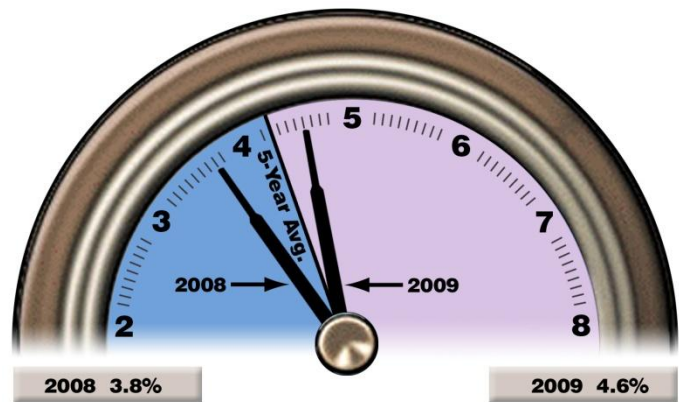


Exhibit 3— Accelerating Medical Care Price Inflation

### Low Interest Rates and Volatile Stock Prices May Constrain Returns on P/C Investment Portfolios

The Federal Reserve has reduced the key federal funds interest rate to a record-low of between 0% and 0.25%. Interest rates on longer-term Treasuries also have declined to record-low levels. Moody's Economy.com believes that the Fed will not begin to push up short-term rates much before the third quarter of 2009, and then only gradually until the economy shows consistent signs of improvement. This lower interest rate environment will negatively impact new-money returns.

Meanwhile, the stock market continues to evidence enormous volatility, with the S&P 500 stock price index some 42% below its pre-recession high (percentage evaluated as of year-end December). Dim prospects for signs of a deepening recession suggests suggest rough sledding in terms of prospective P&C stock market returns. (Exhibit 4 shows the rate of the seven-year Treasury note because the average maturity of Treasury securities held by P&C carriers is roughly seven years.)

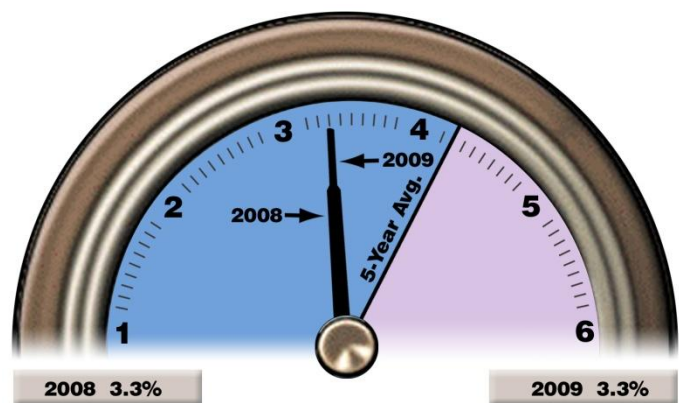


Exhibit 4—Stable Interest Rates Through Most of 2009

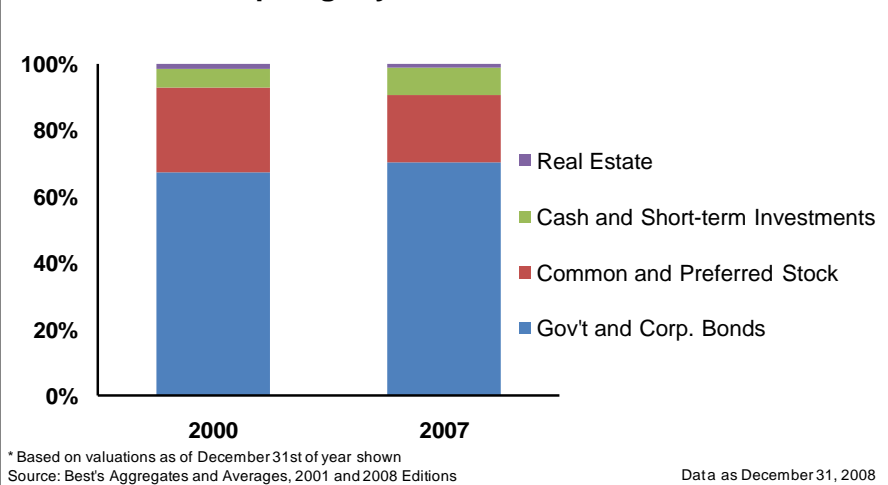
## Behind the Gauges: Financial Markets

The following set of charts focuses on financial market conditions and their implications for the P/C industry. P/C industry investment portfolio data, which is relatively stable on a year-to-year-basis, is currently available through the end of 2007; financial market data reflects information through year-end 2008.

### Portfolio Composition of Invested Assets

As of year-end 2007, private carriers had nearly \$1.2 trillion in invested assets, 70% of which were in fixed income securities (a bit more than half in tax-exempts) and 20% in common and preferred stocks (about 70% of which was in “unaffiliated” common stocks). Most of the balance was in cash and other short-term investments. These percentages have held relatively steady over time.

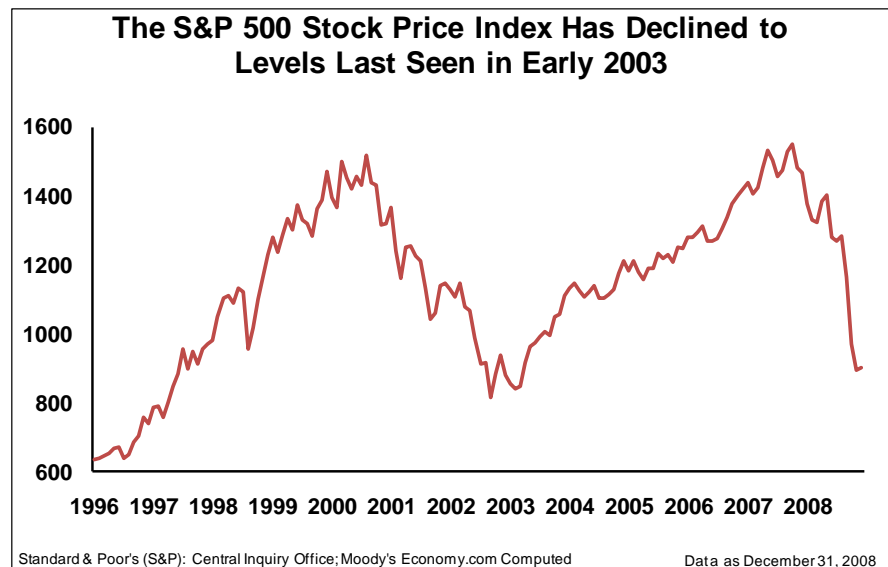
**Bonds Comprised Roughly 70% of P&C Investments in 2007, Up Slightly from that in 2000\***



### Stock Market

The S&P 500 has given back all of its gains between January 2003 and October 2007. The stock market is clearly reacting to what is shaping up to be an especially long and severe recession. It is also reacting to concerns regarding the health—indeed, the viability—of key banking and financial market organizations, both at home and abroad.

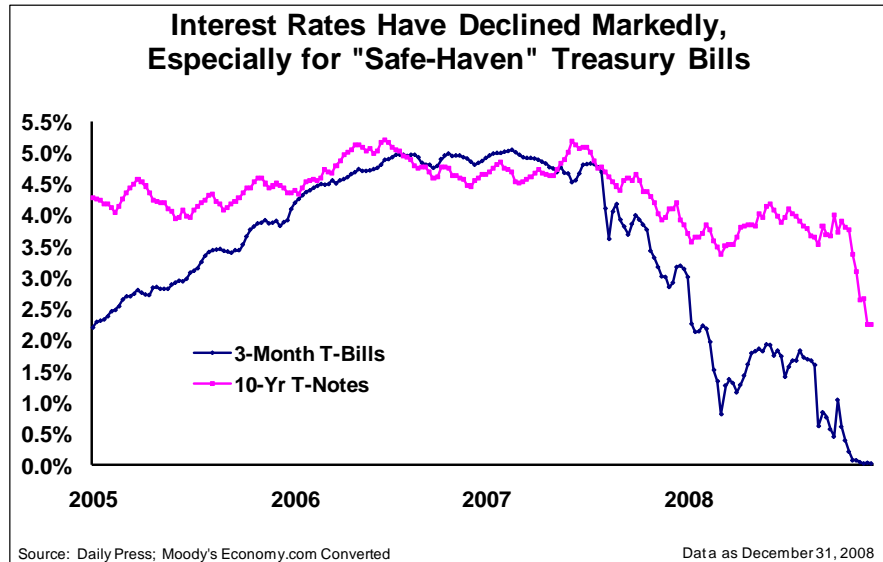
Fortunately, unlike the case of the Great Depression of the 1930s, both monetary and fiscal policymakers have taken strong actions in response to the economy's distress—with additional measures now being considered on an expedited basis. However, substantial downside risks and uncertainties remain, posing major challenges for property/casualty industry investment managers.



## Interest Rates

Short-term interest rates, such as those on three-month Treasury bills, have declined markedly since the Fed began easing in the fall of 2007. The declines have been especially dramatic recently, as the implosion of the stock market in October and heightened concerns about the U.S. banking system have led the Fed to reduce short-term interest rates to near 0%.

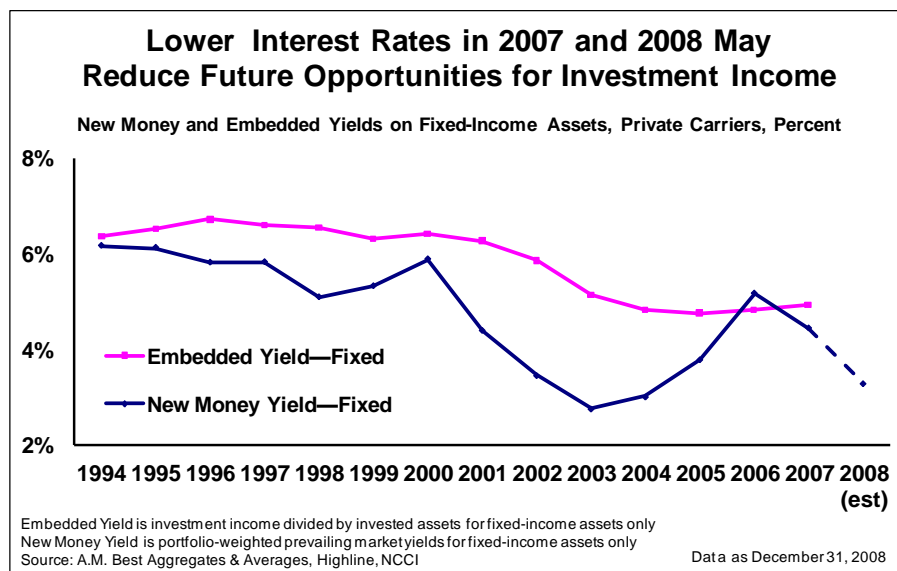
Changes in long-term interest rates are less sensitive to Fed policy and are more related to market perceptions about the future course of inflation and economic growth. Most recently, such rates have been declining, reflecting both concerns about the weakening economy and speculation regarding prospects of the Federal Reserve becoming a major buyer of longer-term Treasuries (such action, which last occurred in the 1950s, would be aimed at reducing long-term rates to foster housing and business investment).



## New Yields vs. Embedded Yields

The decline in interest rates in 2007 and 2008 reduced new money yields available to P/C carriers on their fixed-income portfolio. That portfolio is composed largely of bonds and notes issued by the U.S. government, state and local governments, and corporations, as well as a wide range of short-term money-market instruments.

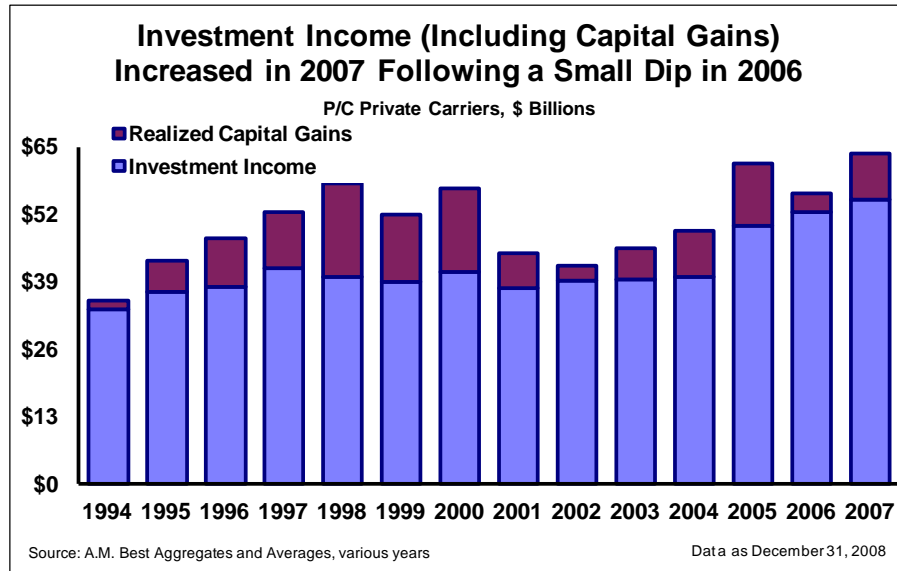
Embedded yields continued to rise in 2007, a reflection of the higher new-money yields in 2004–2006. However, declining new-money yields in both 2007 and 2008 will likely push down embedded yields in 2008 (data for this series will not be available until the spring).



## Components of P/C Investment Returns

Investment income from interest and dividends edged higher in 2007 (up 4%), reflecting both the rise in embedded yields and a small increase in net earned premium. Realized capital gains also increased in 2007, a result consistent with the stock market's positive performance then (with the S&P 500 stock price index up 13% over 2006 on a year-over-year basis).

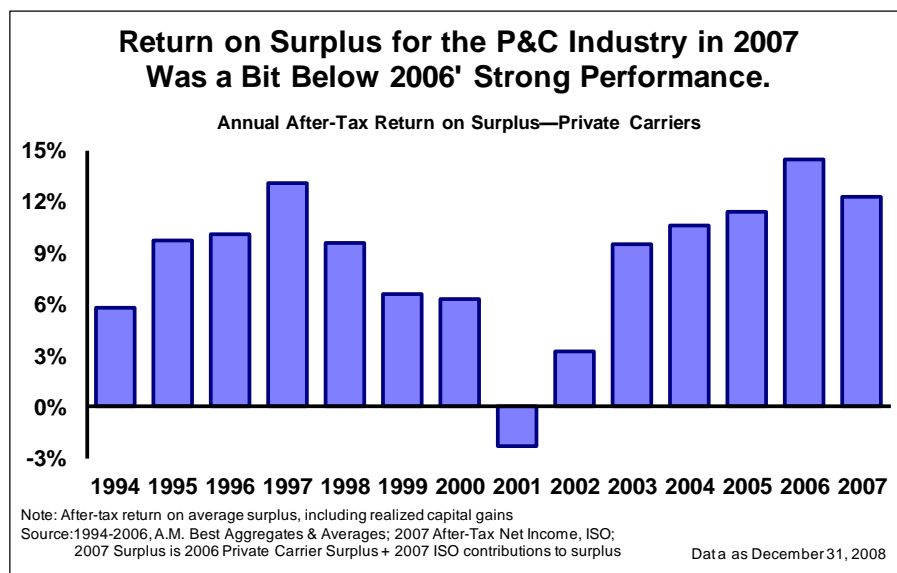
Prospects are not good for achieving similar gains in 2008. That is most likely the case for interest and dividend income, reflecting both lower yields and poor near-term prospects for corporate earnings (although there may be enhanced market values on P&C holdings of Treasuries). The weak earnings outlook also suggests that stock prices will be slow to recover, which may limit the ability to achieve realized capital gains.



## Return on Surplus

The P/C industry's return on surplus declined in 2007 after five years of consecutive increases. However, at 12%, it was still above the 1985–2006 average of 8.9%. The somewhat lower return partly reflected declining underwriting results, with the combined ratio increasing to 95 in 2007 vs. 92 in 2006.

Results for 2008 and prospects for 2009 are guarded. That cautious outlook reflects the weaker investment income environment, uncertainty regarding future underwriting results, and the challenges to recent reforms in some states—especially the recent Florida Supreme Court decision voiding the 2003 reform concerning attorney fees.



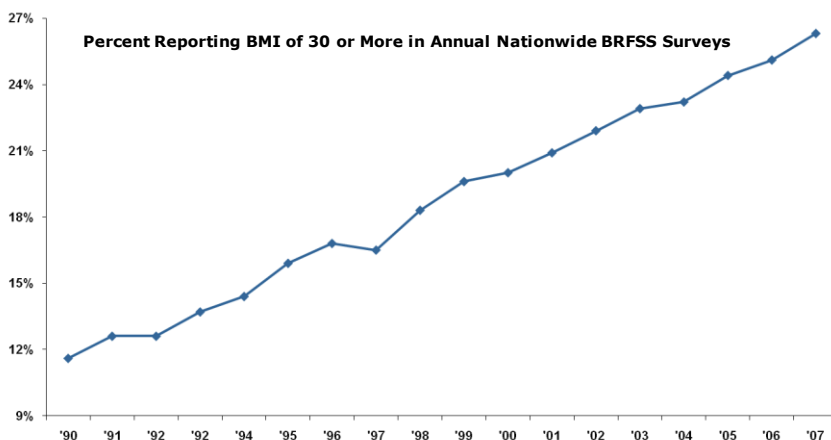
## IMPLICATIONS

### Obesity in America

Obesity is a matter of increasing concern, with the percentage of the population reported as obese increasing from 12% in 1990 to more than 26% in 2007 (Exhibit 1). By the year 2020, 40% of men and 43% of women are predicted to be obese (with more than 70% of both men and women predicted to be overweight).<sup>1</sup>

Exhibit 1

### The Prevalence of Obesity Has More Than Doubled Since 1990



Source: Centers for Disease Control and Prevention, Behavioral Risk Factor Surveillance System

Being obese significantly increases the risk of many diseases and health conditions. Moreover, obese workers tend to have poorer job performance. From a workers compensation perspective, claims involving obesity are seen to have markedly higher indemnity and medical costs. This Implications article provides an overview of the key issues relating to obesity, both from a societal and workers compensation perspective.

#### BMI as a Measure of Obesity

Body Mass Index (or BMI) is a widely used measure of total body fat and is often used as the standard for determining obesity.<sup>2</sup>

- The normal range for BMI is 18.5 to 24.9.
- A BMI below 18.5 is “underweight,” while a BMI of 25.0 to 29.9 is “overweight.”
- A BMI of 30 and above is defined as “obese.” The obese category is often divided into three classes:
  - Class I: 30–34.9 (moderate obesity)
  - Class II: 35–39.9 (severe obesity)
  - Class III: 40 and above (morbid obesity)

#### Healthcare Implications of Obesity

Obesity is a major risk factor for serious medical conditions, most especially diabetes. In addition, obesity increases the risk of heart disease, raises blood cholesterol and triglycerides, and heightens the possibility of stroke. As shown in the accompanying table, based on an analysis by the Centers for Disease Control and Prevention, high BMI levels are associated with a much greater risk of incurring a wide range of diseases.



## Risk of Obesity-Related Diseases Increases With Increases in BMI

Risk Measured Relative to Persons With a "Normal" BMI of Less than 25.0

Disease	BMI <25	BMI 25 to 29.9	BMI 30 to 34.9	BMI 35+
Diabetes (Type 2)	1.00	2.42	3.35	6.16
Gallstones	1.00	1.97	3.30	5.48
Hypertension	1.00	1.92	2.82	3.77
Arthritis	1.00	1.56	1.87	2.39
Stroke	1.00	1.53	1.59	1.75
Heart Disease	1.00	1.39	1.86	1.67

Source: CDC, Third National Health and Nutrition Examination Survey, 1988–1994, analysis by Lewin Group (Falls Church, VA, 1999 as provided in *A Nation at Risk: Obesity in the United States—A Statistical Sourcebook* issued jointly by the Robert Wood Johnson Foundation, American Stroke Association, and the American Heart Association, May 2005, p. 14.

Other diseases also associated with high BMI levels include various forms of cancer, end-stage renal disease, low back pain, sleep apnea, and incontinence.<sup>3</sup>

A recent study comparing U.S. and Canadian mortality rates is suggestive in terms of how obesity can impact mortality rates. The study found that mortality rates among U.S. men aged 60–69 were roughly 20%–25% higher than those for Canadian men. When the data was examined as to cause of death, the researchers found that about half the difference in the mortality rates was due to a higher level of heart disease in the U.S. than in Canada. The greater prevalence of heart disease in the U.S. was attributed the fact that 31% of the U.S. male population is obese vs. just 17% for Canada.<sup>4</sup>

## Impact of Obesity on Measures of Job Performance

Obesity was seen to reduce productivity and increase the percentage of reported impaired activity when associated with comorbidities of type 2 diabetes, high cholesterol, and hypertension. The presence of all three comorbidities at the same time had the most detrimental impact.<sup>5</sup> The underlying study found that the presence of all three comorbidities among overweight or obese persons was associated with more days of hospitalization, more visits to the emergency room and medical providers, and a generally poorer quality of life.

### Prior Research on Obesity and Workers Compensation

There have been a number of recent studies that document the workers compensation effects of obesity, most notably studies by researchers at Duke and Johns Hopkins universities, as well as analyses by the California Department of Health Services.

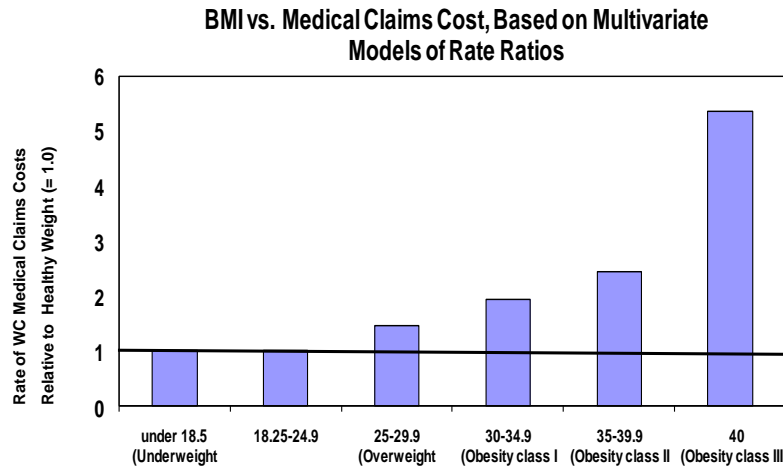
**Duke University:** The most on-point, in terms of workers compensation, was a study by researchers at Duke University Medical Center, published in April 2007.<sup>6</sup> That study looked at the records of nearly 12,000 Duke employees between 1997 and 2004, focusing on four workers compensation metrics—the number of claims, the number of lost workdays, medical claims costs, and indemnity claim costs (all measured on a per 100 full-time equivalent employee basis). Separate breakouts for each of these measures were developed by BMI, gender, age, race/ethnicity, smoking status, employment duration, and detailed occupational group.

Using multivariate regression techniques to control for demographic and occupational differences, the Duke researchers observed dramatic workers compensation-related differences between persons with normal BMIs (in the 18.5–24.9 range) and those with BMIs in the obese range (30 and above). For example:

- **Claims:** Morbidly obese workers filed 45% more claims than workers with a normal BMI. The differential was 21% for workers in the Class I obese range (BMI of 30–34.9) and just 9% for those classified as overweight (BMIs of 25–29.9).
- **Lost Workdays:** Morbidly obese workers had 8 times the number of lost workdays vs. workers with BMIs in the normal range. Those classified as either overweight or Class I obese had roughly 3.5 times as many lost workdays.
- **Medical Claim Costs:** Morbidly obese workers had 5.4 times the medical claims costs vs. workers in the normal BMI range. The differential was a bit less than 2 times for Class I obese workers and 1.5 times for overweight workers (Exhibit 2).

## Exhibit 2

# Medical Claims Costs Increase with BMI

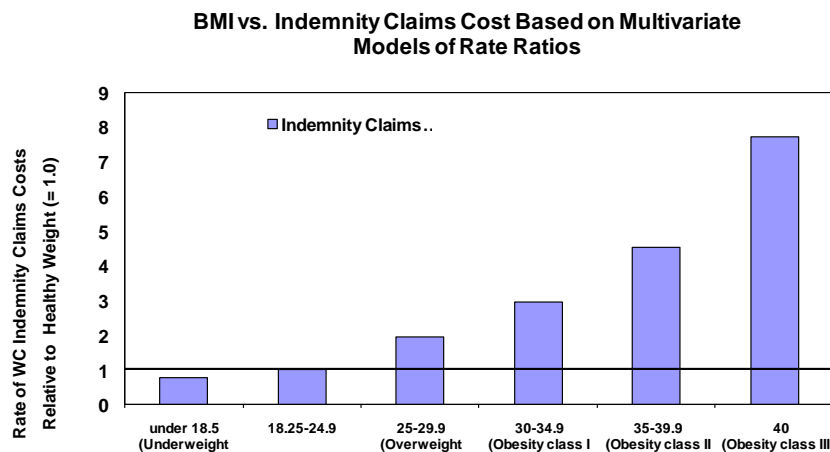


Source: Obesity and Workers Compensation - Results from the Duke Health and Safety Surveillance System

- **Indemnity Claim Costs:** Morbidly obese workers had nearly 8 times more indemnity claims costs than normal workers. The differential was nearly 3 times for those with BMIs in the Class I obese range and nearly twice that for those in the overweight range. (Exhibit 3).

## Exhibit 3

# Indemnity Claims Costs Increase with BMI



Source: Obesity and Workers Compensation - Results from the Duke Health and Safety Surveillance System

The study also looked at BMI impacts by part of body, nature of injury, cause of injury, and occupational group. Most injuries by part of body were seen to have significant BMI effects, except for finger-related injuries. In terms of the nature of the injury, the strongest BMI relationships were seen for sprain or strain, contusion or bruise, and pain and inflammation

Analysis and charts prepared January 2009.

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categories. Claims caused by lifting, falls and slips, and exertion had the largest BMI effects. Finally, persons in more physically demanding jobs (such as skilled craft workers) tended to have higher BMI-related effects than those in lower-risk occupations.

**Johns Hopkins (Bloomberg School of Public Health):** This study, published in May 2007, examined the relationship between BMI and traumatic injuries among 2,221 hourly manufacturing workers in a multistate aluminum manufacturing company using data for 2002–2004.<sup>7</sup> The key findings (after controlling for age, race, ethnicity, education, tenure, plant, nature of job, smoking, and the product of BMI and age) were largely consistent with the Duke research (which, as previously noted, found a strong BMI relationship among skilled craft workers), in that:

- The odds of injury for workers who were morbidly obese (the highest obesity category) were significantly higher when compared with those with a normal BMI. The odds ratio was 2.21 for those in the highest obesity category (category III) and 1.26 and 1.54 for those in the overweight and in the obesity I and II categories, respectively.
- When the data was examined by body part injured, the analysis also showed that a substantially higher portion of injuries occurred to the hand, wrist, and finger among employees in the highest obesity group.

**California Department of Health Services:** The goal of this study<sup>8</sup> was to estimate the California-specific costs of physical inactivity, obesity, and overweight. The analysis covered 25,000 employees and adult dependents from five public and private firms employing workers in California. The study found, in part, that obesity (BMI of 30 and over) resulted in nearly \$18 million in increased direct workers compensation costs per year (measured in Year 2000 dollars) and nearly \$71 million in indirect costs.

## NCCI Research on Workplace Obesity

NCCI is currently undertaking a statistical analysis of the effects of obesity on the cost of medical claims. That work, which has largely been completed (with publication likely in early 2009), confirms the results of other studies in terms of the higher costs of obesity claims, but also breaks new ground in terms of examining the effects of obesity on a per-claim basis. A brief overview of the data used in the study, the methodology employed, and the preliminary results follows:

### *Data and Methodology*

- The source of the data is a sample of medical claims provided by carriers for 36 states for the period 1997–2006. Claims at 12-, 36- and 60-month maturity were examined separately.
- The study used a “matched pairs” framework, wherein the data sets used in the analysis are composed of pairs of claims that are identical in terms of injury year, state, gender, NCCI industry group, and primary diagnosis code—but *where one claim includes an obesity indicator as a secondary or tertiary diagnosis while the other does not.*
- The claims were also matched by age of worker, but not exactly, since that would have severely truncated the number of “pairs” in the analysis. Rather, a “nearest neighbor” technique was employed wherein claims were matched based on their closeness to each other based on the degree of “oldedness” or “youngedness” of the claimant (see footnote for further detail).
- There were roughly 7,800 matched pairs at 12-month maturity, 4,700 at 36 months, and 2,800 at 60 months. The number of claims declined as the maturity increases because claims were excluded following lump-sum payments.

### *Preliminary Results*

- Looking at the sums of medical payments for all claims in the sample, obese claims were seen to be roughly 3 times more expensive at 12-month maturity and 5 times more expensive at 60-month maturity. These findings are in line with those in the Duke University study.
- Averages based on the sum of claims appear to mask far larger differences when the matched-pair data is examined on an individual claim basis. Such differences can be especially large for smaller claims, where added treatments related to obesity can balloon cost differences by as much as 30 times or more.
- Preliminary findings also suggest that the percentage effect of obesity on claim costs is lower in states where mandatory utilization review and mandatory bill review stipulations are in place.

The final paper will provide substantial additional detail, including results when the data is examined within a multilevel modeling context, wherein factors including state, year, gender, industry group, diagnosis, and age can be explicitly taken into account.

## Conclusion

Obesity and its related effects have markedly increased the costs to the workers compensation system, especially in terms of indemnity and medical severity (i.e., cost per claim). Unfortunately, the continued increase in obesity rates—in the face of substantial mitigation efforts by both government and business—suggests that the issues relating to obesity will continue to be a major issue well into the future.

NCCI's full study on the effects of obesity on workers compensation will be available early next year on NCCI's Web site, ([ncci.com](http://ncci.com)). Additional research studies related to the effects of obesity on workers compensation will be forthcoming from NCCI as data from the detailed medical call become available in 2010 and thereafter.

## ENDNOTES

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<sup>1</sup> Christopher J. Ruhm, "Current and Future Prevalence of Obesity and Severe Obesity in the United States," NBER Working Paper No. 13181, June 2007.

<sup>2</sup> For an adult, the BMI index is calculated by dividing a person's weight (in pounds) by the square of his/her height (in inches) and multiplying the quotient by 703.

<sup>3</sup> *A Nation at Risk: Obesity in the United States—A Statistical Sourcebook* issued jointly by the Robert Wood Johnson Foundation, American Stroke Association, and the American Heart Association, May 2005, p. 14.

<sup>4</sup> June E. O'Neill and Dave M. O'Neill, "Health Status, Health Care and Inequality: Canada vs. the U.S.," NBER Working Paper 13429, September 2007, p. 23–24.

<sup>5</sup> Hema Kannan, Stephen Thompson, and Susan C. Bolge, "Economic and Humanistic Outcomes Associated with Comorbid Type-2 Diabetes, High Cholesterol and Hypertension Among Individuals Who Are Overweight or Obese," *Journal of Occupational Environmental Medicine*, Vol. 50, No. 5, May 2008, p. 542–549.

<sup>6</sup> Truls Ostbye, John M. Dement, and Katrina Krause, "Obesity and Workers Compensation, Results from the Duke Health and Safety Surveillance System," *Archives of Internal Medicine*, Vol. 167, April 23, 2007, pp. 766-773.

<sup>7</sup> Keshia M. Pollack, Gary S. Sorock, et al, "Association between Body Mass Index and Acute Traumatic Workplace Injury in Hourly Manufacturing Employees," *American Journal of Epidemiology*, accepted for publication January 17, 2007.

<sup>8</sup> David Chenoweth, "The Economic Costs of Physical Inactivity, Obesity and Overweight in California Adults: Health Care, Workers Compensation, and Lost Productivity," a study prepared for the California Department of Health Services, April 2005.

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