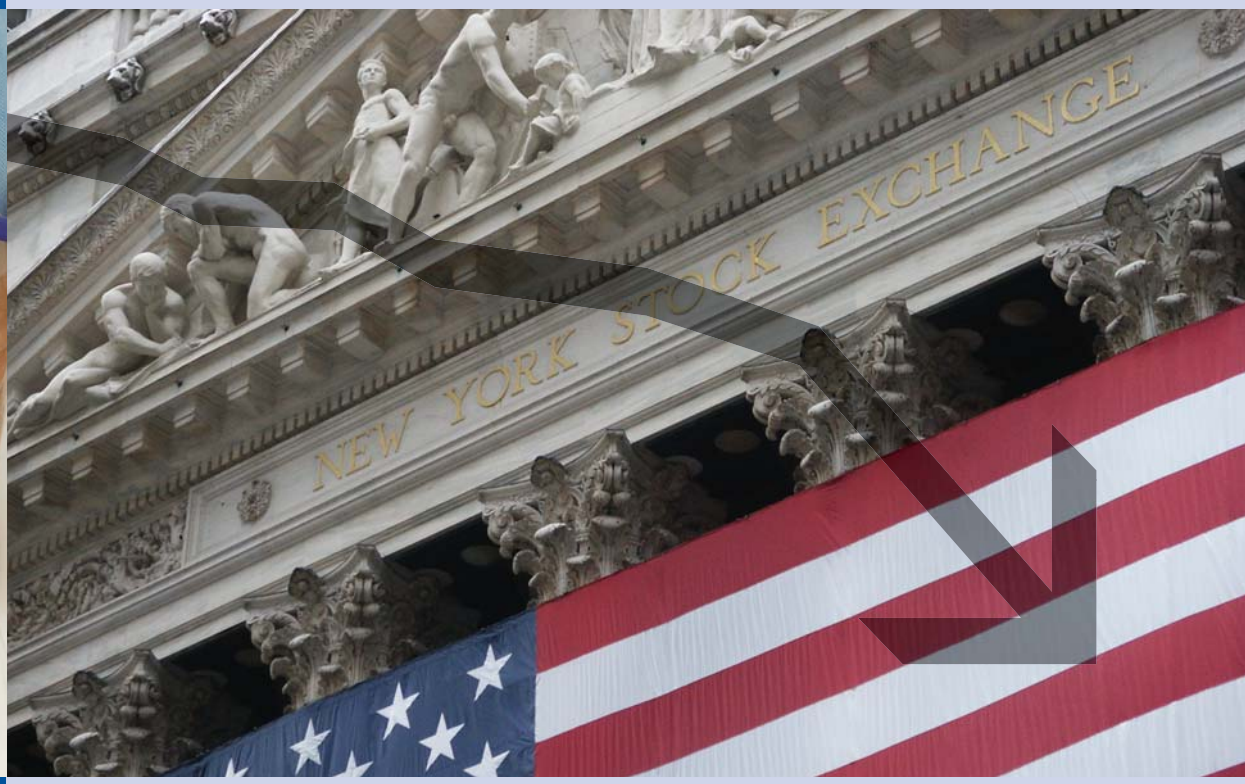
ISSUE REPORT

Pandemic Flu and the Potential for U.S. Economic Recession

A STATE-BY-STATE ANALYSIS



MARCH 2007

PREVENTING EPIDEMICS.
PROTECTING PEOPLE.

Trust for America's Health
WWW.HEALTHYAMERICANS.ORG

TRUST FOR AMERICA'S HEALTH IS A NON-PROFIT, NON-PARTISAN ORGANIZATION DEDICATED TO SAVING LIVES BY PROTECTING THE HEALTH OF EVERY COMMUNITY AND WORKING TO MAKE DISEASE PREVENTION A NATIONAL PRIORITY.

ACKNOWLEDGEMENT

This report is supported by a grant from The Pew Charitable Trusts as part of the U.S. Pandemic Preparedness Initiative. The opinions expressed in this report are those of the authors and do not necessarily the views of The Pew Charitable Trusts.

TFAH BOARD OF DIRECTORS

Governor Lowell Weicker, Jr.
Board President

Patricia Bauman, MS, JD
Board Treasurer
President and Co-Director
Bauman Foundation

John Everets

Margaret Hamburg, MD
Board Secretary
Senior Scientist
NTI

Cynthia Harris, PhD, DABT
Board Vice President
Director, Institute of Public Health
Florida A&M University

Alonzo Plough, MA, MPH, PhD
Vice President of Program, Planning, and Evaluation
The California Endowment

Theo Spencer
Senior Project Manager
Natural Resources Defense Council

REPORT AUTHORS

Jeffrey Levi, PhD
Executive Director
Trust for America's Health

Misha Segal, MBA
Lead Author and Creator of TFAH Pandemic Flu Economic Model
Consultant to Trust for America's Health

Laura M. Segal, MA
Director of Public Affairs
Trust for America's Health

CONTRIBUTORS

Emily Gadola, MPP
Public Affairs Research Associate
Trust for America's Health

CONSULTANT

Marilyn Moon, PhD
Vice President and Director of the Health Program
American Institutes for Research (AIR)

PEER REVIEWER

TFAH thanks the reviewer for her time, expertise, and insights. The opinions expressed in the report do not necessarily represent the views of the individual or organization.

Myra Tanamor, MPP
Co-Founder and Principal
L&M Policy Research, LLC

TABLE OF CONTENTS

INTRODUCTION: Pandemic Flu and the Potential for U.S. Economic Recession . . . 1

SECTION I: Economic Impact State-By-State 5

SECTION 2: Pandemic and Economic Assumptions for the State Estimates 11

A. Illness and Death Rates and Impact on the Workforce 11

B. Impact on Industries 12

C. Trade 15

D. Possible Shifts in World Markets 17

E. Historic and Current Economic Context 18

SECTION 3: Preparing the Economy for a Possible Pandemic 19

TFAH's Strategies for Maintaining Business Continuity During a Severe Pandemic Flu Outbreak 20

Special Challenges for Community-Based Organizations, Faith-Based Organizations, and Small Businesses 22

SF Ready: Example of Business Preparedness Efforts 24

ChicagoFIRST: Example of Business Pandemic Preparedness Efforts 25

Appendix A: Gross Domestic Product By State (Range Of Estimated Losses At 4.25 Percent To 6 Percent) 27

Appendix B: Mortality And Morbidity Estimates By State Based On A Severe Pandemic Outbreak 29

Appendix C: Review of the Models 32

Appendix D: Overview State-By-State 35

Pandemic Flu and the Potential for U.S. Economic Recession

A pandemic influenza outbreak is inevitable, according to scientific experts.[1] Flu pandemics occur 3 to 4 times each century, when a new influenza virus emerges against which people have little-to-no immunity. The major questions are when the next pandemic will occur, what strain of the virus will be involved, and how severe the outbreak will be.

- Once a pandemic flu strain mutates and becomes transmissible among humans, it is expected to spread easily from person-to-person and cause a worldwide outbreak in a very short time. Experts predict these outbreaks will likely come in a series of "waves" that will last 6 to 8 weeks each.
- The U.S. experienced 3 flu pandemics in the 20th century. The influenza pandemic of 1918 killed over 675,000 Americans and tens of millions worldwide. Milder pandemic outbreaks in 1957 and 1968 killed over 34,000 in the U.S. and over 700,000 across the globe.[2]
- H5N1 "bird flu" is being monitored as a major threat for potentially becoming the strain that leads to the next human pandemic. Currently, there is no vaccine widely available to protect humans from H5N1 or similar severe strains of the flu. In the absence of a vaccine, response strategies rest on trying to contain the spread of the disease. While some progress has been made toward improving U.S. preparedness for a possible pandemic, major gaps remain, particularly in the ability of hospitals and health care providers to attend to the huge numbers of people who may become sick.[3] (See box on "Status of U.S. Pandemic Preparedness" for additional details.)

In addition to the possible tragic consequences for human health, a pandemic poses a real threat to the global economy. An outbreak has the potential to impact communities and countries around the world simultaneously. Businesses, government, schools, and other sectors could all face serious disruptions. In today's global economy, almost every aspect of commerce relies directly or indirectly on an interconnected worldwide network of workers, products, and services. A major shock to this network could have serious negative consequences on trade and commerce throughout the world.

According to analyses by 3 major financial and economic research institutions, during a severe pandemic flu outbreak, the U.S. Gross Domestic Product (GDP) could drop between 4.25 and 6 percent.[4] A "severe" outbreak is based on the 1918 pandemic, when 30 percent of the population became ill and 2.5 percent of those who became ill died.[5] In modern times, this would translate into approximately 90 million Americans becoming ill and roughly 2.25 million deaths. An outbreak of this severity would almost certainly lead to **a major economic recession**.

In simplified terms, a recession typically occurs when there are 2 consecutive quarters of decline in real GDP.[6] In a typical year, real GDP grows at an average rate of 3.5 percent.[7] If everything else is held constant, a severe pandemic could lead the U.S. economy to contract by 2 percent.[8]

According to the Congressional Budget Office (CBO), a contraction of this magnitude would be the second worst recession in America since World War II.[9]

In order to further understand how a severe pandemic outbreak could impact the U.S. economy, Trust for America's Health (TFAH) examined the potential financial loss each state could face.

Based on assumptions from the 3 major national analyses, TFAH developed a model to assess the potential impact of a pandemic flu on each states' workforce and how 20 key industry sectors and trade would be affected. (See Section 1 for more details about the model's assumptions.)

The U.S. economy could lose an estimated $683 billion, according to this model. Overall, this is roughly a 5.5 percent decline in annual GDP.

Nevada could face the highest percent loss to its economy, taking an 8.08 percent hit (nearly $9 billion), while Maryland could face the lowest proportional amount lost at 5.09 percent ($12.5 billion). The average loss states could experience is 5.5 percent. D.C. could experience a 4.62 percent ($3.8 billion) loss.

The GDP of California, the state with the largest economy, could lose $86.9 billion, and Vermont, the state with the smallest economy, could lose over $1.3 billion (based on 2005 dollars).

A list of the potential economic impact to all states can be found in Section 1.

STATUS OF U.S. PANDEMIC PREPAREDNESS

In the *Ready or Not? Protecting the Public's Health from Diseases, Disasters, and Bioterrorism* report series, Trust for America's Health (TFAH) has found that the nation's preparedness to respond to public health emergencies, including a pandemic flu outbreak, is inadequate.[10] Important progress has been made toward improving the country's ability to manage a wide-scale health disaster, such as a pandemic, but serious gaps remain.

Key Progress in U.S. Pandemic Preparedness

- A federal investment of nearly $7 billion for pandemic preparedness, much of which is devoted to research to develop a vaccine.
- Release of a national strategy for pandemic preparedness, including a federal government-wide implementation plan.
- Successful execution of the majority of 6 month benchmarks for federal pandemic preparedness activities, such as the Justice Department advising governors on processes for obtaining federal law enforcement assistance and federal military assistance.
- Release of initial guidance for communities to address issues ranging from school closures to limits on public gatherings.
- All states have at least a draft pandemic flu response plan.

Key Concerns for U.S. Pandemic Preparedness

- Lack of a widely-available vaccine for use during a pandemic and still limited U.S. vaccine production capabilities.
- Inadequate national capabilities to distribute vaccines and medical equipment.
- Insufficient stockpiles of anti-viral medications and other medical equipment, such as masks and gloves.
- Gaps in capacity of hospitals and health care providers to manage the "surge" of patients who could become ill during a pandemic.
- Shortages in the number of health care providers needed to respond to a pandemic.
- Lack of a temporary federal "State of Emergency" health benefit to cover the uninsured and underinsured during a mass health emergency.
- Lack of emergency extended sick leave provisions to encourage workers to stay home when they could be infected.
- Limited integration of public and private health resources.
- Lack of funding for workers compensation to protect health care workers and their families in the event that the health care worker may become ill while in the line of duty.
- Continued work needed on community mitigation strategies to develop the most effective and sensible policies for issues including school closures and limits on public gatherings.
- Insufficient "risk communications" strategies for how the public should be informed and appraised of pandemic developments and how they should prepare themselves and their families.
- Gaps in how "continued care" would be provided for ongoing health conditions during the time of a pandemic emergency.

SECTION 1

Economic Impact State-By-State

Developing economic estimates requires making assumptions about unknown factors and predicting how circumstances might unfold in the future. Despite the difficulty in developing predictions and estimates, they are an important policy tool for understanding the impact a pandemic might have and help inform how the country and world could better prepare for an outbreak.

TFAH's model draws primarily on national assumptions outlined in analyses developed by the Congressional Budget Office (CBO), the Australian National University (ANU) and the Lowy Institute for International Policy, and BMO Nesbitt Burns. Some adjustments were made, which are outlined in Section 2 of this paper. Each group developed unique models to calculate potential losses to the U.S. GDP as a result of a severe pandemic, examining the impact different sectors of the economy might face. The models vary based on economic factors included and the degree to which these factors would be affected. The CBO, the ANU/Lowy Institute, BMO Nesbitt Burns, and the TFAH models assume a "severe" or "ultra" outbreak scenario which estimates that 30 percent of Americans could become ill and U.S. fatalities could reach over 2 million, based on updated historical evidence from the 1918 pandemic outbreak.[11]

- The CBO estimates that a severe pandemic would lead to a 4.25 percent drop in annual GDP.[12] The CBO analysis did not explicitly include the impact of the potential disruption to U.S. imports or exports.
- Warwick J. McKibbin of the ANU/Lowy Institute and Alexandra A. Sidorenko of ANU's National Centre for Epidemiology and Population Health calculate that in an "ultra" pandemic, the U.S. GDP loss could be 5.50 percent.[13]
- Sherry Cooper, Chief Economist of BMO Nesbitt Burns Brokerage, forecasts a loss of 6.00 percent in annual U.S. GDP under a severe scenario.[14]

Model Estimates: Severe Pandemic's Economic Impact

Model	Estimated Annual GDP Percentage Loss
Congressional Budget Office (CBO)	4.25%
ANU/Lowy Institute	5.50%
BMO Nesbitt Burns	6.00%
Average	**5.25%**

TFAH applied these assumptions on a state-by-state level to assess the potential impact to the economy in each state. The model takes into account that each state has a different number of residents and that each state's economy is comprised of different industries at varying levels. Detailed discussion of the assumptions and data sources can be found in Section 2.

OVERVIEW SUMMARY OF WHAT IS INCLUDED IN THE "TFAH MODEL"

- **Severity of the Flu strain.** Flu strain severity would impact illness and death rates, which influences labor productivity and consumer demand for supplies and services. The model is based on a severity of flu similar to the 1918 outbreak.
- **Time Frame.** Experts predict a pandemic would likely come in "waves" of 6 to 8 weeks. The model assumes a cumulative consumer demand loss of 3 months to account for a couple 6 to 8 week waves.
- **Illness and Death Rates.** Rates for each state were calculated using Flu Aid, a modeling program developed by the U.S. Centers for Disease Control and Prevention (CDC). It should be noted that Flu Aid is limited in its ability to take into account "density issues," such as how close people live together in cities versus rural areas. To remain consistent with the CBO, the ANU/Lowy Institute, and the BMO Nesbitt Burns models, the state illness and death rates were reconciled by using state-specific relative weights to match a national attack rate of 30 percent and 2.5 percent case-fatality rate.
- **Lost Labor Productivity.** Consistent with the CBO model, this model assumes 1 year of lost productivity from those who die, and a loss of 3 weeks of work from those who get sick but do not die. The model does not explicitly account for the percentage of deaths of children or the elderly who are not part of the workforce, but does include lost productivity due to people who stay home as caregivers or out of fear. Some experts believe the number of people who stay home out of fear could be significantly higher than reflected in these predictions.
- **Loss in Demand for Products and Services.** The model examines the potential percent loss to 20 industry sectors in each state. Economic GDP data for each state were drawn from 2005 Bureau of Economic Analysis (BEA) data.[15] To avoid double-counting, the losses are calculated as a percentage of demand minus some of the drop in worker's productivity. A chart with the assumptions by industry can be found in Section II. The assumptions are largely based on those developed by the CBO, except for the assumptions for finance and insurance and educational services, which TFAH added (noted with an * below).
  - ▲ 80 percent loss in demand: Arts, entertainment, and recreation; Accommodation and food services;
  - ▲ 67 percent loss in demand: Transportation and warehousing;
  - ▲ 10 percent loss in demand: Agriculture, forestry, fishing, and hunting; Mining; Construction; Manufacturing; Wholesale trade; Retail trade; Finance and insurance*; Educational services*;
  - ▲ 5 percent loss in demand: "Other" services, except government;
  - ▲ Zero percent loss in demand: Utilities; Information; Real estate, rental, and leasing; Professional and technical services; Management of companies and enterprises; Administrative and waste services; Government;
  - ▲ 15 percent increase in demand: Health care and social assistance.

Some industry-impact concerns not reflected in this model:

- ▲ **Health Care.** This model includes an assumption that the health care sector could experience a 15 percent increase in demand during a pandemic. However, a number of experts believe that demand for health care would not increase, or could be negatively impacted, particularly since "discretionary spending," such as regular doctor visits, would likely drop, and CDC has recommended that patients should be encouraged to recover at home.[16] Additionally, some experts believe that the health care system would experience significant losses due to expenses incurred from treating the uninsured or underinsured. Differences in state public health and health care capabilities are not reflected in this model. The Health Index is not part of this model.
- ▲ **Other Industries.** Other experts predict that industries that CBO estimated would have zero losses, such as real estate, rental, and leasing, and professional and technical services, would likely experience losses during a pandemic.
- ▲ **Reduction in Trade.** The model assumes a 1 percent loss to U.S. trade, based on the BMO Nesbitt Burns analysis.

Full details about the model and the sources for assumptions can be found in Section II.

Actual losses would be influenced by a range of factors. Additionally, states and communities may undertake containment and intervention strategies that could help reduce the severity or impact of the pandemic.

These estimates are based on the potential impact of a "severe" pandemic, similar to the severity of the 1918 outbreak. No one knows how severe the next pandemic will be, but the current H5N1 strain is raising concern among a number of scientists that if it becomes transmissible among humans, it could pose a severe threat.[17]

These estimates may also be conservative. The model examines demand loss for a cumulative 3 months over the course of a year. A real pandemic could be prolonged over an 18 month period with a series of waves that last 6 to 8 weeks each. Also, individuals who are sick could stay home for longer than the estimated 3 weeks, and the number of people who stay home out of fear could be much higher. Finally, other experts believe the assumptions about the impact on industry demand could be conservative. For instance, the industries considered unaffected in this model would likely also be negatively affected, and the impact to the health industry could be negative instead of positive.

Trust for America's Health Model:*
Estimated Loss to Gross Domestic Product by State During a Pandemic

States & DC	Percent GDP Loss	Ranking of Percentage Losses (Most to Least)	Estimated GDP Lost During a Pandemic Year Based on 2005 dollars (Rounded to the billionth)
Nevada	8.08%	1	$9.0 billion
Hawaii	6.60%	2	$3.6 billion
Alaska	6.59%	3	$2.6 billion
Wyoming	6.40%	4	$1.7 billion
Nebraska	6.22%	5	$4.4 billion
Louisiana	6.03%	6	$10.1 billion
Mississippi	5.99%	7	$4.9 billion
Tennessee	5.98%	8	$13.7 billion
Iowa	5.90%	9	$6.7 billion
Indiana	5.87%	10 (tie)	$14.0 billion
Kentucky	5.87%	10 (tie)	$8.2 billion
Montana	5.86%	12	$1.8 billion
Arkansas	5.81%	13	$5.0 billion
Florida	5.74%	14 (tie)	$38.7 billion
Missouri	5.74%	14 (tie)	$12.4 billion
North Dakota	5.71%	16 (tie)	$1.4 billion
South Dakota	5.71%	16 (tie)	$1.8 billion
West Virginia	5.69%	18	$3.0 billion
Vermont	5.65%	19	$1.3 billion
South Carolina	5.62%	20	$7.9 billion
Illinois	5.60%	21	$31.3 billion
Kansas	5.58%	22	$5.9 billion
Texas	5.57%	23	$55.1 billion
Wisconsin	5.56%	24	$12.0 billion
Oklahoma	5.55%	25	$6.7 billion
Ohio	5.54%	26	$24.4 billion
Arizona	5.52%	27	$12.0 billion
Pennsylvania	5.50%	28	$26.9 billion
Utah	5.49%	29	$5.0 billion
North Carolina	5.48%	30	$19.0 billion
Georgia	5.46%	31 (tie)	$19.8 billion
Oregon	5.46%	31 (tie)	$7.9 billion
Alabama	5.45%	33	$8.3 billion
Minnesota	5.44%	34	$12.8 billion
Idaho	5.42%	35 (tie)	$2.6 billion
New Jersey	5.42%	35 (tie)	$23.4 billion
New Mexico	5.42%	35 (tie)	$3.7 billion
Colorado	5.40%	38	$11.7 billion
Michigan	5.39%	39	$20.3 billion
Maine	5.38%	40	$2.4 billion
California	5.36%	41 (tie)	$86.9 billion
Washington	5.36%	41 (tie)	$14.3 billion
Delaware	5.32%	43	$3.0 billion
New Hampshire	5.30%	44	$2.9 billion
Rhode Island	5.29%	45	$2.3 billion
Connecticut	5.23%	46	$10.1 billion
Massachusetts	5.20%	47 (tie)	$16.9 billion
New York	5.20%	47 (tie)	$49.8 billion
Virginia	5.13%	49	$18.1 billion
Maryland	5.09%	50	$12.5 billion
District of Columbia	4.62%	51	$3.8 billion

Factors involved in the calculations for the impact of a flu pandemic include: the severity of the flu strain, mortality and morbidity rates, population estimates, worker productivity, consumer demand, and trade. Supply effect drivers include: a severe pandemic (with a 30 percent attack rate and 2.5 percent case-fatality rate); 2005 U.S. Census Bureau state population data; and the Centers for Disease Control and Prevention (CDC)'s Flu Aid software program. Demand effect drivers include: 2005 Bureau of Economic Analysis Gross Domestic Product data by state (available at http://www.bea.gov/ bea/regional/gsp/; accessed on January 26, 2007). Trade effect drivers: Assume a 1 percent annual across-the-board GDP loss. Actual losses to GDP by state would depend on other factors, such as public health infrastructure and actions states might take to help mitigate against some of the negative economic impact of the outbreak.

Estimated GDP Lost dollar figures were rounded to the billionth for clarity in presentation, more precise numbers were used in the calculations in the model.

In states where the percentage losses were "tied" the rankings based on rounding to 2 decimal places.

U.S. NATIONAL OVERVIEW:

- **2005 Total U.S. GDP: $12.4 trillion**
- **Projected GDP Loss from Pandemic: $683 billion***
- **Projected GDP Percentage Loss from Pandemic: 5.51%**
- **Projected Impact on the Workforce: $310 billion in losses**
- **Projected Impact on Industries: $250 billion in losses**
- **Projected Trade Impact: $124 billion in losses**
- **Projected Number of Lives Lost: 2,250,000*[18]**
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 87,750,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

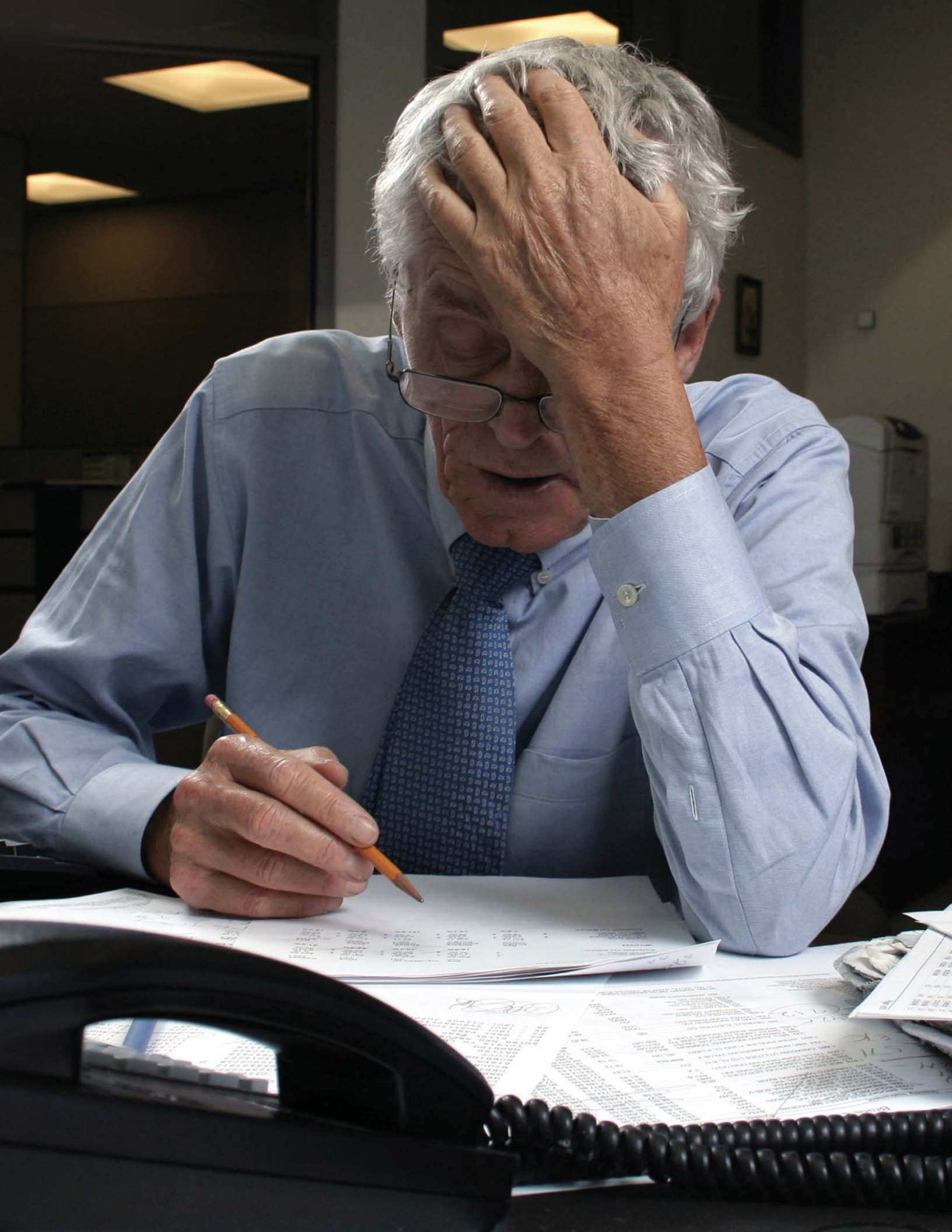
United States: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	119,066,000,000	2,977,000,000
Mining	213,574,000,000	5,339,000,000
Utilities	238,908,000,000	-
Construction	593,535,000,000	14,838,000,000
Manufacturing	1,496,541,000,000	37,414,000,000
Wholesale trade	733,090,000,000	18,327,000,000
Retail trade	828,634,000,000	20,716,000,000
Transportation and warehousing	362,247,000,000	60,676,000,000
Information	578,345,000,000	-
Finance and insurance^^	1,011,548,000,000	25,289,000,000
Real estate, rental, and leasing	1,562,863,000,000	-
Professional and technical services	862,365,000,000	-
Management of companies and enterprises	230,634,000,000	-
Administrative and waste services	375,531,000,000	-
Educational services^^	113,082,000,000	2,827,000,000
Health care and social assistance++	864,355,000,000	(32,413,000,000)
Arts, entertainment, and recreation	117,921,000,000	23,584,000,000
Accommodation and food services	337,957,000,000	67,591,000,000
Other services, except government	294,611,000,000	3,683,000,000
Government	1,474,748,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^ ^ The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.



Pandemic and Economic Assumptions for the State Estimates

SECTION 2

A severe pandemic outbreak could result in a major disruption to the U.S. economy. For instance:

- BMO Nesbitt Burns outlines how a pandemic event "would lead to considerable supply and demand effects. Widespread absenteeism and trade disruption would dominate the supply-side effect, and social distancing and fear would initially increase the demand for essentials such as non-perishable food, water, medical supplies and health-care services, but reduce the demand for virtually everything else."[19]
- The CBO argues that "based on past influenza pandemics and the SARS outbreak," the most important effects of a new pandemic "would be a sharp decline in demand as people avoided shopping malls, restaurants, and other public spaces, and a shrinking of labor supply as workers became ill or stayed home out of fear or to take care of others who were sick."[20]

To develop assumptions about the potential impact on state populations and economies, TFAH relied heavily on the CBO, the ANU/Lowy Institute, and BMO Nesbitt Burns models, and other economic and public health sources.

A. Illness and Death Rates and Impact on the Workforce

From an economic standpoint, estimates about death and illness are important for understanding the impact on labor productivity. People who die would no longer be part of the workforce. Workers who become ill but recover would miss a number of weeks of work. Additionally, workers may miss work if they stay home to care for sick family members. Finally, other people may take time off from work out of fear that they might contract the flu. Some predict that a severe pandemic could result in global absenteeism rates of 25 to 35 percent over an initial 3 to 4 month time period.[21]

Estimated death and illness rates per state, based on a severe outbreak that resembles the 1918 pandemic, are available in Appendix B. The estimates were developed using 2005 U.S. Census population data, and CDC's Flu Aid modeling program, which takes into account state-specific data, such as the age of the population.

- **National assumptions:** Approximately 90 million Americans would get ill, and of those 90 million, roughly 2.25 million would die. The CBO, the ANU/Lowy Institute, and BMO Nesbitt Burns used assumptions that a "severe" or "ultra" pandemic would result in 30 percent of the population becoming ill and a 2.5 percent case-fatality rate.[22, 23]
- **Workforce impact:** Using the CBO assumptions, the economy would lose 1 year of productivity from those who die, and the economy would lose 3 weeks of work from those who are either ill, stay home to take care of sick family members, or stay home from fear.[24] TFAH used these assumptions to determine the loss of work days in each state. In sum, due to loss in workforce productivity, the economy would suffer from a 1 year GDP loss of approximately 2.5 percent ($310 billion).[25]

More information about the methodology for the death and illness rates and workforce loss calculations is available in Appendix B.

B. Impact on Industries

A pandemic outbreak is expected to impact the demand for different industries at varying degrees. For instance, industries that require a high degree of social interaction, such as entertainment and tourism, would likely experience the greatest decline in demand. Consumers would likely reduce their demand for many products and services during the height of an outbreak. Both supply and demand would be impacted if the government enacted policies that restricted operations of certain businesses (such as the airlines) or from corporate liquidity issues (such as the insurance industry due to a significant surge in claims).

The CBO developed a number of assumptions about the potential impact on demand for a range of industries. For example, the CBO assumes a 3 month period of loss in demand by industry. The ANU/Lowy Institute and BMO Nesbitt Burns used the CBO assumptions as a baseline for their models, but adapted them to different degrees.

TFAH also used the CBO assumptions as the basis for quantifying the potential impact a pandemic could have on different industries. (Assumptions that differ from the CBO model are noted in the "Assumed Declines in Demand by Industry" chart.) Overall, based on these assumptions, decline in consumer demand would lead to an approximate 2 percent loss ($250 billion) to the U.S. economy.

The model takes into account that different industries, such as tourism and entertainment, hold various weights in each state economy. The model examines 20 different industries (see the full list in the "Assumed Declines in Demand by Industry" chart) and applies the estimated losses that each of these industries could experience in each state during a severe flu outbreak.

Decline in industry demand assumptions were applied to the 2005 Bureau of Economic Analysis (BEA) Gross Domestic Product by state data.[26] To avoid the possibility of double-counting, the losses are calculated as a percentage of GDP minus one-quarter (or 3 months) of the drop in worker productivity. (TFAH's consumer demand estimates only assume losses for one-quarter, which constitutes a 3 month period. This measure was taken to avoid the double-counting that would occur for the 3 month period of assumed consumer demand loss.) Below are 2 examples of how state economies differ and how the impact was examined.

- The CBO estimates that demand for the agriculture industry could suffer a 10 percent loss over a 3 month period. In the TFAH model, 10 percent was deducted from the portion of each state's economy that is based on agriculture. For example, 6.0 percent of North Dakota's GDP is based on agriculture.[27] Therefore, in simplified terms, 10 percent was deducted from this 6.0 percent in the model.
- The CBO estimates demand for arts, entertainment, and recreation (including tourism) could face an 80 percent loss over a 3 month period. Eighty percent was deducted from the portion of each state's economy that is based on arts, entertainment, and recreation (in simplified terms). For example, 17.6 percent of Nevada's economic activity is related to tourism and entertainment, while it comprises 5.4 percent of Florida's economy, so those portions of their economies would be impacted with an 80 percent loss.[28]

To match the CBO model, the TFAH model also uses a 3 month period of loss in demand by industry.

Assumed Declines in Demand by Industry During a Severe Flu Pandemic**	
Private Industry/Government	**Cumulative 3 Month Loss in Demand Over Course of A Year**
Agriculture, forestry, fishing, and hunting	10%
Mining	10%
Utilities	0%
Construction	10%
Manufacturing	10%
Wholesale trade	10%
Retail trade	10%
Transportation and warehousing	67%
Information	0%
Finance and insurance^^	10%
Real estate, rental, and leasing	0%
Professional and technical services	0%
Management of companies and enterprises	0%
Administrative and waste services	0%
Educational services^^	10%
Health care and social assistance++	-15%
Arts, entertainment, and recreation	80%
Accommodation and food services	80%
Other services, except government	5%
Government	0%

***Industry/Government groups from Bureau of Economic Analysis 2005 data. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. To avoid double-counting, the losses are calculated as a percentage of demand minus some of the drop in worker's productivity.*

^^The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries would be unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

Examples of Impact on Industry Demand

- **Entertainment and Tourism:** The CBO estimates demand for entertainment and tourism could experience an 80 percent drop over a 3 month period.[29] The World Bank forecasts global tourism demand could drop by 20 percent over a year, under a severe pandemic scenario.[30] Businesses described as "Arts, Entertainment, and Recreation" and "Accommodation and Food Services" by the Bureau of Economic Analysis represent over $400 billion in U.S. GDP, or 3.7 percent of the national economy.[31]

  - Some states are particularly reliant on the entertainment and tourism industry, and would, therefore, experience greater negative financial consequences during a pandemic. States with the highest portions of their economies dedicated to tourism and entertainment include: Nevada (17.6 percent), Hawaii (10.1 percent), Florida (5.4 percent), Vermont (5.3 percent), and Mississippi (5.2 percent).[32]

- **Transportation and Warehousing:** The CBO forecasts a 67 percent decline in demand over 3 months for the transportation and warehousing industries.[33] Economists with the European Commission used similar assumptions for their severe pandemic projections.[34] Transportation and warehousing comprise a large portion of the following states' GDP: Alaska (10.0 percent), Nebraska (8.1 percent), and Wyoming (5.9 percent).

- **Other Products and Services:** Many other industries, from construction to retail trade, would experience a less dramatic, but still highly significant, fall in demand

of roughly 10 percent over a 3 month period, according to the CBO.[35]

- **Agriculture:** This model assumes a 10 percent loss in demand for agriculture, which is based on CBO estimates. The CBO spreads out the potential impact on demand for the poultry industry between the tourism and entertainment (which includes the food industry) and agriculture industries.

- **Education:** The CBO did not include any demand losses for the education industry. Since schools and universities are places of great social interaction, many in the public health community believe the education sector will be impacted. The Interim Pre-Pandemic Planning Guidance released by the CDC in February 2007 includes the closure of schools as one possible public health intervention.[36] TFAH's model assumes the education sector would experience a 10 percent decline, similar to the agriculture, manufacturing, and retail industries.

- **Finance and Insurance:** The CBO also did not include any demand loss for the finance or insurance industries. Other experts have predicted that these industries could be affected. For instance, a Fitch Ratings report estimates that a moderate outbreak could cause additional life insurance claims of $18 billion, which could cause 25 percent of the group life insurance companies to pay off claims due to deaths from a severe pandemic.[37] In its model, TFAH assumed a decline in demand of 10 percent for the financial and insurance industries, a decline similar to the CBO's assumptions for the agriculture, manufacturing, and retail industries. Finance and insurance account for a major portion of GDP in Delaware (33.9 percent), South Dakota (17.4 percent), Connecticut (16.7 percent), and New York (15.4 percent).

HEALTH CARE INDUSTRY

The CBO projects that the "most immediate impact of a pandemic would be a surge in demand for medical services. During a severe pandemic, hospitals, clinics, and doctors' offices would probably be overwhelmed, and surveillance (keeping track of where the disease was and where it was going) would be difficult. Health care workers would be exposed to the disease, resulting in further strains on the health care system's capacity, as some workers became sick and others stayed home to care for family members or to avoid becoming ill."[38]

A major outbreak would result in a surge in demand for hospital beds and critical medicines and equipment, such as antiviral medication, ventilators, and protective masks. It is estimated that there would be between 1 million and 4 million hospital admissions in minor and major pandemic scenarios, respectively.[39]

CBO and Cumberland Advisors, a money management firm, believe that an influenza pandemic would increase GDP for the health care industry. For example, CBO estimates a 15 percent revenue increase for the health care sector over a 3 month period.[40] On a macro level, an outbreak could potentially lead to greater revenue for hospitals due to an increase in hospitalizations. In addition, companies that produce medical supplies and equipment could see revenues rise as a result of an increase in demand for masks, ventilators, vaccines, etc.

However, an influenza pandemic could lead to financial hardship for many hospitals. The preparation costs for an outbreak may be $1 million per hospital, or $5 billion in aggregate for the 5,000 general hospitals in this country.[41] These additional costs could strain an already troubled industry. Currently, 30 percent of U.S. hospitals are losing money; of those that are profitable, the operating margins average 1.9 percent.[42] Many do not have more than a few weeks of cash on hand.

Additionally, during a pandemic outbreak, hospitals and health care providers would be overwhelmed by the number of flu patients who would require immediate, emergency care, which would take away from the ability to continue with elective or discretionary procedures, which most health care providers rely on for income. It is likely that regular patient care would be curtailed if patients with elective needs avoided hospitals and doctors' offices from fear of exposure to the disease, which would severely limit discretionary health care spending.

Questions remain about whether the delivery of prescription drugs would be impacted by disruptions to the supply chain during a pandemic, which could result in additional revenue loss for the health sector.

In addition, there are 45 million uninsured Americans, and tens of millions more who are underinsured.[43] It is uncertain whether hospitals would ever receive payments from these individuals if they sought medical care during a pandemic flu outbreak.

While some of these costs may be mitigated through federal assistance programs, it is unclear how much assistance hospitals and the health care system would ultimately receive, and currently no formal measures have been taken to ensure the financial stability of the health care sector if a pandemic outbreak occurs.

C. Trade

The CBO, the ANU/Lowy Institute, and BMO Nesbitt Burns differed in their opinions about the potential impact a pandemic outbreak could have on trade.

In 2005, the United States recorded exports of $927 billion, while it reported imports of $1.7 trillion.[44] Quantifying how a pandemic could disrupt trade is challenging, since an incident equaling the magnitude of a severe global pandemic has not occurred in recent history.

The U.S. relies heavily on imports from around the world. U.S. world import levels have grown from approximately $1.22 trillion in 2000 to approximately $1.7 trillion in 2005, an increase of around 37 percent.[45] In addition, many businesses have implemented just-in-time management strategies through which "inventories of inputs, goods, machine parts, labour, virtually everything" are kept at a minimum and are obtained just when they are needed in order to increase profits and productivity.[46] Increased globalization and just-in-time management require an extremely efficient global network of trade, information systems, and transport.

According to BMO Nesbitt Burns, "any disruption [to this network] can lead to crippling shortages (or stockpiles) and waste, which squeezes sales and profits, thereby dampening job growth and economic activity."[47] A severe pandemic flu outbreak would be a major disruption to the global trade network. Assumptions about trade require considering a complex network of relationships among industries and countries, as well as the economic and financial dynamics among nations.

As a baseline prediction for trade disruption losses during a severe pandemic, BMO Nesbitt Burns estimates a drop of approximately $124 billion, or 1 percent, in U.S. GDP.[48]

- The ANU/Lowy Institute report does not outline an exact estimate for trade disruption losses. However, at an October 2006 briefing, McKibbin estimated that trade would drop by approximately 35 to 40 percent in an "ultra scenario."[49, 50]
- The CBO model does not explicitly include any losses from trade.

The TFAH model assumes a 1 percent GDP loss in each state due to trade (i.e. each state would experience a 1 percent loss in its state GDP).

THE GLOBAL "JUST-IN-TIME" ECONOMY

"To appreciate how important supply-chaining has become as a source of competitive advantage and profit in a flat world, think about this one fact: Wal-Mart today is the biggest retail company in the world, and it does not make a single thing. All it 'makes' is a hyperefficient supply chain."[51]

—Thomas Friedman, *The World is Flat*

With increased globalization, advances in shipping and travel capacity, and communications and technological developments, many businesses have shifted away from the practice of maintaining warehouses with excess stock and supplies and instead order stock and supplies on a "just-in-time" basis. Under a just-in-time system, supplies and products are produced and shipped based on when they are needed, rather than maintained as costly inventory. For instance, many hospitals only have a few days worth of medical supplies, including gloves, masks, linens, pharmaceuticals, and syringes, on hand. Instead of keeping a large stock of back-up or future supplies, new supplies are delivered to the hospital right before they are needed.

Just-in-time management relies heavily upon the fluid movement of supplies, goods, and services, which requires open borders, reliable and quick transport, sophisticated technology systems, and strong warehouse management practices.

"The pandemic-related collapse of worldwide trade and its ripple effect throughout industrialized and developing countries would represent the first real test of the resiliency of the modern global delivery system. Given the extent to which modern commerce relies on the precise and readily available international trade of goods and services, a shutdown of the global economic system would dramatically harm the world's ability to meet the surging demand for essential commodities such as food and medicine during a crisis."[52]

—Dr. Michael Osterholm in *Foreign Affairs*, July 2005

The resiliency and reliability of the just-in-time economy during a serious global crisis, such as a severe flu pandemic, remains untested. A severe outbreak could cause major problems for the approximately 70,000 multinational companies worldwide that account for nearly $19 trillion in global sales.[53] Most experts predict that a severe pandemic could result in worldwide absenteeism rates of 25 to 35 percent over a three-to-four month time period.[54] This level of absenteeism could severely hamper production of important supplies, goods, and services. In addition to lost worker productivity, the just-in-time supply chain could be further impeded by travel and trade restrictions imposed by nations attempting to stop or slow the spread of the virus. The CBO acknowledges that "the actions of governments could influence the effects of a pandemic on the economy."[55] Questions remain about whether energy needs (e.g., shipment of oil or coal) would continue to be fulfilled during a severe outbreak and whether the inventory of necessary goods (e.g., food, water, and health products) would continue, become limited, or be suspended for a period of time.

The World Bank has advised that businesses and organizations "need to plan for all sorts of unexpected disruptions in supply chains, logistics and the availability of key business services, for example business travel. It would make sense for firms to work with their existing suppliers on tactics to cope with potential supply chain disruptions, while also investigating alternative sources of supply and alternative means of doing business. Firms could also consider building up buffer stocks of critical supplies. That may eat into short-term profit margins and runs against current "just-in-time" management philosophy, but could help ensure the very survival of the firm during this type of catastrophic event. Finally, firms obviously need to plan for mitigating the impact of the epidemic on their own employees, working in close concert with the public health authorities."[56]

D. Possible Shifts in World Markets

In its report, the ANU/Lowy Institute speculates that some of the loss to U.S. GDP during a severe outbreak would likely be counterbalanced by an increase of foreign investment in U.S. stocks and bonds.[57] The researchers theorize that a global economic shock would spur investors to move their holdings out of riskier investments, such as those in developing world markets, and into what are viewed as historically safer investments, such as those in the United States and the European Union. On the other hand, the movement of funds would only exacerbate the economic shock for most developing countries. The TFAH model does not explicitly take these considerations into account.

THE WORLDWIDE EFFECT

In a June 2006 study, the World Bank projected that a mild pandemic, modeled on the 1968 Hong Kong epidemic, could cause between 2 million and 7.4 million deaths worldwide, and a severe pandemic, modeled on the 1918-1919 pandemic, could lead to an estimated 70 million deaths.[58] According to the World Bank, while high death and sickness rates would be harmful to the world economy, other factors might be even more financially damaging:

> *"Interestingly, the most immediate and largest economic impact of a pandemic might arise not from actual death or sickness but from the uncoordinated efforts of people to avoid becoming infected. This at least was the experience during SARS, when people tried to avoid infection by minimizing face-to-face interactions, resulting in a severe demand shock for services sectors such as tourism, mass transportation, retail sales, hotels and restaurants, as well as a supply shock due to workplace absenteeism, disruption of production processes and shifts to more costly procedures. To these results of private action could be added economic disruption and costs caused by emergency public policy measures such as quarantines and restrictions on domestic and international travel and trade, resulting in-among other things-a breakdown, at least temporarily, of international and domestic supply chains and logistics."*[59]

Overall, the World Bank estimates that if a severe pandemic were to occur, the total loss to world GDP would be 3.1 percent, or $1.25 trillion to $2 trillion.[60] Assumptions behind this estimate include a 20 percent worldwide decline in the demand for tourism, transportation, and other key services.

The World Bank speculates that some countries would suffer more than others. For instance, countries without strong health infrastructures, including many developing nations, might experience greater proportional GDP losses.[61] The ANU/Lowy Institute report theorizes that differences in economic losses among countries would depend on: (1) how easily the virus might reach and spread throughout a country, and (2) the quantity and quality of health services available in a country. In an "ultra" pandemic scenario, the ANU/Lowy Institute estimates that some economies in the developing world might shrink by over 50 percent, with a global GDP decline of 12 percent.[62]

E. Historic and Current Economic Context

ECONOMIC IMPACT OF SARS: A LESSON FOR PANDEMIC PLANNING

Historical evidence from past influenza pandemics and the recent Severe Acute Respiratory Syndrome (SARS) outbreak can help experts approximate the current impact of a severe flu outbreak on the U.S. economy.

Despite a relatively low human death toll, fear and containment measures related to the emergence of SARS in 2003 led to a significant drop in both worker productivity and consumer demand. According to the World Health Organization (WHO), 8,096 people worldwide contracted SARS, resulting in 774 deaths.[63] During the time of the outbreak, worker absenteeism due to illness, death, and fear caused a decrease in worker productivity. Demand for goods and services, particularly those that required social interactions such as tourism and transportation, plummeted.

At the peak of the SARS outbreak in April 2003, airline passenger arrivals into Hong Kong declined by nearly two-thirds.[64] In addition, residents were much more reluctant to leave their homes. Revenue from cinemas fell by nearly 50 percent, and retail sales dropped by more than 15 percent.[65]

According to a recent study by Morgan Stanley, the Asia-Pacific region's economy lost nearly $40 billion due to SARS.[66] The World Bank found that the East Asian region's GDP fell by 2 percent in the second quarter of 2003.[67] Toronto experienced a 13.4 percent drop in tourism in 2003.[68,69] Overall, the SARS outbreak led to nearly $2 billion in lost revenue in Toronto, even though only 251 cases and 43 deaths were verified.[70, 71]

CURRENT ECONOMIC IMPACT OF H5N1

The economic impact of H5N1 has been limited thus far. There has been no significant effect on tourism or the supply chain to date.[72] The spread of this strain of avian flu has led to direct losses in the poultry sector, which typically constitutes less than 1 percent of a nation's economy.[73] The direct losses stem from control measures, such as culling birds, and impact not only farmers but also related businesses such as poultry traders, feed mills, and breeding farms.

Avian flu outbreaks have led to a decline in consumer demand for poultry as a result of international trade restrictions. In Thailand and Vietnam, poultry demand has decreased by 15 percent to 20 percent, and Thailand has experienced a 40 percent drop in its poultry exports.[74] In Romania, where H5N1 was identified in more than 100 birds, domestic poultry sales have fallen by 80 percent. Overall, Europe was expected to experience an 8 percent to 9 percent decline in poultry consumption in 2006 due to avian flu fears.[75]

To date, the major costs of H5N1 have been for prevention and control, which includes poultry vaccinations, medication, information systems, surveillance, diagnosis, and compensation for affected poultry owners. In January 2006, the International Pledging Conference on Avian and Human Influenza, co-sponsored by the Chinese government, the European Commission, and the World Bank, was convened to assess the "financing needs at the country, regional and global levels" for bird flu prevention and control. At the event, the international community pledged $1.9 billion in financial support, including $334 million from the U.S.[76] The U.S. federal government has provided over $6.1 billion for domestic pandemic flu preparedness, and the Bush Administration has requested over $1 billion more for fiscal year 2008 for U.S. pandemic planning activities.[77]

In February 2007, Britain experienced its first known outbreak of the H5N1 strain in its domestic poultry.[78] In less than 1 week, roughly 2,000 turkeys at one of the biggest farms in Britain died of the disease. As a result, nearly 200,000 were culled. Overall, the impact may be devastating, as nations such as Japan and Russia have banned British poultry imports. In 2006, Britain's poultry industry experienced sales of roughly $6.6 billion a year, with exports accounting for more than $750 million.[79]

A similar scenario in the U.S. could be extremely damaging. In 2006, the poultry and egg industries had sales of $42 billion and $8 billion, respectively.[80] International prices vary, but poultry exports account for 15 percent of total U.S. production.[81]

Preparing the Economy for a Possible Pandemic

SECTION 3

> "ANY COMMUNITY THAT FAILS TO PREPARE AND EXPECTS THE FEDERAL GOVERNMENT WILL COME TO THE RESCUE IS TRAGICALLY WRONG. IT'S NOT BECAUSE WE DON'T CARE, DON'T WANT TO, OR DON'T HAVE THE MONEY, BUT BECAUSE IT'S LOGISTICALLY IMPOSSIBLE.[82]"
>
> — U.S. SECRETARY OF HEALTH AND HUMAN SERVICES (HHS) MICHAEL LEAVITT

The impact of a severe pandemic outbreak would be overwhelming.

With no widely-available vaccine and limited supplies of antiviral medications, preparing for a pandemic must focus on 1) non-pharmaceutical ways of trying to contain the spread of the disease; and 2) working with businesses, government, and community groups to create "continuity" strategies for how to manage during a time when major portions of the population may become sick. If a vaccine does become available before a human pandemic was to occur, TFAH would recommend concentrating efforts on wide-scale vaccination.

TFAH's economic model demonstrates how a severe pandemic could lead to a major nationwide recession. All 50 states would be significantly affected. It would challenge the resiliency of the U.S. and global economies.

While some efforts have been undertaken to prepare for a pandemic, they fall short of adequately preparing the country to deal with the level of disruption a severe pandemic may bring. Communities often rely on the government to have plans in place and capabilities to respond to large-scale emergencies. But a severe pandemic would quickly overstretch federal, state, and local government resources.

The government has made steps toward improving pandemic preparedness, but much more still needs to be done -- in government and other sectors -- to reach adequate levels of preparedness. (See the "Status of U.S. Pandemic Preparedness" in the Introduction.) To provide pandemic preparedness leadership for "State, territorial, tribal, and local communities," the CDC recently issued the *Interim Pre-Pandemic Planning Guidance: Community Strategy for Pandemic Influenza Mitigation in the United States -- Early, Targeted, Layered Use of Non-pharmaceutical Interventions.*[83] However, TFAH believes the CDC guidance is just the beginning for developing effective community mitigation guidelines and policies.

Preparedness for pandemics and disease outbreaks will require partnerships among the health sector, government, businesses, and community organizations. With planning, open channels of communication and acknowledgment of roles and responsibilities, the different sectors can have realistic expectations about the others' capabilities.

A number of corporations have begun to prepare for a possible pandemic, but a May 2006 report by Standard & Poor's found that indirect business contingency planning for pandemic flu is "just starting in most cases, as companies sketch out ways for employers to work remotely, curtail travel, and otherwise lessen exposure to other people. Industries that would be directly affected by avian flu -- airlines, lodging, leisure, restaurants, and, of course, poultry producers -- would face varying fates."[84] And smaller businesses and community groups that have fewer resources face daunting challenges in planning for an emergency on the scale of a severe pandemic.

Overall, given the havoc a severe pandemic could create for the health and financial well-being of the nation, TFAH recommends that nationwide and sector-wide pandemic planning must become a higher national priority.

TFAH'S STRATEGIES FOR MAINTAINING BUSINESS CONTINUITY DURING A SEVERE PANDEMIC FLU OUTBREAK

"The private sector represents an essential pillar of our society because of the essential goods and services it provides. Moreover, it touches the majority of our population on a daily basis, through an employer-employee or vendor-customer relationship. For these reasons, it is essential that the U.S. private sector be engaged in all preparedness and response activities for a pandemic."[85]

— From the November 2005 White House Homeland Security Council's *National Strategy for Pandemic Influenza*

To help organizations prepare for a possible pandemic, TFAH and other health experts have recommended that organizations plan for ways to maintain "business continuity."

Generally, business continuity means ensuring that essential business functions can survive a natural disaster, technological failure, human error, or other disruption. Existing business continuity plans often anticipate disruptions such as fires, earthquakes, and floods; these events are often restricted to a certain geographic area, and the time frames are fairly well defined and limited. Additionally, many organizations have built planning for terrorist-related biological, chemical, or nuclear attacks into their business continuity plans. Pandemic flu, however, demands a different set of continuity assumptions since it will be widely dispersed geographically and could potentially arrive in waves lasting several months at a time. Worker absenteeism not only will include sick employees, but also those who must care for sick family members and those who are well but stay home out of fear of exposure.

Additionally, TFAH recommends that the private sector and governments at all levels: examine and modify family and medical leave policies; expand telecommuting capabilities; assess infection control procedures in the workplace; establish contingency systems to maintain delivery of goods and services during a pandemic event; and update methods and systems for communicating with the workforce.

"The business community can no longer afford to play a minor role in planning the response to a pandemic. For the world to have critical goods and services during a pandemic, industry heads must stockpile raw materials for production and preplan distribution and transportation support. Every company's senior managers need to be ready to respond rapidly to changes in the availability, production, distribution, and inventory management of their products."[86]

— Dr. Michael Osterholm, *Foreign Affairs*, July 2005

Businesses and Organizations should:

- Prioritize business operations into "critical" and "non-critical" and determine the personnel requirements to fill the former. Ensure that multiple personnel can fill each critical business role for resiliency and business continuity.
- Understand the potential impact of a pandemic and develop plans to ensure continuity of operations during this type of catastrophic health emergency. Designate personnel within the company to serve in a variety of critical tasks, including planning, reviewing, and exercising strategy.
- Identify key personnel and company functions that, if affected, could hinder business operations. Ensure that these individuals can perform job functions from remote locations in the event they are unable to come into work. Cross-train individuals so that essential business operations can continue in the event that key personnel are ill. If personnel are unable to remain absent from work, consider providing stockpiles of personal protective equipment for these individuals to prevent disease transmission.

- Develop plans to protect critical infrastructure in the event that routine government services are interrupted. Encourage employees to back up work and have contingency plans for ensuring communications and networking in the event of power failures.
- Update sick leave and family and medical leave policies and communicate with employees about the importance of staying away from the workplace if they become ill. For example, increase the number of sick days or leave for employees during a declared state of emergency or pandemic. Prepare and offer compensation packages to employees in case of business closure.
- Consider how to address instances when employees refuse to report to work because of fear of harm, risk of exposure, or requirements to care for children or parents. Explore provisions for temporary shutdown ("hibernation"), layoff or extended leave, and re-employment policies.
- Encourage telecommuting and ensure that individuals have the proper equipment to work from outside the office.
- Determine which supplies are critical to ensuring business continuity. If these supplies come from offshore markets, decide whether alternative local, regional, or domestic companies could provide these supplies in the event of restricted trade or travel. If no alternative providers can be identified, consider building stockpiles of critical supplies now to allow for continuity of operations.
- Designate liaisons between the company and local and state public health departments and medical insurance companies to ensure continuously updated information. Develop a plan to disseminate this information to employees.
- Conduct mandatory training and education sessions with all employees to ensure that each employee is aware of pandemic plans and protocols. Teach and emphasize proper infection control procedures and strategies that employees can use to protect themselves and one another at the workplace.
- Recognize the emotional, mental, and physical needs of employees during a catastrophic health event. Incorporate these needs into planning documents.
- Encourage direct payroll deposits for all employees. Look to automated systems for delivery and receipt of payment to employees. Be prepared to handle large volumes of insurance claims, both health and death beneficiary. Be aware of possible changes to employment taxes. Review disability and death benefits coverage and payment levels. Ensure the ability of your carrier to pay benefits. Review existing severance pay guidelines. Discuss with your business and financial advisors the levels of accessible cash required to maintain business operations and to provide cash advances to employees for basic goods for the duration of the pandemic.
- Maintain a healthy work environment. Ensure adequate air circulation. Post tips on how to stop the spread of germs at work. Promote hand and respiratory hygiene. Ensure wide and easy availability of alcohol-based hand sanitizer products.
- Consider offering seasonal flu vaccination clinics in the workplace.
- Provide employees with information about self-care and encourage the implementation of emergency family plans.

Source: Prepared by ANSER/Analytic Services Inc. on behalf of TFAH

SPECIAL CHALLENGES FOR COMMUNITY-BASED ORGANIZATIONS, FAITH-BASED ORGANIZATIONS, AND SMALL BUSINESSES

Many community- and faith-based organizations and small businesses do not have the resources needed to undertake the amount of continuity planning and preparation required to be ready for a disruption of the scope of a severe pandemic.

Little attention has been paid to how to help small businesses prepare, or how to pool resources within communities to help small businesses cope with a significant potential loss of business. The special needs of the small business community must be better addressed.

Many community- and faith-based organizations provide essential services. These routine and relied-upon services could be curtailed during a severe pandemic outbreak. And because congregate settings are likely to be disrupted or limited, communities may suffer from the loss of regular social interaction, systems of communication, and routine delivery of basic necessities such as food. A number of community- and faith-based organizations have traditionally taken on additional responsibilities in serving the community during emergencies. A pandemic, however, would present unique circumstances where illness, caring for family members, and fear would limit the number of volunteers as well as the workforce size of these organizations.

TFAH's Recommended Community- and Faith-Based Preparedness Planning Strategies

■ Continuity of operations

Community groups may provide valuable assistance during a pandemic, especially in remote or hard-to-reach regions. It is important that these groups develop realistic plans for continued operations during a pandemic to ensure implementation of community-wide response efforts, often in the absence of external resources. Organizations must define the roles, responsibilities, and schedules of each of their volunteers.

■ Coordination with volunteers

Organizations should have regular and emergency contact numbers to reach out to their volunteers during an emergency, as well as succession plans for backup in the event of illness or inability of volunteers to report to duty. Volunteers should have credentials to allow them to proceed to their duty site despite security barriers or curfews imposed by governments to reduce disease transmission or to maintain civil order. Organizations may wish to consider incentives for inducing volunteers to report to their assignments, such as offering transportation (especially if mass transportation is limited) or vaccines (if and when available) and personal protective equipment to reduce the possibility of disease exposure. Because a shortage of volunteers is a strong possibility during a pandemic, geographically proximate community groups may wish to develop continuity-of-operations plans that aggregate operations into one facility, thus reducing the numbers of volunteers required.

Develop risk communication plans

During a pandemic, sectors of the population may be displaced or medically isolated from the rest of their family and other loved ones. Ill individuals may be isolated and their contacts quarantined during the first stages of the pandemic to delay spread of the disease in the community. Feelings of isolation and loneliness may cause widespread psychological and mental impacts within a community. Restrictions of movement within communities may lead to disruptions in the ability of community groups to provide direct, face-to-face social and emotional support to individuals at a time when counseling and support services may be most essential. Community groups should explore methods of risk communication such as telephone hotlines, live web chats, and television and radio broadcasts.

Define the "universal" role of community groups during disaster and pandemic response

Expectations from federal, state, and local governments regarding services and support by community groups must be met with full inclusion in planning, training, and exercise activities, as well as agreement on the level of effort that will be provided during a pandemic. Responsibilities must match capabilities.

Coordinate roles

Geographically proximate community groups must coordinate the efforts and services they will provide in order to avoid duplication of existing efforts. Moreover, the populations they serve must have realistic expectations of what services will be available in specific locations. For example, if faith-based organizations in an area can provide child or elder care, food, and material goods, but one in another area can provide only food, people must receive guidance regarding which organization can best serve their needs. This is particularly critical in rural areas.

Improve knowledge and capabilities regarding infectious diseases

Although many community groups have historically provided support to their communities, pandemic influenza provides a unique set of conditions: most are not equipped to deal with disease outbreaks. They may lack experience and training in issues such as proper precautions, isolation, hygiene practices, and use of personal protective equipment, vaccines, and medical prophylaxis. Once the role of the community group is defined for a pandemic event, it is important that it be immediately provided with the necessary education and training. For example, the National Strategy for Pandemic Influenza Implementation Plan calls for "pre-vaccination... for emergency response teams."[87] If there is an expectation that community groups are first responders, they must be assured the same level of protection as other first-responder organizations.

Liability protections must be provided

Community groups must understand the liability protections available to them in response to an infectious disease outbreak where unlicensed individuals may be called upon to administer care to potentially infectious individuals. Most states have laws governing charitable immunity, describing the protections available to organizations that provide medical and related services in an emergency.

Source: Prepared by ANSER/Analytic Services Inc. on behalf of TFAH

SF READY: EXAMPLE OF BUSINESS PREPAREDNESS EFFORTS

SF Ready

Founded in 1998, SF Ready encourages and promotes emergency preparedness and business continuity planning in the San Francisco business community. SF Ready is a collaboration among San Francisco's Office of Emergency Services and Homeland Security, the San Francisco Chamber of Commerce, and area businesses.[88]

Each year, SF Ready produces 6 roundtables, which are free and open to the public, on topics concerning emergency preparedness and business continuity.

- In December 2006, SF Ready hosted a tabletop exercise practicing the interface between San Francisco businesses and the city's Office of Emergency Services and Homeland Security, including the resources of the Auxiliary Communication Service, which provides communication assistance to the City and County of San Francisco in time of disaster.
- In June 2007, SF Ready will be hosting a roundtable on "the current thinking on pandemic effects and what companies around the Bay Area are doing to get ready."[89]

In October 2006, SF Ready also helped sponsor a half-day pandemic flu symposium for San Francisco businesses and organizations. The symposium, which was hosted by the San Francisco Department of Public Health, featured presentations on pandemic influenza planning in San Francisco; business continuity planning; infection control for the workplace; and San Francisco isolation and quarantine plans.[90]

San Francisco Department of Public Health

The Communicable Disease and Control Prevention Division within San Francisco's Department of Public Health has developed a highly detailed business continuity guide and template for area businesses preparing for pandemic influenza. The template can be found at www.sfcdcp.org under the "Avian Flu" link.

The template leads businesses through the entire business continuity planning process, from establishing authority and protocols for a business response plan to preparing for a post pandemic recovery phase. It asks important questions of businesses to assist them in developing an effective continuity plan so the essential operations of their organizations will be maintained if a pandemic occurs. For example, to spur businesses into creating thorough pandemic policies for employees, the template asks:

- The health department may advise that during a pandemic, employees with flu-like symptoms stay home from work. If the organization chooses to follow the guidance: 1) Will a doctor's note be required? What if that is not feasible? 2) Will employees be required to take sick or vacation days? 3) What if employees have used up all of their sick and vacation days? 4) Will sick employees who are required to stay home be compensated if they do not have any sick or vacation time? Will they be dismissed?
- What will be the protocol for employees who become ill at work?
- Some employees may try to hide their symptoms because they do not want to use personal leave or take a leave of absence. How will you encourage people with symptoms to stay home?
- How will you respond to employees who are too afraid to come to work or who stay home to care for sick family members?
- Are there policies that allow for flexible worksites (e.g., telecommuting) and flexible work hours (e.g., staggered shifts, extended shifts)?
- Is there a policy on how "non-essential workers" can be re-assigned for other "essential" duties in other departments?
- Will policies for "essential workers" differ from those for "non-essential workers"?
- Will workers have access to medical and mental health services?[91]

CHICAGOFIRST: EXAMPLE OF BUSINESS PANDEMIC PREPAREDNESS EFFORTS

"A crisis is no time to exchange business cards."[92]

—Brian Tishuk, Executive Director of ChicagoFIRST

Established in 2003 with the support of the U.S. Treasury Department, ChicagoFIRST "seeks to enhance the resilience" of Chicago financial institutions by "establishing relationships between the Chicago financial community and all levels of government and by providing a means by which the financial firms can coordinate with respect to homeland security issues."[93]

ChicagoFIRST's members include Aon, Bank of America, Allstate, Chicago Board of Trade, Chicago Stock Exchange, Goldman Sachs, JP Morgan Chase, and Northern Trust Bank. The coalition also has strategic partnerships with numerous community and government organizations, including: American Red Cross of Greater Chicago, Chicago Office of Emergency Management and Communications, Federal Reserve Bank of Chicago, Illinois Management Agency, and United States Department of Homeland Security - Private Sector Office.

To ensure that critical information will flow freely between coalition members and the public sector during a major emergency, ChicagoFIRST holds a seat in the City of Chicago's Emergency Management Joint Operations Center.[94]

According to Brian Tishuk, executive director of ChicagoFIRST, the organization's "biggest concern of the moment centers on a pandemic."[95] In January 2007, the coalition took a major step in addressing its concern by hosting a resilience exercise on pandemic flu. During the exercise, teams of "financial service organizations and public sector officials were challenged to recover from potential societal conditions including school and building closures, as well as public transit service reductions, and to identify methods to protect their employees."[96]

The exercise identified the following major issues yet to be addressed by the financial community in preparing for a pandemic:

1) It is likely that most financial organizations will enact telecommuting policies if a pandemic occurs. However, as exercise participants discovered, it is not clear whether the telecommunications infrastructure in neighborhoods will be able to handle the increased traffic.

2) Exercise participants expressed concern over the distribution and protection of cash during an outbreak, "when demand for the commodity will rise and the ability of providing it will be strained."[97]

ChicagoFIRST has inspired other cities to form coalitions to enhance the preparedness and response efforts of local financial firms. Organizations similar to ChicagoFIRST currently operate in Los Angeles, San Francisco, Miami, and Minneapolis.[98]

Appendix A

GROSS DOMESTIC PRODUCT BY STATE (RANGE OF ESTIMATED LOSSES AT 4.25 PERCENT TO 6 PERCENT)

The table on the following page examines the range in projected losses from 3 economic and financial institutions, Congressional Budget Office (CBO), the ANU/Lowy Institute, and BMO Nesbitt Burns. It is important to note that both the low-end and high-end estimates would almost certainly lead to a major recession.

Estimates are based on projected losses in U.S. GDP by state during a severe pandemic outbreak. TFAH applied the CBO-model estimate of a 4.25 percent GDP loss and the BMO Nesbitt Burns-model estimate of 6 percent GDP loss to each state's 2005 GDP by state figures (compiled by the Bureau of Economic Analysis of the U.S. Department of Commerce at http://www.bea.gov/bea/regional/gsp, accessed for this analysis on January 26, 2007). Actual losses to state GDP would depend on a variety of factors, such as prevalence and type of industries in each state economy, public health and health care capabilities, severity of the pandemic, and the mitigation strategies that states might take to prepare for a possible pandemic.

Loss of Gross Domestic Product (GDP) by State During a Pandemic: Low- and High-End Estimates

(Ranked from largest to smallest projected loss)

States and DC	Low-End Estimate (4.25% GDP Loss) (Rounded to millions of dollars) Based on 2005 dollars	High-End Estimate (6% GDP Loss) (Rounded to millions of dollars) Based on 2005 dollars
California	68,940,000,000	97,327,000,000
Texas	42,051,000,000	59,367,000,000
New York	40,710,000,000	57,472,000,000
Florida	28,614,000,000	40,396,000,000
Illinois	23,801,000,000	33,602,000,000
Pennsylvania	20,784,000,000	29,342,000,000
Ohio	18,739,000,000	26,455,000,000
New Jersey	18,321,000,000	25,865,000,000
Michigan	15,990,000,000	22,575,000,000
Georgia	15,463,000,000	21,830,000,000
Virginia	14,956,000,000	21,114,000,000
North Carolina	14,732,000,000	20,798,000,000
Massachusetts	13,851,000,000	19,555,000,000
Washington	11,361,000,000	16,038,000,000
Maryland	10,465,000,000	14,774,000,000
Indiana	10,139,000,000	14,314,000,000
Minnesota	9,968,000,000	14,073,000,000
Tennessee	9,742,000,000	13,753,000,000
Colorado	9,203,000,000	12,992,000,000
Arizona	9,202,000,000	12,992,000,000
Wisconsin	9,194,000,000	12,979,000,000
Missouri	9,183,000,000	12,964,000,000
Connecticut	8,234,000,000	11,625,000,000
Louisiana	7,149,000,000	10,092,000,000
Alabama	6,443,000,000	9,097,000,000
Oregon	6,132,000,000	8,657,000,000
Kentucky	5,971,000,000	8,430,000,000
South Carolina	5,951,000,000	8,401,000,000
Oklahoma	5,163,000,000	7,289,000,000
Iowa	4,826,000,000	6,813,000,000
Nevada	4,732,000,000	6,681,000,000
Kansas	4,487,000,000	6,334,000,000
Utah	3,858,000,000	5,447,000,000
Arkansas	3,687,000,000	5,205,000,000
District of Columbia	3,478,000,000	4,910,000,000
Mississippi	3,455,000,000	4,877,000,000
Nebraska	3,004,000,000	4,241,000,000
New Mexico	2,927,000,000	4,132,000,000
Delaware	2,401,000,000	3,389,000,000
New Hampshire	2,340,000,000	3,304,000,000
Hawaii	2,296,000,000	3,241,000,000
West Virginia	2,255,000,000	3,183,000,000
Idaho	2,006,000,000	2,831,000,000
Maine	1,911,000,000	2,698,000,000
Rhode Island	1,861,000,000	2,627,000,000
Alaska	1,671,000,000	2,359,000,000
South Dakota	1,314,000,000	1,855,000,000
Montana	1,270,000,000	1,793,000,000
Wyoming	1,159,000,000	1,636,000,000
North Dakota	1,037,000,000	1,464,000,000
Vermont	980,000,000	1,384,000,000

Appendix B

MORTALITY AND MORBIDITY ESTIMATES BY STATE BASED ON A SEVERE PANDEMIC OUTBREAK

TFAH's state estimates are based on models of a severe pandemic outbreak. These estimates are similar to the assumptions made by the Centers for Disease Control and Prevention (CDC) and White House Homeland Security Council for a severe pandemic resembling the pandemic outbreak of 1918.[99] The CBO, the ANU/Lowy Institute, and BMO Nesbitt Burns developed national assumptions about what would constitute a "severe" or "ultra" pandemic outbreak, using estimates of a 30 percent attack rate and 2.5 percent case-fatality rate under "severe" and "ultra" scenarios.[100, 101] In 2005, the national population was nearly 300 million people. With these estimates, approximately 90 million people would get ill, and of those 90 million, roughly 2.25 million would die.[102, 103]

The state-specific estimates of illness and death rates in each state used the same assumptions of a 30 percent attack rate and a 2.5 percent case-fatality rate. The rates were calculated using the Flu Aid computer modeling program developed by the CDC, which also considers the age and health risk factors of a state's population. It should be noted that Flu Aid is limited in its ability to account for density issues, such as how close people live together in cities versus rural areas.

- **Population Data:** TFAH used 2005 U.S. Census data for the state population estimates.
- **Illness and Fatality Data:** TFAH used CDC's Flu Aid to generate state illness and fatality projections. Flu Aid is a computer program designed to estimate possible mortality rates in states to help local planners prepare for the next pandemic. Factors taken into account in the model include age, attack rates, mortality rates, and health risk. The CDC makes health risk and mortality assumptions based on age in each state. To determine state-specific calculations, the 2005 U.S. Census age data was imputed into the Flu Aid program. To remain consistent with the CBO, the ANU/Lowy Institute, and BMO Nesbitt Burns models, the totals were reconciled by using state-specific relative weights to match the 30 percent national attack rate and 2.5 percent case-fatality rate.

Workforce Productivity Losses

TFAH used state illness and death data generated by Flu Aid to determine the potential impact of a severe outbreak on worker productivity in each state. The CBO model equated productivity decline with the number of lost work days caused by worker illness and death.

- The CBO assumed that the economy would lose 1 year of productivity from those who die, and 3 weeks of work (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members. The CBO estimated that nationally, 2.25 million would die (representing three-quarters of 1 percent of the population) and 87.75 million would get sick but not die.[104]

TFAH used these assumptions to determine loss of work days in each state, based on the death and illness projections for each state. In sum, due to losses in workforce productivity, the economy would suffer from a 1 year GDP drop of approximately 2.5 percent.[105]

Note: The CBO, ANU/Lowy Institute, and BMO Nesbitt Burns models do not explicitly account for the percentage of the 2.25 million deaths and 87.75 million illnesses who are non-working members of society, such as children or the elderly. The models do include lost productivity due to people who stay home as caretakers or out of fear. For example, the CBO blends these considerations into the 3 weeks of work lost for those who are sick but do not die. The ANU/Lowy Institute also includes considerations for time lost for caretaking.

The estimates on the next page for potential death and illness rates during a severe pandemic were calculated using CDC's Flu Aid computer software program (http://www.cdc.gov/flu/tools/fluaid/). 2005 U.S. Census data by state was used for the population estimates. To remain consistent with the numbers used by the CBO, the ANU/Lowy Institute, and BMO Nesbitt Burns to model a "severe" or "ultra" pandemic, an attack rate of 30 percent and a case-fatality rate of 2.5 percent were used as the basis for the estimates.

In the table on the next page, the projected number of lives lost and sick workers are rounded to the thousandths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.

[Note: In June 2005, TFAH released state-by-state estimates for potential death and illness rates for states based on a "mid-level" pandemic, using assumptions based on a pandemic with the severity at a midway point between the historical precedents of the 1918 and 1968 pandemic outbreaks. Severe (based on the 1918 pandemic) and mild (based on the 1968 pandemic) scenarios were also included in the appendix material of that report.]

Trust for America's Health Model: Estimated Mortality and Morbidity for a Severe Pandemic		
States & DC	**Mortality (Death Rates - Rounded for Presentation in Appendix)**	**Morbidity (Illness Rates - Rounded for Presentation in Appendix)**
Alabama	37,000	1,350,000
Alaska	4,000	192,000
Arizona	38,000	1,766,000
Arkansas	22,000	823,000
California	253,000	10,713,000
Colorado	30,000	1,381,000
Connecticut	29,000	1,039,000
Delaware	6,000	250,000
District of Columbia	5,000	162,000
Florida	149,000	5,254,000
Georgia	57,000	2,688,000
Hawaii	10,000	365,000
Idaho	9,000	425,000
Illinois	99,000	3,787,000
Indiana	49,000	1,863,000
Iowa	26,000	878,000
Kansas	22,000	810,000
Kentucky	33,000	1,232,000
Louisiana	35,000	1,339,000
Maine	11,000	391,000
Maryland	41,000	1,656,000
Massachusetts	55,000	1,895,000
Michigan	82,000	3,003,000
Minnesota	39,000	1,526,000
Mississippi	22,000	864,000
Missouri	47,000	1,717,000
Montana	7,000	277,000
Nebraska	14,000	520,000
Nevada	13,000	720,000
New Hampshire	10,000	389,000
New Jersey	71,000	2,585,000
New Mexico	13,000	571,000
New York	157,000	5,706,000
North Carolina	62,000	2,556,000
North Dakota	6,000	186,000
Ohio	96,000	3,396,000
Oklahoma	28,000	1,046,000
Oregon	28,000	1,082,000
Pennsylvania	113,000	3,675,000
Rhode Island	9,000	318,000
South Carolina	31,000	1,256,000
South Dakota	6,000	229,000
Tennessee	45,000	1,767,000
Texas	146,000	6,789,000
Utah	14,000	737,000
Vermont	5,000	185,000
Virginia	54,000	2,208,000
Washington	45,000	1,853,000
West Virginia	17,000	537,000
Wisconsin	44,000	1,643,000
Wyoming	4,000	150,000

APPENDIX C

Appendix C

REVIEW OF THE MODELS

To estimate economic losses in each state due to a severe pandemic, TFAH primarily draws from 3 models. The CBO model, which predicts GDP loss on a national level, provides the methodological backbone for TFAH's estimates. The ANU/Lowy Institute model examines the impact of a pandemic on the entire world by taking into account country-specific factors, such as changes in fiscal policies and the relative quality of each nation's health system. TFAH's model does not explicitly include any of those considerations. The BMO Nesbitt Burns report adds a financial industry, Wall Street-focused perspective on the macroeconomic impact of a pandemic.

The ANU/Lowy Institute

The ANU/Lowy Institute report examines the potential worldwide economic impact of pandemic influenza, as well as nation-specific effects. Authors Warwick J. McKibbin and Alexandra A. Sidorenko created a sophisticated model that forecasts the economic shock by considering factors from the interconnectedness of global trade and financial markets to nation-specific public health and governance indexes.[106]

The report estimates that the GDP loss to the U.S. would be anywhere from less than 1 percent in a mild scenario to 5.5 percent in an "ultra" scenario. A mild scenario assumes just 20,000 deaths, which are fewer than the 36,000 who die each year from the seasonal flu.[107] An ultra scenario assumes 2 million fatalities, which is roughly equivalent to a 30 percent attack rate and 2.5 percent case-fatality rate for 300 million U.S. citizens.[108]

Under an ultra scenario, this model demonstrates that the cost of doing business would increase significantly, particularly in the service industry as people would avoid places of great social interaction. Trade disruption of the just-in-time economy would also have a major impact. Overall, the ANU/Lowy Institute estimates that U.S. GDP would drop by over 4 percent from this factor alone. In addition, the loss of labor productivity would negatively impact the supply side. Worker absenteeism, due to mortality, morbidity, taking care of sick family members, or fear, would reduce GDP by nearly 1 percent.

The ANU/Lowy Institute model forecasts nearly a 1 percent drop in GDP from a change in consumer demand. For instance, consumers would likely avoid heavily populated places such as shopping malls and airports. The model does predict a modest bounce to the U.S. economy from an inflow of cash from the international financial community. The researchers assume that investors and nations will look to shift their holdings from riskier countries to "safe-haven" economies like the U.S. and Europe.

A shortcoming of the model is that it uses national per capita health care spending to create its health policy index, an input variable of the model. The health policy index, which measures the ability of each country's health services sector to respond to a flu pandemic, is computed as a weighted average of the country's per capita total expenditure on health (in international dollars) and other influenza-specific policies and measures.[109] Most of the weight (75 percent) is given to health care spending, with only 25 percent going towards flu policies and measures.[110]

Since the U.S. has the highest per capita health spending of any nation, it has the best health policy index rating in the model.

Despite U.S. expenditures on health care, the Katrina disaster in 2005 demonstrated the inability of the nation's fragmented health care system to respond effectively during a large scale public health disaster. In addition, a greater health policy index score assumes that a country will develop vaccines quickly. The U.S. currently has limited domestic vaccine-production capability. The model also assumes that if and when a vaccine is developed, it would be highly effective.[111]

It should be noted that the ANU/Lowy Institute model estimates the economic losses for twenty nations/regions worldwide. As a result, the model may be less precise for individual nations.

Congressional Budget Office (CBO)

The CBO report examines the macroeconomic impact of the avian flu on the U.S. CBO researchers developed a simpler model than the ANU/Lowy Institute model. As a result, the CBO model does not capture some important factors, such as trade disruption and efforts taken to contain the spread of disease.

The CBO estimates a 1 percent loss in U.S. GDP under a mild scenario and a 4.25 percent loss under a severe scenario. The CBO attributes the majority of the economic decline to losses on the supply side due to a drop in worker productivity. Under a mild scenario, the CBO estimates that 75 million will become infected and 100,000 of them will die, assuming an attack rate of 25 percent and a case-fatality rate of roughly 0.1 percent. Under a severe scenario, the CBO model assumes a modestly higher attack rate of 30 percent but a considerably greater case-fatality rate of 2.5 percent. This translates into 90 million infections and approximately 2 million deaths.[112]

In its model, the CBO assumes that those who survive the pandemic would miss nearly a week of work under a mild scenario and 3 weeks under a severe scenario. These assumptions include workers who are staying home because 1) they are sick, 2) they are caring for family members who may be sick, or 3) they want to avoid social interaction at the office. The CBO estimates that GDP loss due to worker absenteeism would be approximately 0.5 percent under a mild scenario and 2.25 percent under a severe scenario.[113]

Under a severe scenario, the CBO model assumes a sharp decline in consumer demand over a 3 month period, particularly in those industries requiring greater degrees of social interaction. For example, the CBO assumes that demand for the entertainment, tourism, and lodging industries would fall by 80 percent, while demand for the transportation industry would drop by 67 percent. Many other industries, from construction to retail trade, would see demand fall by 10 percent, according to the CBO model assumptions. Under a mild scenario, the CBO model assumes that demand-side declines in each industry would be one-quarter of the impact under a severe scenario.

The CBO model assumes that there will be no significant impact to the finance and insurance industries, even though the insurance industry would have to respond to a large number of life and medical insurance claims filed during a severe outbreak. A Fitch Ratings report estimates that a moderate outbreak could cause additional life insurance claims of $18 billion.[114] The Insurance Information Institute estimates "that perhaps five to eight of the 30 leading group life insurance writers might struggle to pay their group life claims, particularly if other lines of business, as well as their asset values, are also under stress."[115]

The CBO model also assumes a 15 percent increase in demand for the health care sector during a severe pandemic.[116] Obviously, the number of sick and dying will increase the need for health care services and products, and some companies may stand to gain financially. However, the model did not examine the supply side. Many health care institutions, particularly hospitals, emergency rooms, and nursing homes, would likely suffer financially as they will bear the cost of the procurement of extra medical supplies and overtime pay for staffers. Many of these institutions will

also treat a great number of uninsured or underinsured citizens with the risk of never receiving compensation. It is possible that due to financial hardship, some hospital and health care providers may close or refuse to see uninsured or underinsured patients.

Additionally, the CBO model does not directly account for economic losses due to trade disruption. It should be noted, however, that part of the loss from trade may be implicitly accounted for in the CBO's consumer demand assumptions. For example, a portion of the 67 percent drop in demand for the transportation industry under a severe scenario may be attributable to trade disruption. However, trade disruption also affects supply so it is likely the CBO model underestimates the amount of economic loss due to trade disruption during a severe outbreak.

Finally, while it is discussed in the CBO report, the CBO model does not directly account for how increased pandemic preparedness efforts, such as the widespread availability of a vaccine, could lessen the impact of a pandemic on the economy.

BMO Nesbitt Burns

BMO Nesbitt Burns economist Sherry Cooper wrote one of the first reports that later evolved into a series on the potential economic impact of pandemic influenza in North America. BMO Nesbitt Burns has examined the issue on a macroeconomic level and from a Wall Street investor's perspective.

In its most recent paper, BMO Nesbitt Burns uses the CBO model as a basis for its economic impact estimates but adapts the model to account for trade disruption. BMO Nesbitt Burns also adapts the model to account for what it describes as "quibbles" it has with some of the CBO's assumptions.[117] For example, BMO Nesbitt Burns disagrees with the CBO's assumption that demand for education would be unaffected by a pandemic.

In another difference, BMO Nesbitt Burns believes imports and exports would be significantly impacted. The BMO Nesbitt Burns analysis cites the CBO estimate of an overall 5 percent decline in U.S. GDP during a severe pandemic. Using this 5 percent as a baseline, it can be inferred that BMO Nesbitt Burns estimates that trade disruption alone could lead to roughly an additional 1 percent loss in GDP.[118] (It should be noted that the CBO estimate of 5 percent was later revised to 4.25 percent.)

Overall, BMO Nesbitt Burns estimates that annual U.S. GDP would drop by 6 percent under a severe pandemic scenario.

Other Estimates:

Other groups have provided estimates for GDP loss due to a pandemic. These forecasts were not incorporated into this analysis because they either did not examine GDP loss in the U.S. or did not provide enough details about their methodology.

- **Canadian Department of Finance:** Steven James and Timothy Sargent of the Canadian Department of Finance examined the potential impact on the Canadian economy. Overall, they believe that the economic impact of a severe pandemic would be relatively mild. They forecast that a severe flu pandemic will only create an economic shock of 0.3 percent to 1.1 percent to the Canadian economy.[119] After reviewing the effects of the 1918 pandemic, the authors concluded that there was no evidence that trade flows were disrupted or that financial markets were impacted.

- **Cumberland Advisors:** David Kotok, Chief Investment Officer of Cumberland Advisors, believes that a severe outbreak would lead to a 10 to 11 percent decline in U.S. GDP.[120] According to the money management firm, this drop would mirror the GDP loss experienced during the 1918 pandemic.

- **European Commission:** Lars Jonung and Werner Roeger of the European Commission developed a complex "New Keynesian Macro-Model of the World Economy" to simulate the potential impact of a severe pandemic on the European Union.[121] The researchers relied on many of the same demand and supply assumptions used by the CBO. Overall, they calculate a potential loss to the European Union's economy of 2 to 4 percent of annual GDP.

OVERVIEW STATE-BY-STATE

ALABAMA OVERVIEW:

- **2005 Total State GDP: $151.6 billion**
- **Projected GDP Loss from Pandemic: $8.3 billion***
- **Projected GDP Percentage Loss from Pandemic: 5.45%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 33**
- **Projected Impact on the Workforce: $3.9 billion in losses**
- **Projected Impact on Industries: $2.9 billion in losses**
- **Projected Trade Impact: $1.6 billion in losses**
- **Projected Number of Lives Lost: 37,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 1,350,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

Alabama: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	2,520,000,000	63,000,000
Mining	2,672,000,000	67,000,000
Utilities	3,774,000,000	-
Construction	7,399,000,000	185,000,000
Manufacturing	26,993,000,000	675,000,000
Wholesale trade	8,690,000,000	217,000,000
Retail trade	12,084,000,000	302,000,000
Transportation and warehousing	4,296,000,000	720,000,000
Information	4,939,000,000	-
Finance and insurance ^ ^	8,148,000,000	204,000,000
Real estate, rental, and leasing	14,219,000,000	-
Professional and technical services	8,556,000,000	-
Management of companies and enterprises	1,141,000,000	-
Administrative and waste services	3,624,000,000	-
Educational services ^ ^	700,000,000	18,000,000
Health care and social assistance++	10,809,000,000	(405,000,000)
Arts, entertainment, and recreation	568,000,000	114,000,000
Accommodation and food services	3,484,000,000	697,000,000
Other services, except government	4,018,000,000	50,000,000
Government	22,975,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^ ^ The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

ALASKA OVERVIEW:

- **2005 Total State GDP: $39.3 billion**
- **Projected GDP Loss from Pandemic: $2.6 billion***
- **Projected GDP Percentage Loss from Pandemic: 6.59%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 3**
- **Projected Impact on the Workforce: $0.9 billion in losses**
- **Projected Impact on Industries: $1.3 billion in losses**
- **Projected Trade Impact: $0.4 billion in losses**
- **Projected Number of Lives Lost: 4,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 192,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

Alaska: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	357,000,000	9,000,000
Mining	10,672,000,000	267,000,000
Utilities	401,000,000	-
Construction	1,932,000,000	48,000,000
Manufacturing	909,000,000	23,000,000
Wholesale trade	786,000,000	20,000,000
Retail trade	1,805,000,000	45,000,000
Transportation and warehousing	3,951,000,000	662,000,000
Information	997,000,000	-
Finance and insurance^^	1,211,000,000	30,000,000
Real estate, rental, and leasing	3,035,000,000	-
Professional and technical services	1,361,000,000	-
Management of companies and enterprises	122,000,000	-
Administrative and waste services	672,000,000	-
Educational services^^	117,000,000	3,000,000
Health care and social assistance++	2,095,000,000	(79,000,000)
Arts, entertainment, and recreation	290,000,000	58,000,000
Accommodation and food services	981,000,000	196,000,000
Other services, except government	630,000,000	8,000,000
Government	6,990,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^ ^ The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

ARIZONA OVERVIEW:

- **2005 Total State GDP: $216.5 billion**
- **Projected GDP Loss from Pandemic: $12.0 billion***
- **Projected GDP Percentage Loss from Pandemic: 5.52%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 27**
- **Projected Impact on the Workforce: $5.2 billion in losses**
- **Projected Impact on Industries: $4.6 billion in losses**
- **Projected Trade Impact: $2.2 billion in losses**
- **Projected Number of Lives Lost: 38,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 1,766,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

Arizona: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	2,062,000,000	52,000,000
Mining	2,026,000,000	51,000,000
Utilities	3,835,000,000	-
Construction	15,579,000,000	389,000,000
Manufacturing	19,644,000,000	491,000,000
Wholesale trade	12,510,000,000	313,000,000
Retail trade	18,203,000,000	455,000,000
Transportation and warehousing	6,082,000,000	1,019,000,000
Information	6,678,000,000	-
Finance and insurance^^	19,479,000,000	487,000,000
Real estate, rental, and leasing	30,352,000,000	-
Professional and technical services	12,130,000,000	-
Management of companies and enterprises	2,285,000,000	-
Administrative and waste services	9,714,000,000	-
Educational services^^	1,546,000,000	39,000,000
Health care and social assistance++	14,873,000,000	(558,000,000)
Arts, entertainment, and recreation	2,026,000,000	405,000,000
Accommodation and food services	7,166,000,000	1,433,000,000
Other services, except government	4,331,000,000	54,000,000
Government	26,006,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^ ^ The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

ARKANSAS OVERVIEW:

- **2005 Total State GDP: $86.8 billion**
- **Projected GDP Loss from Pandemic: $5.0 billion***
- **Projected GDP Percentage Loss from Pandemic: 5.81%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 13**
- **Projected Impact on the Workforce: $2.2 billion in losses**
- **Projected Impact on Industries: $1.9 billion in losses**
- **Projected Trade Impact: $0.9 billion in losses**
- **Projected Number of Lives Lost: 22,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 823,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

Arkansas: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	2,401,000,000	60,000,000
Mining	972,000,000	24,000,000
Utilities	1,838,000,000	-
Construction	3,841,000,000	96,000,000
Manufacturing	16,874,000,000	422,000,000
Wholesale trade	5,798,000,000	145,000,000
Retail trade	6,268,000,000	157,000,000
Transportation and warehousing	4,336,000,000	726,000,000
Information	3,120,000,000	-
Finance and insurance^^	3,884,000,000	97,000,000
Real estate, rental, and leasing	7,854,000,000	-
Professional and technical services	3,263,000,000	-
Management of companies and enterprises	1,797,000,000	-
Administrative and waste services	1,759,000,000	-
Educational services^^	365,000,000	9,000,000
Health care and social assistance++	6,593,000,000	(247,000,000)
Arts, entertainment, and recreation	377,000,000	75,000,000
Accommodation and food services	1,950,000,000	390,000,000
Other services, except government	1,938,000,000	24,000,000
Government	11,523,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^^The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

CALIFORNIA OVERVIEW:

- **2005 Total State GDP: $1.622 trillion**
- **Projected GDP Loss from Pandemic: $86.9 billion***
- **Projected GDP Percentage Loss from Pandemic: 5.36%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 41**
- **Projected Impact on the Workforce: $39.8 billion in losses**
- **Projected Impact on Industries: $31.0 billion in losses**
- **Projected Trade Impact: $16.2 billion in losses**
- **Projected Number of Lives Lost: 253,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 10,713,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

California: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	23,132,000,000	578,000,000
Mining	9,685,000,000	242,000,000
Utilities	24,906,000,000	-
Construction	76,487,000,000	1,912,000,000
Manufacturing	157,148,000,000	3,929,000,000
Wholesale trade	92,548,000,000	2,314,000,000
Retail trade	113,903,000,000	2,848,000,000
Transportation and warehousing	37,577,000,000	6,294,000,000
Information	107,120,000,000	-
Finance and insurance^^	120,795,000,000	3,020,000,000
Real estate, rental, and leasing	259,606,000,000	-
Professional and technical services	134,141,000,000	-
Management of companies and enterprises	23,392,000,000	-
Administrative and waste services	50,624,000,000	-
Educational services^^	12,456,000,000	311,000,000
Health care and social assistance++	96,911,000,000	(3,634,000,000)
Arts, entertainment, and recreation	20,201,000,000	4,040,000,000
Accommodation and food services	43,880,000,000	8,776,000,000
Other services, except government	39,174,000,000	490,000,000
Government	178,431,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^ ^ The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

COLORADO OVERVIEW:

- **2005 Total State GDP: $216.5 billion**
- **Projected GDP Loss from Pandemic: $11.7 billion***
- **Projected GDP Percentage Loss from Pandemic: 5.40%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 38**
- **Projected Impact on the Workforce: $5.2 billion in losses**
- **Projected Impact on Industries: $4.3 billion in losses**
- **Projected Trade Impact: $2.2 billion in losses**
- **Projected Number of Lives Lost: 30,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 1,381,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

Colorado: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	1,823,000,000	46,000,000
Mining	8,591,000,000	215,000,000
Utilities	2,525,000,000	-
Construction	13,669,000,000	342,000,000
Manufacturing	13,975,000,000	349,000,000
Wholesale trade	11,489,000,000	287,000,000
Retail trade	13,404,000,000	335,000,000
Transportation and warehousing	5,650,000,000	946,000,000
Information	18,729,000,000	-
Finance and insurance^^	14,123,000,000	353,000,000
Real estate, rental, and leasing	30,080,000,000	-
Professional and technical services	18,759,000,000	-
Management of companies and enterprises	3,266,000,000	-
Administrative and waste services	6,736,000,000	-
Educational services^^	1,268,000,000	32,000,000
Health care and social assistance++	12,525,000,000	(470,000,000)
Arts, entertainment, and recreation	2,901,000,000	580,000,000
Accommodation and food services	6,436,000,000	1,287,000,000
Other services, except government	4,916,000,000	61,000,000
Government	25,673,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^ ^ The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

CONNECTICUT OVERVIEW:

- **2005 Total State GDP: $193.7 billion**
- **Projected GDP Loss from Pandemic: $10.1 billion***
- **Projected GDP Percentage Loss from Pandemic: 5.23%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 46**
- **Projected Impact on the Workforce: $5.0 billion in losses**
- **Projected Impact on Industries: $3.2 billion in losses**
- **Projected Trade Impact: $1.9 billion in losses**
- **Projected Number of Lives Lost: 29,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 1,039,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

Connecticut: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	340,000,000	9,000,000
Mining	108,000,000	3,000,000
Utilities	3,357,000,000	-
Construction	6,927,000,000	173,000,000
Manufacturing	21,973,000,000	549,000,000
Wholesale trade	10,449,000,000	261,000,000
Retail trade	11,458,000,000	286,000,000
Transportation and warehousing	3,015,000,000	505,000,000
Information	7,707,000,000	-
Finance and insurance^^	32,341,000,000	809,000,000
Real estate, rental, and leasing	26,906,000,000	-
Professional and technical services	14,261,000,000	-
Management of companies and enterprises	5,732,000,000	-
Administrative and waste services	5,104,000,000	-
Educational services^^	2,833,000,000	71,000,000
Health care and social assistance++	14,691,000,000	(551,000,000)
Arts, entertainment, and recreation	1,833,000,000	367,000,000
Accommodation and food services	3,527,000,000	705,000,000
Other services, except government	3,939,000,000	49,000,000
Government	17,244,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^ ^ The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

DELAWARE OVERVIEW:

- **2005 Total State GDP: $56.5 billion**
- **Projected GDP Loss from Pandemic: $3.0 billion***
- **Projected GDP Percentage Loss from Pandemic: 5.32%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 43**
- **Projected Impact on the Workforce: $1.4 billion in losses**
- **Projected Impact on Industries: $1.0 billion in losses**
- **Projected Trade Impact: $0.6 billion in losses**
- **Projected Number of Lives Lost: 6,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 250,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

Delaware: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	414,000,000	10,000,000
Mining	-	-
Utilities	942,000,000	-
Construction	2,201,000,000	55,000,000
Manufacturing	4,204,000,000	105,000,000
Wholesale trade	1,935,000,000	48,000,000
Retail trade	2,437,000,000	61,000,000
Transportation and warehousing	730,000,000	122,000,000
Information	1,218,000,000	-
Finance and insurance^^	19,174,000,000	479,000,000
Real estate, rental, and leasing	6,077,000,000	-
Professional and technical services	3,609,000,000	-
Management of companies and enterprises	2,219,000,000	-
Administrative and waste services	1,016,000,000	-
Educational services^^	263,000,000	7,000,000
Health care and social assistance++	2,951,000,000	(111,000,000)
Arts, entertainment, and recreation	374,000,000	75,000,000
Accommodation and food services	883,000,000	177,000,000
Other services, except government	977,000,000	12,000,000
Government	4,859,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^ ^ The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

DISTRICT OF COLUMBIA OVERVIEW:

- **2005 Total State GDP: $81.8 billion**
- **Projected GDP Loss from Pandemic: $3.8 billion***
- **Projected GDP Percentage Loss from Pandemic: 4.62%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 51**
- **Projected Impact on the Workforce: $2.1 billion in losses**
- **Projected Impact on Industries: $0.9 billion in losses**
- **Projected Trade Impact: $0.8 billion in losses**
- **Projected Number of Lives Lost: 5,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 162,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

District of Columbia: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	1,000,000	-
Mining	-	-
Utilities	763,000,000	-
Construction	1,076,000,000	27,000,000
Manufacturing	214,000,000	5,000,000
Wholesale trade	762,000,000	19,000,000
Retail trade	1,059,000,000	26,000,000
Transportation and warehousing	467,000,000	78,000,000
Information	5,320,000,000	-
Finance and insurance^^	3,918,000,000	98,000,000
Real estate, rental, and leasing	6,949,000,000	-
Professional and technical services	16,336,000,000	-
Management of companies and enterprises	757,000,000	-
Administrative and waste services	2,180,000,000	-
Educational services^^	2,081,000,000	52,000,000
Health care and social assistance++	3,655,000,000	(137,000,000)
Arts, entertainment, and recreation	501,000,000	100,000,000
Accommodation and food services	2,495,000,000	499,000,000
Other services, except government	5,143,000,000	64,000,000
Government	28,153,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^ ^ The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

FLORIDA OVERVIEW:

- **2005 Total State GDP: $673.3 billion**
- **Projected GDP Loss from Pandemic: $38.7 billion***
- **Projected GDP Percentage Loss from Pandemic: 5.74%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 14**
- **Projected Impact on the Workforce: $17.3 billion in losses**
- **Projected Impact on Industries: $14.7 billion in losses**
- **Projected Trade Impact: $6.7 billion in losses**
- **Projected Number of Lives Lost: 149,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 5,254,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

Florida: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	6,216,000,000	155,000,000
Mining	859,000,000	21,000,000
Utilities	10,665,000,000	-
Construction	47,723,000,000	1,193,000,000
Manufacturing	33,747,000,000	844,000,000
Wholesale trade	43,623,000,000	1,091,000,000
Retail trade	53,425,000,000	1,336,000,000
Transportation and warehousing	18,052,000,000	3,024,000,000
Information	28,977,000,000	-
Finance and insurance^^	49,717,000,000	1,243,000,000
Real estate, rental, and leasing	110,650,000,000	-
Professional and technical services	41,517,000,000	-
Management of companies and enterprises	9,009,000,000	-
Administrative and waste services	36,060,000,000	-
Educational services^^	4,487,000,000	112,000,000
Health care and social assistance++	48,379,000,000	(1,814,000,000)
Arts, entertainment, and recreation	11,052,000,000	2,210,000,000
Accommodation and food services	25,289,000,000	5,058,000,000
Other services, except government	18,133,000,000	227,000,000
Government	75,691,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^ ^ The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

GEORGIA OVERVIEW:

- **2005 Total State GDP: $363.8 billion**
- **Projected GDP Loss from Pandemic: $19.8 billion***
- **Projected GDP Percentage Loss from Pandemic: 5.46%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 31**
- **Projected Impact on the Workforce: $8.7 billion in losses**
- **Projected Impact on Industries: $7.6 billion in losses**
- **Projected Trade Impact: $3.6 billion in losses**
- **Projected Number of Lives Lost: 57,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 2,688,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

Georgia: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	3,343,000,000	84,000,000
Mining	1,147,000,000	29,000,000
Utilities	7,414,000,000	-
Construction	18,680,000,000	467,000,000
Manufacturing	46,076,000,000	1,152,000,000
Wholesale trade	28,420,000,000	711,000,000
Retail trade	24,328,000,000	608,000,000
Transportation and warehousing	13,323,000,000	2,232,000,000
Information	23,585,000,000	-
Finance and insurance^^	22,604,000,000	565,000,000
Real estate, rental, and leasing	41,528,000,000	-
Professional and technical services	22,878,000,000	-
Management of companies and enterprises	7,513,000,000	-
Administrative and waste services	12,682,000,000	-
Educational services^^	2,912,000,000	73,000,000
Health care and social assistance++	21,204,000,000	(795,000,000)
Arts, entertainment, and recreation	2,260,000,000	452,000,000
Accommodation and food services	9,573,000,000	1,915,000,000
Other services, except government	7,491,000,000	94,000,000
Government	46,879,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^ ^ The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

HAWAII OVERVIEW:

- **2005 Total State GDP: $54.0 billion**
- **Projected GDP Loss from Pandemic: $3.6 billion***
- **Projected GDP Percentage Loss from Pandemic: 6.60%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 2**
- **Projected Impact on the Workforce: $1.4 billion in losses**
- **Projected Impact on Industries: $1.6 billion in losses**
- **Projected Trade Impact: $0.5 billion in losses**
- **Projected Number of Lives Lost: 10,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 365,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

Hawaii: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	339,000,000	8,000,000
Mining	45,000,000	1,000,000
Utilities	899,000,000	-
Construction	3,157,000,000	79,000,000
Manufacturing	882,000,000	22,000,000
Wholesale trade	1,913,000,000	48,000,000
Retail trade	3,995,000,000	100,000,000
Transportation and warehousing	2,060,000,000	345,000,000
Information	1,389,000,000	-
Finance and insurance^^	2,459,000,000	61,000,000
Real estate, rental, and leasing	8,835,000,000	-
Professional and technical services	2,464,000,000	-
Management of companies and enterprises	637,000,000	-
Administrative and waste services	1,864,000,000	-
Educational services^^	541,000,000	14,000,000
Health care and social assistance++	3,650,000,000	(137,000,000)
Arts, entertainment, and recreation	656,000,000	131,000,000
Accommodation and food services	4,792,000,000	958,000,000
Other services, except government	1,420,000,000	18,000,000
Government	12,022,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^ ^ The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

IDAHO OVERVIEW:

- **2005 Total State GDP: $47.2 billion**
- **Projected GDP Loss from Pandemic: $2.6 billion***
- **Projected GDP Percentage Loss from Pandemic: 5.42%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 35**
- **Projected Impact on the Workforce: $1.1 billion in losses**
- **Projected Impact on Industries: $1.0 billion in losses**
- **Projected Trade Impact: $0.5 billion in losses**
- **Projected Number of Lives Lost: 9,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 425,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

Idaho: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	2,168,000,000	54,000,000
Mining	203,000,000	5,000,000
Utilities	783,000,000	-
Construction	2,811,000,000	70,000,000
Manufacturing	6,306,000,000	158,000,000
Wholesale trade	2,605,000,000	65,000,000
Retail trade	4,043,000,000	101,000,000
Transportation and warehousing	1,336,000,000	224,000,000
Information	1,180,000,000	-
Finance and insurance^^	2,404,000,000	60,000,000
Real estate, rental, and leasing	5,688,000,000	-
Professional and technical services	3,338,000,000	-
Management of companies and enterprises	685,000,000	-
Administrative and waste services	1,352,000,000	-
Educational services^^	262,000,000	7,000,000
Health care and social assistance++	3,113,000,000	(117,000,000)
Arts, entertainment, and recreation	381,000,000	76,000,000
Accommodation and food services	1,174,000,000	235,000,000
Other services, except government	959,000,000	12,000,000
Government	6,397,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^ ^ The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

ILLINOIS OVERVIEW:

- **2005 Total State GDP: $560.0 billion**
- **Projected GDP Loss from Pandemic: $31.3 billion***
- **Projected GDP Percentage Loss from Pandemic: 5.60%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 21**
- **Projected Impact on the Workforce: $14.1 billion in losses**
- **Projected Impact on Industries: $11.7 billion in losses**
- **Projected Trade Impact: $5.6 billion in losses**
- **Projected Number of Lives Lost: 99,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 3,787,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

Illinois: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	2,071,000,000	52,000,000
Mining	1,662,000,000	42,000,000
Utilities	12,240,000,000	-
Construction	26,010,000,000	650,000,000
Manufacturing	74,826,000,000	1,871,000,000
Wholesale trade	38,871,000,000	972,000,000
Retail trade	32,833,000,000	821,000,000
Transportation and warehousing	20,144,000,000	3,374,000,000
Information	20,858,000,000	-
Finance and insurance^^	53,747,000,000	1,344,000,000
Real estate, rental, and leasing	70,428,000,000	-
Professional and technical services	46,303,000,000	-
Management of companies and enterprises	13,990,000,000	-
Administrative and waste services	17,330,000,000	-
Educational services^^	5,677,000,000	142,000,000
Health care and social assistance++	36,492,000,000	(1,368,000,000)
Arts, entertainment, and recreation	5,209,000,000	1,042,000,000
Accommodation and food services	13,106,000,000	2,621,000,000
Other services, except government	13,568,000,000	170,000,000
Government	54,666,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^ ^ The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

INDIANA OVERVIEW:

- **2005 Total State GDP: $238.6 billion**
- **Projected GDP Loss from Pandemic: $14.0 billion***
- **Projected GDP Percentage Loss from Pandemic: 5.87%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 10**
- **Projected Impact on the Workforce: $6.0 billion in losses**
- **Projected Impact on Industries: $5.6 billion in losses**
- **Projected Trade Impact: $2.4 billion in losses**
- **Projected Number of Lives Lost: 49,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 1,863,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

Indiana: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	1,686,000,000	42,000,000
Mining	910,000,000	23,000,000
Utilities	5,214,000,000	-
Construction	10,549,000,000	264,000,000
Manufacturing	67,208,000,000	1,680,000,000
Wholesale trade	12,846,000,000	321,000,000
Retail trade	15,262,000,000	382,000,000
Transportation and warehousing	8,397,000,000	1,406,000,000
Information	5,412,000,000	-
Finance and insurance^^	13,964,000,000	349,000,000
Real estate, rental, and leasing	22,627,000,000	-
Professional and technical services	9,110,000,000	-
Management of companies and enterprises	2,602,000,000	-
Administrative and waste services	6,192,000,000	-
Educational services^^	1,773,000,000	44,000,000
Health care and social assistance++	17,422,000,000	(653,000,000)
Arts, entertainment, and recreation	3,215,000,000	643,000,000
Accommodation and food services	5,247,000,000	1,049,000,000
Other services, except government	5,658,000,000	71,000,000
Government	23,274,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^ ^ The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

IOWA OVERVIEW:

- **2005 Total State GDP: $113.6 billion**
- **Projected GDP Loss from Pandemic: $6.7 billion***
- **Projected GDP Percentage Loss from Pandemic: 5.90%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 9**
- **Projected Impact on the Workforce: $3.0 billion in losses**
- **Projected Impact on Industries: $2.6 billion in losses**
- **Projected Trade Impact: $1.1 billion in losses**
- **Projected Number of Lives Lost: 26,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 878,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

Iowa: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	3,707,000,000	93,000,000
Mining	207,000,000	5,000,000
Utilities	2,082,000,000	-
Construction	4,783,000,000	120,000,000
Manufacturing	24,710,000,000	618,000,000
Wholesale trade	6,599,000,000	165,000,000
Retail trade	7,156,000,000	179,000,000
Transportation and warehousing	4,187,000,000	701,000,000
Information	3,495,000,000	-
Finance and insurance^^	11,234,000,000	281,000,000
Real estate, rental, and leasing	10,385,000,000	-
Professional and technical services	3,472,000,000	-
Management of companies and enterprises	867,000,000	-
Administrative and waste services	2,238,000,000	-
Educational services^^	973,000,000	24,000,000
Health care and social assistance++	7,898,000,000	(296,000,000)
Arts, entertainment, and recreation	1,211,000,000	242,000,000
Accommodation and food services	2,308,000,000	462,000,000
Other services, except government	2,537,000,000	32,000,000
Government	13,503,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^ ^ The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

KANSAS OVERVIEW:

- **2005 Total State GDP: $105.6 billion**
- **Projected GDP Loss from Pandemic: $5.9 billion***
- **Projected GDP Percentage Loss from Pandemic: 5.58%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 22**
- **Projected Impact on the Workforce: $2.7 billion in losses**
- **Projected Impact on Industries: $2.1 billion in losses**
- **Projected Trade Impact: $1.1 billion in losses**
- **Projected Number of Lives Lost: 22,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 810,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

Kansas: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	2,816,000,000	70,000,000
Mining	2,286,000,000	57,000,000
Utilities	2,204,000,000	-
Construction	4,104,000,000	103,000,000
Manufacturing	15,536,000,000	388,000,000
Wholesale trade	6,587,000,000	165,000,000
Retail trade	7,181,000,000	180,000,000
Transportation and warehousing	3,962,000,000	664,000,000
Information	6,712,000,000	-
Finance and insurance^^	6,451,000,000	161,000,000
Real estate, rental, and leasing	9,605,000,000	-
Professional and technical services	5,785,000,000	-
Management of companies and enterprises	1,229,000,000	-
Administrative and waste services	3,062,000,000	-
Educational services^^	561,000,000	14,000,000
Health care and social assistance++	7,462,000,000	(280,000,000)
Arts, entertainment, and recreation	490,000,000	98,000,000
Accommodation and food services	2,501,000,000	500,000,000
Other services, except government	2,518,000,000	31,000,000
Government	14,523,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^ ^ The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

KENTUCKY OVERVIEW:

- **2005 Total State GDP: $140.5 billion**
- **Projected GDP Loss from Pandemic: $8.2 billion***
- **Projected GDP Percentage Loss from Pandemic: 5.87%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 10**
- **Projected Impact on the Workforce: $3.6 billion in losses**
- **Projected Impact on Industries: $3.2 billion in losses**
- **Projected Trade Impact: $1.4 billion in losses**
- **Projected Number of Lives Lost: 33,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 1,232,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

Kentucky: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	2,290,000,000	57,000,000
Mining	3,410,000,000	85,000,000
Utilities	2,223,000,000	-
Construction	5,998,000,000	150,000,000
Manufacturing	27,040,000,000	676,000,000
Wholesale trade	8,596,000,000	215,000,000
Retail trade	9,788,000,000	245,000,000
Transportation and warehousing	6,793,000,000	1,138,000,000
Information	3,755,000,000	-
Finance and insurance^^	7,112,000,000	178,000,000
Real estate, rental, and leasing	12,372,000,000	-
Professional and technical services	5,535,000,000	-
Management of companies and enterprises	1,588,000,000	-
Administrative and waste services	3,282,000,000	-
Educational services^^	793,000,000	20,000,000
Health care and social assistance++	11,413,000,000	(428,000,000)
Arts, entertainment, and recreation	869,000,000	174,000,000
Accommodation and food services	3,735,000,000	747,000,000
Other services, except government	3,218,000,000	40,000,000
Government	20,688,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^ ^ The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

LOUISIANA OVERVIEW:

- **2005 Total State GDP: $168.2 billion**
- **Projected GDP Loss from Pandemic: $10.1 billion***
- **Projected GDP Percentage Loss from Pandemic: 6.03%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 6**
- **Projected Impact on the Workforce: $4.2 billion in losses**
- **Projected Impact on Industries: $4.2 billion in losses**
- **Projected Trade Impact: $1.7 billion in losses**
- **Projected Number of Lives Lost: 35,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 1,339,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

Louisiana: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	1,302,000,000	33,000,000
Mining	20,489,000,000	512,000,000
Utilities	4,635,000,000	-
Construction	7,096,000,000	177,000,000
Manufacturing	27,575,000,000	689,000,000
Wholesale trade	8,210,000,000	205,000,000
Retail trade	11,403,000,000	285,000,000
Transportation and warehousing	5,969,000,000	1,000,000,000
Information	4,147,000,000	-
Finance and insurance^^	6,818,000,000	170,000,000
Real estate, rental, and leasing	13,219,000,000	-
Professional and technical services	6,839,000,000	-
Management of companies and enterprises	2,718,000,000	-
Administrative and waste services	3,913,000,000	-
Educational services^^	1,216,000,000	30,000,000
Health care and social assistance++	10,542,000,000	(395,000,000)
Arts, entertainment, and recreation	2,692,000,000	538,000,000
Accommodation and food services	4,861,000,000	972,000,000
Other services, except government	3,670,000,000	46,000,000
Government	20,890,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^ ^ The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

MAINE OVERVIEW:

- **2005 Total State GDP: $45.0 billion**
- **Projected GDP Loss from Pandemic: $2.4 billion***
- **Projected GDP Percentage Loss from Pandemic: 5.38%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 40**
- **Projected Impact on the Workforce: $1.2 billion in losses**
- **Projected Impact on Industries: $0.8 billion in losses**
- **Projected Trade Impact: $0.5 billion in losses**
- **Projected Number of Lives Lost: 11,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 391,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

Maine: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	656,000,000	16,000,000
Mining	8,000,000	-
Utilities	936,000,000	-
Construction	2,406,000,000	60,000,000
Manufacturing	4,971,000,000	124,000,000
Wholesale trade	2,474,000,000	62,000,000
Retail trade	4,037,000,000	101,000,000
Transportation and warehousing	1,016,000,000	170,000,000
Information	1,347,000,000	-
Finance and insurance^^	3,006,000,000	75,000,000
Real estate, rental, and leasing	6,062,000,000	-
Professional and technical services	2,110,000,000	-
Management of companies and enterprises	393,000,000	-
Administrative and waste services	1,017,000,000	-
Educational services^^	443,000,000	11,000,000
Health care and social assistance++	4,825,000,000	(181,000,000)
Arts, entertainment, and recreation	399,000,000	80,000,000
Accommodation and food services	1,417,000,000	283,000,000
Other services, except government	1,033,000,000	13,000,000
Government	6,415,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^ ^ The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

MARYLAND OVERVIEW:

- **2005 Total State GDP: $246.2 billion**
- **Projected GDP Loss from Pandemic: $12.5 billion***
- **Projected GDP Percentage Loss from Pandemic: 5.09%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 50**
- **Projected Impact on the Workforce: $6.1 billion in losses**
- **Projected Impact on Industries: $4.0 billion in losses**
- **Projected Trade Impact: $2.5 billion in losses**
- **Projected Number of Lives Lost: 41,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 1,656,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

Maryland: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	781,000,000	20,000,000
Mining	296,000,000	7,000,000
Utilities	6,033,000,000	-
Construction	15,018,000,000	375,000,000
Manufacturing	13,558,000,000	339,000,000
Wholesale trade	12,751,000,000	319,000,000
Retail trade	15,893,000,000	397,000,000
Transportation and warehousing	5,065,000,000	848,000,000
Information	10,072,000,000	-
Finance and insurance^^	17,497,000,000	437,000,000
Real estate, rental, and leasing	38,119,000,000	-
Professional and technical services	25,154,000,000	-
Management of companies and enterprises	1,518,000,000	-
Administrative and waste services	7,455,000,000	-
Educational services^^	3,005,000,000	75,000,000
Health care and social assistance++	18,032,000,000	(676,000,000)
Arts, entertainment, and recreation	1,842,000,000	368,000,000
Accommodation and food services	6,849,000,000	1,370,000,000
Other services, except government	6,383,000,000	80,000,000
Government	40,911,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^ ^ The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

MASSACHUSETTS OVERVIEW:

- **2005 Total State GDP: $325.9 billion**
- **Projected GDP Loss from Pandemic: $16.9 billion***
- **Projected GDP Percentage Loss from Pandemic: 5.20%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 47**
- **Projected Impact on the Workforce: $8.4 billion in losses**
- **Projected Impact on Industries: $5.3 billion in losses**
- **Projected Trade Impact: $3.3 billion in losses**
- **Projected Number of Lives Lost: 55,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 1,895,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

Massachusetts: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	906,000,000	23,000,000
Mining	193,000,000	5,000,000
Utilities	4,070,000,000	-
Construction	14,102,000,000	353,000,000
Manufacturing	32,824,000,000	821,000,000
Wholesale trade	18,325,000,000	458,000,000
Retail trade	17,906,000,000	448,000,000
Transportation and warehousing	5,420,000,000	908,000,000
Information	15,341,000,000	-
Finance and insurance^^	34,870,000,000	872,000,000
Real estate, rental, and leasing	47,576,000,000	-
Professional and technical services	35,202,000,000	-
Management of companies and enterprises	6,727,000,000	-
Administrative and waste services	9,195,000,000	-
Educational services^^	7,864,000,000	197,000,000
Health care and social assistance++	28,502,000,000	(1,069,000,000)
Arts, entertainment, and recreation	2,726,000,000	545,000,000
Accommodation and food services	8,167,000,000	1,633,000,000
Other services, except government	6,994,000,000	87,000,000
Government	29,007,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^ ^ The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

MICHIGAN OVERVIEW:

- **2005 Total State GDP: $376.2 billion**
- **Projected GDP Loss from Pandemic: $20.3 billion***
- **Projected GDP Percentage Loss from Pandemic: 5.39%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 39**
- **Projected Impact on the Workforce: $9.6 billion in losses**
- **Projected Impact on Industries: $7.0 billion in losses**
- **Projected Trade Impact: $3.8 billion in losses**
- **Projected Number of Lives Lost: 82,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 3,003,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

Michigan: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	2,038,000,000	51,000,000
Mining	1,013,000,000	25,000,000
Utilities	7,758,000,000	-
Construction	16,231,000,000	406,000,000
Manufacturing	69,186,000,000	1,730,000,000
Wholesale trade	22,340,000,000	559,000,000
Retail trade	25,335,000,000	633,000,000
Transportation and warehousing	9,567,000,000	1,602,000,000
Information	10,847,000,000	-
Finance and insurance^^	22,733,000,000	568,000,000
Real estate, rental, and leasing	45,435,000,000	-
Professional and technical services	29,515,000,000	-
Management of companies and enterprises	8,647,000,000	-
Administrative and waste services	13,305,000,000	-
Educational services^^	2,235,000,000	56,000,000
Health care and social assistance++	28,381,000,000	(1,064,000,000)
Arts, entertainment, and recreation	3,385,000,000	677,000,000
Accommodation and food services	8,251,000,000	1,650,000,000
Other services, except government	8,817,000,000	110,000,000
Government	41,225,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^ ^ The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

MINNESOTA OVERVIEW:

- **2005 Total State GDP: $234.6 billion**
- **Projected GDP Loss from Pandemic: $12.8 billion***
- **Projected GDP Percentage Loss from Pandemic: 5.44%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 34**
- **Projected Impact on the Workforce: $5.9 billion in losses**
- **Projected Impact on Industries: $4.6 billion in losses**
- **Projected Trade Impact: $2.3 billion in losses**
- **Projected Number of Lives Lost: 39,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 1,526,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

Minnesota: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	3,422,000,000	86,000,000
Mining	896,000,000	22,000,000
Utilities	3,183,000,000	-
Construction	11,104,000,000	278,000,000
Manufacturing	32,036,000,000	801,000,000
Wholesale trade	16,104,000,000	403,000,000
Retail trade	14,398,000,000	360,000,000
Transportation and warehousing	7,412,000,000	1,242,000,000
Information	8,693,000,000	-
Finance and insurance^^	23,812,000,000	595,000,000
Real estate, rental, and leasing	28,956,000,000	-
Professional and technical services	13,677,000,000	-
Management of companies and enterprises	8,157,000,000	-
Administrative and waste services	5,493,000,000	-
Educational services^^	1,872,000,000	47,000,000
Health care and social assistance++	18,802,000,000	(705,000,000)
Arts, entertainment, and recreation	1,820,000,000	364,000,000
Accommodation and food services	5,156,000,000	1,031,000,000
Other services, except government	5,608,000,000	70,000,000
Government	23,951,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^ ^ The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

MISSISSIPPI OVERVIEW:

- **2005 Total State GDP: $81.3 billion**
- **Projected GDP Loss from Pandemic: $4.9 billion***
- **Projected GDP Percentage Loss from Pandemic: 5.99%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 7**
- **Projected Impact on the Workforce: $2.0 billion in losses**
- **Projected Impact on Industries: $2.0 billion in losses**
- **Projected Trade Impact: $0.8 billion in losses**
- **Projected Number of Lives Lost: 22,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 864,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

Mississippi: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	2,085,000,000	52,000,000
Mining	2,042,000,000	51,000,000
Utilities	2,247,000,000	-
Construction	3,536,000,000	88,000,000
Manufacturing	12,647,000,000	316,000,000
Wholesale trade	4,170,000,000	104,000,000
Retail trade	6,772,000,000	169,000,000
Transportation and warehousing	2,916,000,000	488,000,000
Information	2,073,000,000	-
Finance and insurance^^	3,662,000,000	92,000,000
Real estate, rental, and leasing	7,174,000,000	-
Professional and technical services	2,697,000,000	-
Management of companies and enterprises	828,000,000	-
Administrative and waste services	1,608,000,000	-
Educational services^^	463,000,000	12,000,000
Health care and social assistance++	5,721,000,000	(215,000,000)
Arts, entertainment, and recreation	842,000,000	168,000,000
Accommodation and food services	3,358,000,000	672,000,000
Other services, except government	2,255,000,000	28,000,000
Government	14,194,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^ ^ The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

MISSOURI OVERVIEW:

- **2005 Total State GDP: $216.1 billion**
- **Projected GDP Loss from Pandemic: $12.4 billion***
- **Projected GDP Percentage Loss from Pandemic: 5.74%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 14**
- **Projected Impact on the Workforce: $5.5 billion in losses**
- **Projected Impact on Industries: $4.7 billion in losses**
- **Projected Trade Impact: $2.2 billion in losses**
- **Projected Number of Lives Lost: 47,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 1,717,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

Missouri: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	2,011,000,000	50,000,000
Mining	1,076,000,000	27,000,000
Utilities	3,493,000,000	-
Construction	10,184,000,000	255,000,000
Manufacturing	32,348,000,000	809,000,000
Wholesale trade	13,979,000,000	349,000,000
Retail trade	14,997,000,000	375,000,000
Transportation and warehousing	7,837,000,000	1,313,000,000
Information	10,124,000,000	-
Finance and insurance^^	13,378,000,000	334,000,000
Real estate, rental, and leasing	21,958,000,000	-
Professional and technical services	12,500,000,000	-
Management of companies and enterprises	8,006,000,000	-
Administrative and waste services	5,869,000,000	-
Educational services^^	2,590,000,000	65,000,000
Health care and social assistance++	16,270,000,000	(610,000,000)
Arts, entertainment, and recreation	2,892,000,000	578,000,000
Accommodation and food services	5,739,000,000	1,148,000,000
Other services, except government	5,438,000,000	68,000,000
Government	25,377,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^^The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

MONTANA OVERVIEW:

- **2005 Total State GDP: $29.9 billion**
- **Projected GDP Loss from Pandemic: $1.8 billion***
- **Projected GDP Percentage Loss from Pandemic: 5.86%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 12**
- **Projected Impact on the Workforce: $0.8 billion in losses**
- **Projected Impact on Industries: $0.7 billion in losses**
- **Projected Trade Impact: $0.3 billion in losses**
- **Projected Number of Lives Lost: 7,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 277,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

Montana: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	1,232,000,000	31,000,000
Mining	1,342,000,000	34,000,000
Utilities	1,055,000,000	-
Construction	1,930,000,000	48,000,000
Manufacturing	1,452,000,000	36,000,000
Wholesale trade	1,631,000,000	41,000,000
Retail trade	2,199,000,000	55,000,000
Transportation and warehousing	1,333,000,000	223,000,000
Information	901,000,000	-
Finance and insurance^^	1,493,000,000	37,000,000
Real estate, rental, and leasing	3,448,000,000	-
Professional and technical services	1,424,000,000	-
Management of companies and enterprises	63,000,000	-
Administrative and waste services	606,000,000	-
Educational services^^	119,000,000	3,000,000
Health care and social assistance++	2,674,000,000	(100,000,000)
Arts, entertainment, and recreation	397,000,000	79,000,000
Accommodation and food services	994,000,000	199,000,000
Other services, except government	770,000,000	10,000,000
Government	4,823,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^ ^ The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

NEBRASKA OVERVIEW:

- **2005 Total State GDP: $70.7 billion**
- **Projected GDP Loss from Pandemic: $4.4 billion***
- **Projected GDP Percentage Loss from Pandemic: 6.22%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 5**
- **Projected Impact on the Workforce: $1.8 billion in losses**
- **Projected Impact on Industries: $1.9 billion in losses**
- **Projected Trade Impact: $0.7 billion in losses**
- **Projected Number of Lives Lost: 14,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 520,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

Nebraska: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	3,122,000,000	78,000,000
Mining	139,000,000	3,000,000
Utilities	1,343,000,000	-
Construction	3,021,000,000	76,000,000
Manufacturing	7,672,000,000	192,000,000
Wholesale trade	4,230,000,000	106,000,000
Retail trade	4,552,000,000	114,000,000
Transportation and warehousing	5,737,000,000	961,000,000
Information	2,571,000,000	-
Finance and insurance^^	5,916,000,000	148,000,000
Real estate, rental, and leasing	6,352,000,000	-
Professional and technical services	3,237,000,000	-
Management of companies and enterprises	1,147,000,000	-
Administrative and waste services	1,758,000,000	-
Educational services^^	588,000,000	15,000,000
Health care and social assistance++	5,214,000,000	(196,000,000)
Arts, entertainment, and recreation	395,000,000	79,000,000
Accommodation and food services	1,480,000,000	296,000,000
Other services, except government	1,698,000,000	21,000,000
Government	10,503,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^^The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

NEVADA OVERVIEW:

- **2005 Total State GDP: $111.3 billion**
- **Projected GDP Loss from Pandemic: $9.0 billion***
- **Projected GDP Percentage Loss from Pandemic: 8.08%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 1**
- **Projected Impact on the Workforce: $2.6 billion in losses**
- **Projected Impact on Industries: $5.3 billion in losses**
- **Projected Trade Impact: $1.1 billion in losses**
- **Projected Number of Lives Lost: 13,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 720,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

Nevada: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	233,000,000	6,000,000
Mining	1,757,000,000	44,000,000
Utilities	1,808,000,000	-
Construction	10,639,000,000	266,000,000
Manufacturing	4,102,000,000	103,000,000
Wholesale trade	4,313,000,000	108,000,000
Retail trade	8,382,000,000	210,000,000
Transportation and warehousing	3,383,000,000	567,000,000
Information	2,509,000,000	-
Finance and insurance^^	10,308,000,000	258,000,000
Real estate, rental, and leasing	14,184,000,000	-
Professional and technical services	5,511,000,000	-
Management of companies and enterprises	2,726,000,000	-
Administrative and waste services	3,504,000,000	-
Educational services^^	260,000,000	7,000,000
Health care and social assistance++	5,473,000,000	(205,000,000)
Arts, entertainment, and recreation	3,143,000,000	629,000,000
Accommodation and food services	16,589,000,000	3,318,000,000
Other services, except government	1,912,000,000	24,000,000
Government	10,607,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^ ^ The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

NEW HAMPSHIRE OVERVIEW:

- **2005 Total State GDP: $55.1 billion**
- **Projected GDP Loss from Pandemic: $2.9 billion***
- **Projected GDP Percentage Loss from Pandemic: 5.30%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 44**
- **Projected Impact on the Workforce: $1.4 billion in losses**
- **Projected Impact on Industries: $1.0 billion in losses**
- **Projected Trade Impact: $0.5 billion in losses**
- **Projected Number of Lives Lost: 10,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 389,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

New Hampshire: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	241,000,000	6,000,000
Mining	55,000,000	1,000,000
Utilities	1,791,000,000	-
Construction	2,754,000,000	69,000,000
Manufacturing	6,599,000,000	165,000,000
Wholesale trade	3,523,000,000	88,000,000
Retail trade	4,658,000,000	116,000,000
Transportation and warehousing	885,000,000	148,000,000
Information	1,942,000,000	-
Finance and insurance^^	4,785,000,000	120,000,000
Real estate, rental, and leasing	8,322,000,000	-
Professional and technical services	3,349,000,000	-
Management of companies and enterprises	781,000,000	-
Administrative and waste services	1,430,000,000	-
Educational services^^	960,000,000	24,000,000
Health care and social assistance++	4,547,000,000	(171,000,000)
Arts, entertainment, and recreation	461,000,000	92,000,000
Accommodation and food services	1,640,000,000	328,000,000
Other services, except government	1,308,000,000	16,000,000
Government	5,030,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^^The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

NEW JERSEY OVERVIEW:

- **2005 Total State GDP: $431.1 billion**
- **Projected GDP Loss from Pandemic: $23.4 billion***
- **Projected GDP Percentage Loss from Pandemic: 5.42%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 35**
- **Projected Impact on the Workforce: $11.0 billion in losses**
- **Projected Impact on Industries: $8.1 billion in losses**
- **Projected Trade Impact: $4.3 billion in losses**
- **Projected Number of Lives Lost: 71,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 2,585,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

New Jersey: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	623,000,000	16,000,000
Mining	262,000,000	7,000,000
Utilities	7,917,000,000	-
Construction	17,850,000,000	446,000,000
Manufacturing	41,034,000,000	1,026,000,000
Wholesale trade	34,985,000,000	875,000,000
Retail trade	27,766,000,000	694,000,000
Transportation and warehousing	12,836,000,000	2,150,000,000
Information	20,268,000,000	-
Finance and insurance^^	36,808,000,000	920,000,000
Real estate, rental, and leasing	69,515,000,000	-
Professional and technical services	35,770,000,000	-
Management of companies and enterprises	9,242,000,000	-
Administrative and waste services	13,804,000,000	-
Educational services^^	3,694,000,000	92,000,000
Health care and social assistance++	30,661,000,000	(1,150,000,000)
Arts, entertainment, and recreation	3,805,000,000	761,000,000
Accommodation and food services	10,888,000,000	2,178,000,000
Other services, except government	9,125,000,000	114,000,000
Government	44,228,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^ ^ The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

NEW MEXICO OVERVIEW:

- **2005 Total State GDP: $68.9 billion**
- **Projected GDP Loss from Pandemic: $3.7 billion***
- **Projected GDP Percentage Loss from Pandemic: 5.42%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 35**
- **Projected Impact on the Workforce: $1.7 billion in losses**
- **Projected Impact on Industries: $1.3 billion in losses**
- **Projected Trade Impact: $0.7 billion in losses**
- **Projected Number of Lives Lost: 13,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 571,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

New Mexico: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	1,123,000,000	28,000,000
Mining	8,781,000,000	220,000,000
Utilities	1,473,000,000	-
Construction	3,133,000,000	78,000,000
Manufacturing	6,487,000,000	162,000,000
Wholesale trade	2,372,000,000	59,000,000
Retail trade	4,654,000,000	116,000,000
Transportation and warehousing	1,838,000,000	308,000,000
Information	1,802,000,000	-
Finance and insurance^^	2,441,000,000	61,000,000
Real estate, rental, and leasing	6,580,000,000	-
Professional and technical services	4,503,000,000	-
Management of companies and enterprises	327,000,000	-
Administrative and waste services	1,892,000,000	-
Educational services^^	320,000,000	8,000,000
Health care and social assistance++	4,458,000,000	(167,000,000)
Arts, entertainment, and recreation	420,000,000	84,000,000
Accommodation and food services	1,962,000,000	392,000,000
Other services, except government	1,432,000,000	18,000,000
Government	12,872,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^ ^ The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

NEW YORK OVERVIEW:

- **2005 Total State GDP: $957.9 billion**
- **Projected GDP Loss from Pandemic: $49.8 billion***
- **Projected GDP Percentage Loss from Pandemic: 5.20%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 47**
- **Projected Impact on the Workforce: $24.5 billion in losses**
- **Projected Impact on Industries: $15.8 billion in losses**
- **Projected Trade Impact: $9.6 billion in losses**
- **Projected Number of Lives Lost: 157,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 5,706,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

New York: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	2,099,000,000	52,000,000
Mining	811,000,000	20,000,000
Utilities	17,026,000,000	-
Construction	30,344,000,000	759,000,000
Manufacturing	60,992,000,000	1,525,000,000
Wholesale trade	49,524,000,000	1,238,000,000
Retail trade	52,560,000,000	1,314,000,000
Transportation and warehousing	17,238,000,000	2,887,000,000
Information	74,306,000,000	-
Finance and insurance^^	147,154,000,000	3,679,000,000
Real estate, rental, and leasing	136,510,000,000	-
Professional and technical services	79,946,000,000	-
Management of companies and enterprises	26,955,000,000	-
Administrative and waste services	25,479,000,000	-
Educational services^^	14,471,000,000	362,000,000
Health care and social assistance++	73,547,000,000	(2,758,000,000)
Arts, entertainment, and recreation	10,407,000,000	2,081,000,000
Accommodation and food services	22,144,000,000	4,429,000,000
Other services, except government	20,420,000,000	255,000,000
Government	95,941,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^ ^ The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

NORTH CAROLINA OVERVIEW:

- **2005 Total State GDP: $346.6 billion**
- **Projected GDP Loss from Pandemic: $19.0 billion***
- **Projected GDP Percentage Loss from Pandemic: 5.48%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 30**
- **Projected Impact on the Workforce: $8.6 billion in losses**
- **Projected Impact on Industries: $6.9 billion in losses**
- **Projected Trade Impact: $3.5 billion in losses**
- **Projected Number of Lives Lost: 62,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 2,556,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

North Carolina: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	3,725,000,000	93,000,000
Mining	559,000,000	14,000,000
Utilities	6,208,000,000	-
Construction	16,549,000,000	414,000,000
Manufacturing	67,233,000,000	1,681,000,000
Wholesale trade	19,387,000,000	485,000,000
Retail trade	23,053,000,000	576,000,000
Transportation and warehousing	8,514,000,000	1,426,000,000
Information	12,573,000,000	-
Finance and insurance^^	36,286,000,000	907,000,000
Real estate, rental, and leasing	32,429,000,000	-
Professional and technical services	16,514,000,000	-
Management of companies and enterprises	7,477,000,000	-
Administrative and waste services	9,089,000,000	-
Educational services^^	2,611,000,000	65,000,000
Health care and social assistance++	21,902,000,000	(821,000,000)
Arts, entertainment, and recreation	2,341,000,000	468,000,000
Accommodation and food services	8,134,000,000	1,627,000,000
Other services, except government	7,116,000,000	89,000,000
Government	44,941,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^ ^ The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

NORTH DAKOTA OVERVIEW:

- **2005 Total State GDP: $24.4 billion**
- **Projected GDP Loss from Pandemic: $1.4 billion***
- **Projected GDP Percentage Loss from Pandemic: 5.71%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 16**
- **Projected Impact on the Workforce: $0.6 billion in losses**
- **Projected Impact on Industries: $0.5 billion in losses**
- **Projected Trade Impact: $0.2 billion in losses**
- **Projected Number of Lives Lost: 6,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 186,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

North Dakota: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	1,472,000,000	37,000,000
Mining	812,000,000	20,000,000
Utilities	661,000,000	-
Construction	1,144,000,000	29,000,000
Manufacturing	2,205,000,000	55,000,000
Wholesale trade	1,982,000,000	50,000,000
Retail trade	1,795,000,000	45,000,000
Transportation and warehousing	992,000,000	166,000,000
Information	925,000,000	-
Finance and insurance^^	1,463,000,000	37,000,000
Real estate, rental, and leasing	2,143,000,000	-
Professional and technical services	827,000,000	-
Management of companies and enterprises	199,000,000	-
Administrative and waste services	412,000,000	-
Educational services^^	107,000,000	3,000,000
Health care and social assistance++	2,194,000,000	(82,000,000)
Arts, entertainment, and recreation	123,000,000	25,000,000
Accommodation and food services	600,000,000	120,000,000
Other services, except government	591,000,000	7,000,000
Government	3,751,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^ ^ The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

OHIO OVERVIEW:

- **2005 Total State GDP: $440.9 billion**
- **Projected GDP Loss from Pandemic: $24.4 billion***
- **Projected GDP Percentage Loss from Pandemic: 5.54%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 26**
- **Projected Impact on the Workforce: $11.4 billion in losses**
- **Projected Impact on Industries: $8.6 billion in losses**
- **Projected Trade Impact: $4.4 billion in losses**
- **Projected Number of Lives Lost: 96,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 3,396,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

Ohio: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	1,922,000,000	48,000,000
Mining	2,061,000,000	52,000,000
Utilities	9,717,000,000	-
Construction	17,535,000,000	438,000,000
Manufacturing	85,279,000,000	2,132,000,000
Wholesale trade	26,682,000,000	667,000,000
Retail trade	30,647,000,000	766,000,000
Transportation and warehousing	13,530,000,000	2,266,000,000
Information	12,410,000,000	-
Finance and insurance^^	32,957,000,000	824,000,000
Real estate, rental, and leasing	47,594,000,000	-
Professional and technical services	23,516,000,000	-
Management of companies and enterprises	12,890,000,000	-
Administrative and waste services	12,324,000,000	-
Educational services^^	3,226,000,000	81,000,000
Health care and social assistance++	35,326,000,000	(1,325,000,000)
Arts, entertainment, and recreation	3,193,000,000	639,000,000
Accommodation and food services	9,831,000,000	1,966,000,000
Other services, except government	11,155,000,000	139,000,000
Government	49,128,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^ ^ The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

OKLAHOMA OVERVIEW:

- **2005 Total State GDP: $121.5 billion**
- **Projected GDP Loss from Pandemic: $6.7 billion***
- **Projected GDP Percentage Loss from Pandemic: 5.55%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 25**
- **Projected Impact on the Workforce: $3.1 billion in losses**
- **Projected Impact on Industries: $2.4 billion in losses**
- **Projected Trade Impact: $1.2 billion in losses**
- **Projected Number of Lives Lost: 28,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 1,046,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

Oklahoma: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	2,015,000,000	50,000,000
Mining	15,764,000,000	394,000,000
Utilities	3,169,000,000	-
Construction	4,735,000,000	118,000,000
Manufacturing	11,822,000,000	296,000,000
Wholesale trade	6,006,000,000	150,000,000
Retail trade	8,633,000,000	216,000,000
Transportation and warehousing	3,954,000,000	662,000,000
Information	4,306,000,000	-
Finance and insurance^^	5,791,000,000	145,000,000
Real estate, rental, and leasing	10,749,000,000	-
Professional and technical services	5,154,000,000	-
Management of companies and enterprises	1,580,000,000	-
Administrative and waste services	3,438,000,000	-
Educational services^^	632,000,000	16,000,000
Health care and social assistance++	8,188,000,000	(307,000,000)
Arts, entertainment, and recreation	640,000,000	128,000,000
Accommodation and food services	2,743,000,000	549,000,000
Other services, except government	2,831,000,000	35,000,000
Government	19,339,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^ ^ The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

OREGON OVERVIEW:

- **2005 Total State GDP: $144.3 billion**
- **Projected GDP Loss from Pandemic: $7.9 billion***
- **Projected GDP Percentage Loss from Pandemic: 5.46%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 31**
- **Projected Impact on the Workforce: $3.6 billion in losses**
- **Projected Impact on Industries: $2.8 billion in losses**
- **Projected Trade Impact: $1.4 billion in losses**
- **Projected Number of Lives Lost: 28,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 1,082,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

Oregon: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	3,707,000,000	93,000,000
Mining	187,000,000	5,000,000
Utilities	1,857,000,000	-
Construction	6,233,000,000	156,000,000
Manufacturing	27,175,000,000	679,000,000
Wholesale trade	9,529,000,000	238,000,000
Retail trade	8,189,000,000	205,000,000
Transportation and warehousing	4,136,000,000	693,000,000
Information	4,476,000,000	-
Finance and insurance^^	8,019,000,000	200,000,000
Real estate, rental, and leasing	19,005,000,000	-
Professional and technical services	6,793,000,000	-
Management of companies and enterprises	2,760,000,000	-
Administrative and waste services	3,747,000,000	-
Educational services^^	936,000,000	23,000,000
Health care and social assistance++	10,571,000,000	(396,000,000)
Arts, entertainment, and recreation	904,000,000	181,000,000
Accommodation and food services	3,550,000,000	710,000,000
Other services, except government	3,090,000,000	39,000,000
Government	19,413,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^ ^ The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

PENNSYLVANIA OVERVIEW:

- **2005 Total State GDP: $489.0 billion**
- **Projected GDP Loss from Pandemic: $26.9 billion***
- **Projected GDP Percentage Loss from Pandemic: 5.50%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 28**
- **Projected Impact on the Workforce: $12.9 billion in losses**
- **Projected Impact on Industries: $9.1 billion in losses**
- **Projected Trade Impact: $4.9 billion in losses**
- **Projected Number of Lives Lost: 113,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 3,675,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

Pennsylvania: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	2,837,000,000	71,000,000
Mining	3,653,000,000	91,000,000
Utilities	12,902,000,000	-
Construction	21,981,000,000	550,000,000
Manufacturing	73,944,000,000	1,849,000,000
Wholesale trade	28,970,000,000	724,000,000
Retail trade	31,951,000,000	799,000,000
Transportation and warehousing	15,358,000,000	2,572,000,000
Information	17,361,000,000	-
Finance and insurance^^	37,861,000,000	947,000,000
Real estate, rental, and leasing	55,748,000,000	-
Professional and technical services	34,800,000,000	-
Management of companies and enterprises	9,281,000,000	-
Administrative and waste services	13,025,000,000	-
Educational services^^	9,240,000,000	231,000,000
Health care and social assistance++	45,377,000,000	(1,702,000,000)
Arts, entertainment, and recreation	3,570,000,000	714,000,000
Accommodation and food services	10,673,000,000	2,135,000,000
Other services, except government	13,142,000,000	164,000,000
Government	47,353,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^ ^ The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

RHODE ISLAND OVERVIEW:

- **2005 Total State GDP: $43.8 billion**
- **Projected GDP Loss from Pandemic: $2.3 billion***
- **Projected GDP Percentage Loss from Pandemic: 5.29%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 45**
- **Projected Impact on the Workforce: $1.1 billion in losses**
- **Projected Impact on Industries: $0.7 billion in losses**
- **Projected Trade Impact: $0.4 billion in losses**
- **Projected Number of Lives Lost: 9,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 318,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

Rhode Island: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	99,000,000	2,000,000
Mining	26,000,000	1,000,000
Utilities	784,000,000	-
Construction	2,153,000,000	54,000,000
Manufacturing	4,306,000,000	108,000,000
Wholesale trade	2,259,000,000	56,000,000
Retail trade	2,783,000,000	70,000,000
Transportation and warehousing	637,000,000	107,000,000
Information	1,756,000,000	-
Finance and insurance^^	5,614,000,000	140,000,000
Real estate, rental, and leasing	6,266,000,000	-
Professional and technical services	2,256,000,000	-
Management of companies and enterprises	889,000,000	-
Administrative and waste services	1,066,000,000	-
Educational services^^	954,000,000	24,000,000
Health care and social assistance++	4,103,000,000	(154,000,000)
Arts, entertainment, and recreation	382,000,000	76,000,000
Accommodation and food services	1,242,000,000	248,000,000
Other services, except government	973,000,000	12,000,000
Government	5,239,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^ ^ The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

SOUTH CAROLINA OVERVIEW:

- **2005 Total State GDP: $140.0 billion**
- **Projected GDP Loss from Pandemic: $7.9 billion***
- **Projected GDP Percentage Loss from Pandemic: 5.62%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 20**
- **Projected Impact on the Workforce: $3.5 billion in losses**
- **Projected Impact on Industries: $3.0 billion in losses**
- **Projected Trade Impact: $1.4 billion in losses**
- **Projected Number of Lives Lost: 31,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 1,256,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

South Carolina: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	1,162,000,000	29,000,000
Mining	218,000,000	5,000,000
Utilities	3,563,000,000	-
Construction	7,997,000,000	200,000,000
Manufacturing	24,911,000,000	623,000,000
Wholesale trade	8,261,000,000	207,000,000
Retail trade	11,360,000,000	284,000,000
Transportation and warehousing	3,432,000,000	575,000,000
Information	3,881,000,000	-
Finance and insurance^^	7,223,000,000	181,000,000
Real estate, rental, and leasing	15,094,000,000	-
Professional and technical services	6,119,000,000	-
Management of companies and enterprises	744,000,000	-
Administrative and waste services	5,411,000,000	-
Educational services^^	740,000,000	19,000,000
Health care and social assistance++	8,287,000,000	(311,000,000)
Arts, entertainment, and recreation	1,040,000,000	208,000,000
Accommodation and food services	4,755,000,000	951,000,000
Other services, except government	3,503,000,000	44,000,000
Government	22,318,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^ ^ The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

SOUTH DAKOTA OVERVIEW:

- **2005 Total State GDP: $30.9 billion**
- **Projected GDP Loss from Pandemic: $1.8 billion***
- **Projected GDP Percentage Loss from Pandemic: 5.71%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 16**
- **Projected Impact on the Workforce: $0.8 billion in losses**
- **Projected Impact on Industries: $0.7 billion in losses**
- **Projected Trade Impact: $0.3 billion in losses**
- **Projected Number of Lives Lost: 6,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 229,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

South Dakota: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	1,808,000,000	45,000,000
Mining	138,000,000	3,000,000
Utilities	564,000,000	-
Construction	1,267,000,000	32,000,000
Manufacturing	3,068,000,000	77,000,000
Wholesale trade	1,713,000,000	43,000,000
Retail trade	2,206,000,000	55,000,000
Transportation and warehousing	819,000,000	137,000,000
Information	886,000,000	-
Finance and insurance^^	5,366,000,000	134,000,000
Real estate, rental, and leasing	2,813,000,000	-
Professional and technical services	785,000,000	-
Management of companies and enterprises	222,000,000	-
Administrative and waste services	465,000,000	-
Educational services^^	222,000,000	6,000,000
Health care and social assistance++	2,699,000,000	(101,000,000)
Arts, entertainment, and recreation	298,000,000	60,000,000
Accommodation and food services	820,000,000	164,000,000
Other services, except government	752,000,000	9,000,000
Government	4,007,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^ ^ The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

TENNESSEE OVERVIEW:

- **2005 Total State GDP: $229.2 billion**
- **Projected GDP Loss from Pandemic: $13.7 billion***
- **Projected GDP Percentage Loss from Pandemic: 5.98%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 8**
- **Projected Impact on the Workforce: $5.7 billion in losses**
- **Projected Impact on Industries: $5.7 billion in losses**
- **Projected Trade Impact: $2.3 billion in losses**
- **Projected Number of Lives Lost: 45,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 1,767,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

Tennessee: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	1,384,000,000	35,000,000
Mining	544,000,000	14,000,000
Utilities	888,000,000	-
Construction	9,635,000,000	241,000,000
Manufacturing	40,917,000,000	1,023,000,000
Wholesale trade	15,350,000,000	384,000,000
Retail trade	18,887,000,000	472,000,000
Transportation and warehousing	11,719,000,000	1,963,000,000
Information	7,687,000,000	-
Finance and insurance^^	13,210,000,000	330,000,000
Real estate, rental, and leasing	23,131,000,000	-
Professional and technical services	11,850,000,000	-
Management of companies and enterprises	2,589,000,000	-
Administrative and waste services	9,115,000,000	-
Educational services^^	2,199,000,000	55,000,000
Health care and social assistance++	19,649,000,000	(737,000,000)
Arts, entertainment, and recreation	2,131,000,000	426,000,000
Accommodation and food services	7,196,000,000	1,439,000,000
Other services, except government	6,289,000,000	79,000,000
Government	24,845,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^ ^ The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

TEXAS OVERVIEW:

- **2005 Total State GDP: $989.4 billion**
- **Projected GDP Loss from Pandemic: $55.1 billion***
- **Projected GDP Percentage Loss from Pandemic: 5.57%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 23**
- **Projected Impact on the Workforce: $23.7 billion in losses**
- **Projected Impact on Industries: $21.6 billion in losses**
- **Projected Trade Impact: $9.9 billion in losses**
- **Projected Number of Lives Lost: 146,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 6,789,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

Texas: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	8,176,000,000	204,000,000
Mining	87,341,000,000	2,184,000,000
Utilities	30,141,000,000	-
Construction	50,633,000,000	1,266,000,000
Manufacturing	122,003,000,000	3,050,000,000
Wholesale trade	65,515,000,000	1,638,000,000
Retail trade	65,133,000,000	1,628,000,000
Transportation and warehousing	35,216,000,000	5,899,000,000
Information	40,809,000,000	-
Finance and insurance^^	60,905,000,000	1,523,000,000
Real estate, rental, and leasing	90,678,000,000	-
Professional and technical services	63,164,000,000	-
Management of companies and enterprises	17,163,000,000	-
Administrative and waste services	29,343,000,000	-
Educational services^^	5,188,000,000	130,000,000
Health care and social assistance++	57,990,000,000	(2,175,000,000)
Arts, entertainment, and recreation	5,833,000,000	1,167,000,000
Accommodation and food services	24,492,000,000	4,898,000,000
Other services, except government	21,866,000,000	273,000,000
Government	107,854,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^ ^ The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

UTAH OVERVIEW:

- **2005 Total State GDP: $90.8 billion**
- **Projected GDP Loss from Pandemic: $5.0 billion***
- **Projected GDP Percentage Loss from Pandemic: 5.49%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 29**
- **Projected Impact on the Workforce: $2.1 billion in losses**
- **Projected Impact on Industries: $2.0 billion in losses**
- **Projected Trade Impact: $0.9 billion in losses**
- **Projected Number of Lives Lost: 14,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 737,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

Utah: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	551,000,000	14,000,000
Mining	2,377,000,000	59,000,000
Utilities	1,163,000,000	-
Construction	5,292,000,000	132,000,000
Manufacturing	9,822,000,000	246,000,000
Wholesale trade	4,599,000,000	115,000,000
Retail trade	6,762,000,000	169,000,000
Transportation and warehousing	3,362,000,000	563,000,000
Information	3,654,000,000	-
Finance and insurance^^	8,161,000,000	204,000,000
Real estate, rental, and leasing	10,239,000,000	-
Professional and technical services	6,163,000,000	-
Management of companies and enterprises	1,608,000,000	-
Administrative and waste services	2,485,000,000	-
Educational services^^	929,000,000	23,000,000
Health care and social assistance++	5,091,000,000	(191,000,000)
Arts, entertainment, and recreation	747,000,000	149,000,000
Accommodation and food services	2,271,000,000	454,000,000
Other services, except government	2,940,000,000	37,000,000
Government	12,563,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^ ^ The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

VERMONT OVERVIEW:

- **2005 Total State GDP: $23.1 billion**
- **Projected GDP Loss from Pandemic: $1.3 billion***
- **Projected GDP Percentage Loss from Pandemic: 5.65%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 19**
- **Projected Impact on the Workforce: $0.6 billion in losses**
- **Projected Impact on Industries: $0.5 billion in losses**
- **Projected Trade Impact: $0.2 billion in losses**
- **Projected Number of Lives Lost: 5,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 185,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

Vermont: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	375,000,000	9,000,000
Mining	100,000,000	3,000,000
Utilities	553,000,000	-
Construction	1,258,000,000	31,000,000
Manufacturing	2,922,000,000	73,000,000
Wholesale trade	1,175,000,000	29,000,000
Retail trade	1,934,000,000	48,000,000
Transportation and warehousing	484,000,000	81,000,000
Information	958,000,000	-
Finance and insurance^^	1,369,000,000	34,000,000
Real estate, rental, and leasing	2,667,000,000	-
Professional and technical services	1,276,000,000	-
Management of companies and enterprises	35,000,000	-
Administrative and waste services	436,000,000	-
Educational services^^	478,000,000	12,000,000
Health care and social assistance++	2,170,000,000	(81,000,000)
Arts, entertainment, and recreation	194,000,000	39,000,000
Accommodation and food services	1,035,000,000	207,000,000
Other services, except government	563,000,000	7,000,000
Government	3,083,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^ ^ The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

VIRGINIA OVERVIEW:

- **2005 Total State GDP: $351.9 billion**
- **Projected GDP Loss from Pandemic: $18.1 billion***
- **Projected GDP Percentage Loss from Pandemic: 5.13%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 49**
- **Projected Impact on the Workforce: $8.7 billion in losses**
- **Projected Impact on Industries: $5.8 billion in losses**
- **Projected Trade Impact: $3.5 billion in losses**
- **Projected Number of Lives Lost: 54,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 2,208,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

Virginia: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	1,533,000,000	38,000,000
Mining	1,848,000,000	46,000,000
Utilities	6,276,000,000	-
Construction	18,304,000,000	458,000,000
Manufacturing	32,623,000,000	816,000,000
Wholesale trade	14,919,000,000	373,000,000
Retail trade	21,511,000,000	538,000,000
Transportation and warehousing	8,742,000,000	1,464,000,000
Information	19,938,000,000	-
Finance and insurance^^	24,576,000,000	614,000,000
Real estate, rental, and leasing	44,280,000,000	-
Professional and technical services	40,329,000,000	-
Management of companies and enterprises	7,533,000,000	-
Administrative and waste services	9,134,000,000	-
Educational services^^	2,421,000,000	61,000,000
Health care and social assistance++	18,699,000,000	(701,000,000)
Arts, entertainment, and recreation	1,849,000,000	370,000,000
Accommodation and food services	8,335,000,000	1,667,000,000
Other services, except government	8,813,000,000	110,000,000
Government	60,236,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^ ^ The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

WASHINGTON OVERVIEW:

- **2005 Total State GDP: $267.3 billion**
- **Projected GDP Loss from Pandemic: $14.3 billion***
- **Projected GDP Percentage Loss from Pandemic: 5.36%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 41**
- **Projected Impact on the Workforce: $6.6 billion in losses**
- **Projected Impact on Industries: $5.0 billion in losses**
- **Projected Trade Impact: $2.7 billion in losses**
- **Projected Number of Lives Lost: 45,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 1,853,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

Washington: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	5,112,000,000	128,000,000
Mining	262,000,000	7,000,000
Utilities	2,488,000,000	-
Construction	12,963,000,000	324,000,000
Manufacturing	25,356,000,000	634,000,000
Wholesale trade	16,645,000,000	416,000,000
Retail trade	20,012,000,000	500,000,000
Transportation and warehousing	7,944,000,000	1,331,000,000
Information	20,212,000,000	-
Finance and insurance^^	16,410,000,000	410,000,000
Real estate, rental, and leasing	37,194,000,000	-
Professional and technical services	16,797,000,000	-
Management of companies and enterprises	3,454,000,000	-
Administrative and waste services	8,150,000,000	-
Educational services^^	1,475,000,000	37,000,000
Health care and social assistance++	18,310,000,000	(687,000,000)
Arts, entertainment, and recreation	2,373,000,000	475,000,000
Accommodation and food services	7,127,000,000	1,425,000,000
Other services, except government	6,741,000,000	84,000,000
Government	38,284,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^ ^ The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

WEST VIRGINIA OVERVIEW:

- **2005 Total State GDP: $53.1 billion**
- **Projected GDP Loss from Pandemic: $3.0 billion***
- **Projected GDP Percentage Loss from Pandemic: 5.69%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 18**
- **Projected Impact on the Workforce: $1.4 billion in losses**
- **Projected Impact on Industries: $1.1 billion in losses**
- **Projected Trade Impact: $0.5 billion in losses**
- **Projected Number of Lives Lost: 17,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 537,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

West Virginia: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	271,000,000	7,000,000
Mining	4,456,000,000	111,000,000
Utilities	2,416,000,000	-
Construction	2,182,000,000	55,000,000
Manufacturing	5,543,000,000	139,000,000
Wholesale trade	2,591,000,000	65,000,000
Retail trade	4,252,000,000	106,000,000
Transportation and warehousing	1,885,000,000	316,000,000
Information	1,462,000,000	-
Finance and insurance^^	2,128,000,000	53,000,000
Real estate, rental, and leasing	4,729,000,000	-
Professional and technical services	2,067,000,000	-
Management of companies and enterprises	378,000,000	-
Administrative and waste services	1,111,000,000	-
Educational services^^	258,000,000	6,000,000
Health care and social assistance++	5,034,000,000	(189,000,000)
Arts, entertainment, and recreation	533,000,000	107,000,000
Accommodation and food services	1,463,000,000	293,000,000
Other services, except government	1,280,000,000	16,000,000
Government	9,010,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^ ^ The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

WISCONSIN OVERVIEW:

- **2005 Total State GDP: $216.3 billion**
- **Projected GDP Loss from Pandemic: $12.0 billion***
- **Projected GDP Percentage Loss from Pandemic: 5.56%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 24**
- **Projected Impact on the Workforce: $5.5 billion in losses**
- **Projected Impact on Industries: $4.4 billion in losses**
- **Projected Trade Impact: $2.2 billion in losses**
- **Projected Number of Lives Lost: 44,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 1,643,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

Wisconsin: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	2,929,000,000	73,000,000
Mining	322,000,000	8,000,000
Utilities	3,475,000,000	-
Construction	9,989,000,000	250,000,000
Manufacturing	44,556,000,000	1,114,000,000
Wholesale trade	12,611,000,000	315,000,000
Retail trade	13,888,000,000	347,000,000
Transportation and warehousing	7,110,000,000	1,191,000,000
Information	6,487,000,000	-
Finance and insurance^^	16,033,000,000	401,000,000
Real estate, rental, and leasing	25,305,000,000	-
Professional and technical services	8,943,000,000	-
Management of companies and enterprises	4,684,000,000	-
Administrative and waste services	4,665,000,000	-
Educational services^^	1,700,000,000	43,000,000
Health care and social assistance++	17,858,000,000	(670,000,000)
Arts, entertainment, and recreation	1,546,000,000	309,000,000
Accommodation and food services	4,834,000,000	967,000,000
Other services, except government	5,092,000,000	64,000,000
Government	24,292,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^ ^ The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

WYOMING OVERVIEW:

- **2005 Total State GDP: $27.3 billion**
- **Projected GDP Loss from Pandemic: $1.7 billion***
- **Projected GDP Percentage Loss from Pandemic: 6.40%**
- **Ranking of Percentage Losses Out of 50 States (Highest = 1): 4**
- **Projected Impact on the Workforce: $0.7 billion in losses**
- **Projected Impact on Industries: $0.8 billion in losses**
- **Projected Trade Impact: $0.3 billion in losses**
- **Projected Number of Lives Lost: 4,000***
- **Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 150,000***

*** Note: "Projected GDP Loss from Pandemic" may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.**

Wyoming: Potential GDP Losses by Industry During a Severe Flu Pandemic**

Private Industry/Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	426,000,000	11,000,000
Mining	8,265,000,000	207,000,000
Utilities	1,250,000,000	-
Construction	1,434,000,000	36,000,000
Manufacturing	1,107,000,000	28,000,000
Wholesale trade	938,000,000	23,000,000
Retail trade	1,493,000,000	37,000,000
Transportation and warehousing	1,603,000,000	269,000,000
Information	431,000,000	-
Finance and insurance^^	731,000,000	18,000,000
Real estate, rental, and leasing	2,190,000,000	-
Professional and technical services	760,000,000	-
Management of companies and enterprises	81,000,000	-
Administrative and waste services	296,000,000	-
Educational services^^	55,000,000	1,000,000
Health care and social assistance++	1,120,000,000	(42,000,000)
Arts, entertainment, and recreation	183,000,000	37,000,000
Accommodation and food services	834,000,000	167,000,000
Other services, except government	447,000,000	6,000,000
Government	3,624,000,000	-

***Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at http://www.bea.gov/bea/regional/gsp/; accessed on January 26, 2007). Demand losses are for a 3 month period. Numbers are rounded to the millionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.*

^ ^ The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

Endnotes

1 Anthony Fauci, Director, National Institute of Allergy and Infectious Diseases, National Institutes of Health, "Preparation for Avian Flu Pandemic," Testimony before the Senate Appropriations Subcommittee on Labor, Health and Human Services, Education, and Related Agencies, 24 January 2007.

Julie L. Gerberding, Director, Centers for Disease Control and Prevention, "Preparation for Avian Flu Pandemic," Testimony before the Senate Appropriations Subcommittee on Labor, Health and Human Services, Education, and Related Agencies, 24 January 2007.

Gerald Parker, Principal Deputy Assistant Secretary, Preparedness and Response, Department of Health and Human Services, "Preparation for Avian Flu Pandemic," Testimony before the Senate Appropriations Subcommittee on Labor, Health and Human Services, Education, and Related Agencies, 24 January 2007.

John Treanor, Director, Vaccine and Treatment Evaluation Unit, University of Rochester, "Preparation for Avian Flu Pandemic," Testimony before the Senate Appropriations Subcommittee on Labor, Health and Human Services, Education, and Related Agencies, 24 January 2007.

2 U.S. Department of Health and Human Services, "General Information: What would be the Impact of a Pandemic?" http://www.pandemicflu.gov/general/index.html#impact [30 January 2007].

3 Trust for America's Health, *Ready or Not? Protecting the Public's Health from Diseases, Disasters, and Bioterrorism* (Washington, D.C.: Trust for America's Health, December 2006).

4 Congressional Budget Office, *A Potential Influenza Pandemic: Possible Macroeconomic Effects and Policy Issues* (Washington, D.C.: Congressional Budget Office, 8 December 2005; revised 27 July 2006); W. J. McKibbin and A. A. Sidorenko, *Global Macroeconomic Consequences of Pandemic Influenza* (Sydney, Australia: Lowy Institute for International Policy, February 2006); and Dr. S. Cooper, The Avian Flu Crisis: An Economic Update (Toronto, Ontario: BMO Nesbitt Burns, 13 March 2006).

5 These assumptions were used in the analyses performed by the 3 major financial and economic research institutions and are based on the U.S. Center for Disease Control and Prevention's Flu Aid software program.

6 Cycle Dating Committee, National Bureau of Economic Research, "The NBER's Recession Dating Procedure," 21 October 2003, http://www.nber.org/cycles/recessions.html [25 January 2007]. Real GDP equals total GDP minus the impact of inflation.

7 Congressional Budget Office, *A Potential Influenza Pandemic: Possible Macroeconomic Effects and Policy Issues* (Washington, D.C.: Congressional Budget Office, 8 December 2005; revised 27 July 2006).

8 Mathematically: the average real GDP rate, 3.5 percent, minus the impact of a severe pandemic, 5.5 percent.

9 Congressional Budget Office, *A Potential Influenza Pandemic: Possible Macroeconomic Effects and Policy Issues* (Washington, D.C.: Congressional Budget Office, 8 December 2005; revised 27 July 2006).

10 Trust for America's Health, *Ready or Not? Protecting the Public's Health from Diseases, Disasters, and Bioterrorism* (Washington, D.C.: Trust for America's Health, December 2006).

11 Congressional Budget Office, *A Potential Influenza Pandemic: Possible Macroeconomic Effects and Policy Issues* (Washington, D.C.: Congressional Budget Office, 8 December 2005; revised 27 July 2006); W. J. McKibbin and A. A. Sidorenko, *Global Macroeconomic Consequences of Pandemic Influenza* (Sydney, Australia: Lowy Institute for International Policy, February 2006); and Dr. S. Cooper, The Avian Flu Crisis: An Economic Update (Toronto, Ontario: BMO Nesbitt Burns, 13 March 2006).

12 Congressional Budget Office, *A Potential Influenza Pandemic: Possible Macroeconomic Effects and Policy Issues* (Washington, D.C.: Congressional Budget Office, 8 December 2005; revised 27 July 2006).

13 W. J. McKibbin and A. A. Sidorenko, *Global Macroeconomic Consequences of Pandemic Influenza* (Sydney, Australia: Lowy Institute for International Policy, February 2006).

14 Dr. S. Cooper, *The Avian Flu Crisis: An Economic Update* (Toronto, Ontario: BMO Nesbitt Burns, 13 March 2006).

15 According to the Bureau of Economic Analysis (BEA), GDP by state (formerly known as gross state product or GSP) is derived as the sum of U.S. GDP originating in all the industries in the state. Source: Bureau of Economic Analysis, "Gross Domestic Product (GDP) by State, 2005," News Release, 26 October 2006, http://bea.gov/bea/newsrel/gspnewsrelease.htm

16 The U.S. Centers for Disease Control and Prevention recommend caring for individuals at home as much as possible in the *Interim Pre-Pandemic Planning Guidance: Community Strategy for Pandemic Influenza Mitigation in the United States-Early, Targeted, Layered Use of Nonpharmaceutical Interventions* (Washington, D.C.: Centers for Disease Control and Prevention, U.S. Department of Health and Human Services, February 2007).

17 Anthony Fauci, Director, National Institute of Allergy and Infectious Diseases, National Institutes of Health, "Preparation for Avian Flu Pandemic," Testimony before the Senate Appropriations Subcommittee on Labor, Health and Human Services, Education, and Related Agencies, 24 January 2007.

Julie L. Gerberding, Director, Centers for Disease Control and Prevention, "Preparation for Avian Flu Pandemic," Testimony before the Senate Appropriations Subcommittee on Labor, Health and Human Services, Education, and Related Agencies, 24 January 2007.

Gerald Parker, Principal Deputy Assistant Secretary, Preparedness and Response, Department of Health and Human Services, "Preparation for Avian Flu Pandemic," Testimony before the Senate Appropriations Subcommittee on Labor, Health and Human Services, Education, and Related Agencies, 24 January 2007.

John Treanor, Director, Vaccine and Treatment Evaluation Unit, University of Rochester, "Preparation for Avian Flu Pandemic," Testimony before the Senate Appropriations Subcommittee on Labor, Health and Human Services, Education, and Related Agencies, 24 January 2007.

18 This is the number projected by the Congressional Budget Office, the ANU/Lowy Institute, and the BMO Nesbitt Burns analyses.

19 BMO Nesbitt Burns, "Avian Flu Crisis: BMO Nesbitt Burns Economic Update," PRNewswire 13 March 2006.

20 Congressional Budget Office, *A Potential Influenza Pandemic: Possible Macroeconomic Effects and Policy Issues* (Washington, D.C.: Congressional Budget Office, 8 December 2005; revised 27 July 2006).

21 Trust for America's Health, "It's Not Flu as Usual: What Businesses Need to Know about Pandemic Flu," 2005, http://healthyamericans.org/reports/flu/brochures/FluBrochure.pdf.

22 Congressional Budget Office, *A Potential Influenza Pandemic: Possible Macroeconomic Effects and Policy Issues* (Washington, D.C.: Congressional Budget Office, 8 December 2005; revised 27 July 2006).

23 W. J. McKibbin and A. A. Sidorenko, *Global Macroeconomic Consequences of Pandemic Influenza* (Sydney, Australia: Lowy Institute for International Policy, February 2006). The ANU/Lowy Institute model uses these estimates for their "ultra" scenario.

24 Congressional Budget Office, *A Potential Influenza Pandemic: Possible Macroeconomic Effects and Policy Issues* (Washington, D.C.: Congressional Budget Office, 8 December 2005; revised 27 July 2006).

25 Mathematically, losses from (a) the deceased (2.25 million/300 million = 0.75 percent) plus (b) losses from the sick ((87.5 million/300 million)*(3 weeks/50 weeks) = 1.75 percent) equals (c) 2.5 percent.

26 2005 is the most recent available data as of February 9, 2007.

27 Bureau of Economic Analysis, US Department of Commerce, "Gross Domestic Product by State," http://bea.gov/regional/gsp/ [7 February 2007].

28 2005 Bureau of Economic Analysis GDP by state figures (available at http://www.bea.gov/bea/regional/gsp/). Entertainment/Tourism includes the industries "Arts, Entertainment, and Recreation" and "Accommodation and Food Services."

29 Congressional Budget Office, *A Potential Influenza Pandemic: Possible Macroeconomic Effects and Policy Issues* (Washington, D.C.: Congressional Budget Office, 8 December 2005; revised 27 July 2006).

30 World Health Organization, "Epidemic and Pandemic Alert and Response: Cumulative Number of Confirmed Human Cases of Avian Influenza A/(H5N1) Reported to WHO," 23 August 2006, http://www.who.int/csr/disease/avian_influenza/country/cases_table_2006_08_23/en/index.html.

31 Bureau of Economic Analysis, US Department of Commerce, "Gross Domestic Product by State," http://bea.gov/regional/gsp/ [7 February 2007].

32 2005 Bureau of Economic Analysis GDP by state figures (available at http://www.bea.gov/bea/regional/gsp/). Entertainment/Tourism includes the industries "Arts, Entertainment, and Recreation" and "Accommodation and Food Services."

33 Congressional Budget Office, *A Potential Influenza Pandemic: Possible Macroeconomic Effects and Policy Issues* (Washington, D.C.: Congressional Budget Office, 8 December 2005; revised 27 July 2006).

34 Lars Jonung and Werner Roeger, *The Macroeconomic Effects of a Pandemic in Europe: A Model-based Assessment* (Brussels, Belgium: European Commission, June 2006).

35 Congressional Budget Office, *A Potential Influenza Pandemic: Possible Macroeconomic Effects and Policy Issues* (Washington, D.C.: Congressional Budget Office, 8 December 2005; revised 27 July 2006).

36 Centers for Disease Control and Prevention, *Interim Pre-Pandemic Planning Guidance: Community Strategy for Pandemic Influenza Mitigation in the United States - Early, Targeted, Layered Use of Nonpharmaceutical Interventions* (Washington, D.C.: Centers for Disease Control and Prevention, U.S. Department of Health and Human Services, February 2007).

37 Steven Weisbart, Insurance Information Institute, "Pandemic: Can the Life Insurance Industry Survive The Avian Flu?" 17 January 2006 (updated 1 November 2006), http://server.iii.org/yy_obj_data/binary/768534_1_0/Bird_Flu.pdf.

38 Congressional Budget Office, *A Potential Influenza Pandemic: Possible Macroeconomic Effects and Policy Issues* (Washington, D.C.: Congressional Budget Office, 8 December 2005; revised 27 July 2006).

39 U.S. Centers for Disease Control and Prevention, FluSurge2.0 Beta Test Software, http://www.cdc.gov/flu/flusurge.htm [30 October 2006]; and E. Toner et al., "Meeting Report: Hospital Preparedness for Pandemic Influenza," *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science* 4, no. 2 (2006).

40 Congressional Budget Office, A *Potential Influenza Pandemic: Possible Macroeconomic Effects and Policy Issues* (Washington, D.C.: Congressional Budget Office, 8 December 2005; revised 27 July 2006).

41 E. Toner et al., "Meeting Report: Hospital Preparedness for Pandemic Influenza," *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science* 4, no. 2 (2006).

42 Ibid.

43 US Census Bureau, I*ncome, Poverty, and Health Insurance Coverage in the United States: 2004,* August 2005, http://www.census.gov/prod/ 2005pubs/p60-229.pdf.

44 Central Intelligence Agency, "The World Factbook: United States," Last updated 8 February 2007, https://www.cia.gov/cia/publications/factbook/geos/us.html.

45 Office of Trade and Industry Information, US Department of Commerce, "TradeStats Express - National Trade Data," http://tse.export.gov/NTDHome.aspx?UniqueURL=klxudfnwe042okr-can320rim-2007-1-9-12-29-51

46 Dr. S. Cooper, *The Avian Flu Crisis: An Economic Update* (Toronto, Ontario: BMO Nesbitt Burns, 13 March 2006).

47 Ibid.

48 This is what accounts for roughly the additional 1 percent U.S. GDP loss that BMO Nesbitt Burns predicts above the CBO estimate. This would constitute an additional $120 billion reduction to U.S. GDP. Source: Dr. S. Cooper, *The Avian Flu Crisis: An Economic Update* (Toronto, Ontario: BMO Nesbitt Burns, 13 March 2006).

49 Warwick McKibbin, "Assessing the Impact of Pandemic Flu," *A Brookings Economic Studies and Global Economy & Development Briefing,* 19 October 2006.

50 The "ultra" scenario is similar to the Spanish Flu outbreak of 1918. However, the ultra scenario does not take into account the "anomalously high elderly survival rates" that were apparent during the 1918 outbreak. Thus, it is of a greater severity than the 1918 pandemic. Source: W. J. McKibbin and A. A. Sidorenko, *Global Macroeconomic Consequences of Pandemic Influenza* (Sydney, Australia: Lowy Institute for International Policy, February 2006).

51 Thomas Friedman, *The World is Flat: A Brief History of the Twenty-First Century,* (New York, New York: Farrar, Straus, and Giroux, April 2005).

52 Michael T. Osterholm, "Preparing for the Next Pandemic," *Foreign Affairs,* July/August 2005..

53 Dr. S. Cooper, *The Avian Flu Crisis: An Economic Update* (Toronto, Ontario: BMO Nesbitt Burns, 13 March 2006).

54 Trust for America's Health, "It's Not Flu as Usual: What Businesses Need to Know about Pandemic Flu," 2005, http://healthyamericans.org/reports/flu/brochures/FluBrochure.pdf.

55 Congressional Budget Office, *A Potential Influenza Pandemic: Possible Macroeconomic Effects and Policy Issues* (Washington, D.C.: Congressional Budget Office, 8 December 2005; revised 27 July 2006).

56 Milan Brahmbhatt, World Bank, "Economic Impacts of Avian Influenza Propogation," Speech at the First International Conference on Avian Influenza in Humans, 29 June 2006.

57 Warwick McKibbin, "Assessing the Impact of Pandemic Flu," *A Brookings Economic Studies and Global Economy & Development Briefing,* 19 October 2006.

58 Milan Brahmbhatt, World Bank, "Economic Impacts of Avian Influenza Propogation," Speech at the First International Conference on Avian Influenza in Humans, 29 June 2006.

59 Ibid.

60 The World Bank does not intend for its estimates to serve as precise forecasts; rather, "they are only exercises to help think through the various channels of impact and possible orders of magnitude." Source: Milan Brahmbhatt, World Bank, "Economic Impacts of Avian Influenza Propogation," Speech at the First International Conference on Avian Influenza in Humans, 29 June 2006.

61 Milan Brahmbhatt, World Bank, "Economic Impacts of Avian Influenza Propogation," Speech at the First International Conference on Avian Influenza in Humans, 29 June 2006.

62 W. J. McKibbin and A. A. Sidorenko, *Global Macroeconomic Consequences of Pandemic Influenza* (Sydney, Australia: Lowy Institute for International Policy, February 2006).

63 World Health Organization, "Epidemic and Pandemic Alert Response: Summary of probable SARS cases with onset of illness from 1 November 2002 to 31 July 2003," Based on data as of 31 December 2003, http://www.who.int/csr/sars/country/table2004_04_21/en/index.html.

64 Alan Siu and Richard Wong, "Economic Impact of SARS: The Case of Hong Kong," *Asian Economic Papers* 3, no. 1 (Winter 2004).

65 Ibid.

66 Jeffrey Matsu, "Pandemic Fallout," Morgan Stanley, Global Economic Forum, 28 February 2006, http://www.morganstanley.com/views/gef/archive/2006/20060228-Tue.html#anchor0 [10 May 2006].

In a separate study, Bio Economic Research Associates estimates that the economic damages to the global economy due to SARS were upwards of $50 billion. Source: Bio Economic Research Associates, "Thinking Ahead: Anticipating Early Impacts of an Avian Influenza Pandemic," http://www.bio-era.net/research/add_research_18.html.

67 Milan Brahmbhatt, World Bank, "Economic Impacts of Avian Influenza Propogation," Speech at the First International Conference on Avian Influenza in Humans, 29 June 2006.

68 World Health Organization, "Epidemic and Pandemic Alert Response: Summary of probable SARS cases with onset of illness from 1 November 2002 to 31 July 2003," Based on data as of 31 December 2003, http://www.who.int/csr/sars/country/table2004_04_21/en/index.html.

69 Dr. S. Cooper, *The Avian Flu Crisis: An Economic Update* (Toronto, Ontario: BMO Nesbitt Burns, 13 March 2006).

70 World Health Organization, "Epidemic and Pandemic Alert Response: Summary of probable SARS cases with onset of illness from 1 November 2002 to 31 July 2003," Based on data as of 31 December 2003, http://www.who.int/csr/sars/country/table2004_04_21/en/index.html.

71 Dr. S. Cooper, *The Avian Flu Crisis: An Economic Update* (Toronto, Ontario: BMO Nesbitt Burns, 13 March 2006).

72 Milan Brahmbhatt, World Bank, "Economic Impacts of Avian Influenza Propogation," Speech at the First International Conference on Avian Influenza in Humans, 29 June 2006.

73 Ibid.

74 Ibid.

75 Ibid.

76 The World Bank, "Projects and Operations: International Pledging Conference on Avian and Human Influenza," http://web.worldbank.org/WBSITE/EXTERNAL/PROJECTS/0,,contentMDK:20765526~pagePK:41367~piPK:51533~theSitePK:40941,00.html [18 January 2007].

77 US Department of Health and Human Services, "FY 2008 President's Budget for HHS," http://www.hhs.gov/budget/docbudget.htm [5 February 2007].

78 Department for Environmental Food and Rural Affairs, United Kingdom, "Suffolk bird flu outbreak: cull now complete," Press Release, 5 February 2007, http://www.defra.gov.uk/news/latest/2007/animal-0203.htm.

79 British Poultry Council, "Economic Contribution," http://www.poultry.uk.com/con_economic01.htm [5 February 2007].

80 Bureau of Economic Analysis, US Department of Commerce, "National Income and Product Accounts Table," BEA Personal Consumption Data, http://bea.gov/bea/dn/nipaweb/nipa_underlying/TableView.asp#Mid [5 February 2007].

81 US Department of Agriculture, "International Egg and Poultry Review," 24 February 2004.

82 Aimee Curl, "Bracing for Bird Flu, Feds to States: You're On Your Own," *Federal Times* 10 April 2006, http://www.federaltimes.com/index.php?S=1673613 [26 February 2007].

83 Centers for Disease Control and Prevention, *Interim Pre-Pandemic Planning Guidance: Community Strategy for Pandemic Influenza Mitigation in the United States – Early, Targeted, Layered Use of Nonpharmaceutical Interventions* (Washington, D.C.: Centers for Disease Control and Prevention, US Department of Health and Human Services, February 2007).

84 Standard & Poor's, "U.S. Government and Health Care Sectors Gearing Up For A Bird Flu Pandemic, Report Says," News Release, 11 May 2006, http://www2.standardandpoors.com/servlet/Satellite?pagename=sp/Page/PressMainPg&r=1&l=EN&b=5.

85 US Homeland Security Council, *National Strategy for Pandemic Influenza* (Washington, D.C.: The White House, November 2005).

86 Michael T. Osterholm, "Preparing for the Next Pandemic," *Foreign Affairs,* July/August 2005.

87 US Homeland Security Council, *National Strategy for Pandemic Influenza: Implementation Plan* (Washington, D.C.: The White House, May 2006).

88 SF Ready at www.sfready.org [7 February 2007].

89 SF Ready, "2006," http://sfready.org/2006/2006.html [7 February 2007].

90 San Francisco Department of Public Health Communicable Disease Control & Prevention, "2006 Pandemic Flu Symposium for San Francisco Businesses & Organizations," 23 October 2006, http://www.sfcdcp.org/UserFiles/File/Training/PanFluSymposium/Symposium_Handouts.ALL.pdf.

91 San Francisco Department of Public Health, Communicable Disease Control and Prevention Section, "Pandemic Influenza Business Continuity Guide & Template For San Francisco Businesses," 13 June 2006, http://www.sfcdcp.org/UserFiles/File/InfectiousDiseasesAtoZ/Business._Pan_Flu_Continuity_Plan.6.11.06.pdf.

92 Ken Sternberg, "Taking Care of Business: Across the country, private-private and public-private coalitions are giving business a stronger, more effective voice in emergency and disaster planning," *Homeland Protection Professional,* October 2006.

93 ChicagoFIRST, "ChicagoFIRST Hosts Resilience Exercise Testing Response to Pandemic Influenza," Press Release, 16 January 2007, https://www.chicagofirst.org/press/2007/press_20070116.jsp.

94 Ken Sternberg, "Taking Care of Business: Across the country, private-private and public-private coalitions are giving business a stronger, more effective voice in emergency and disaster planning," *Homeland Protection Professional*, October 2006.

95 Ibid.

96 ChicagoFIRST, "ChicagoFIRST Hosts Resilience Exercise Testing Response to Pandemic Influenza," Press Release, 16 January 2007, https://www.chicagofirst.org/press/2007/press_20070116.jsp.

97 Ibid.

98 ChicagoFIRST, "Regional Partnership Council," https://www.chicagofirst.org/partners/regional_partnerships.jsp [8 February 2007].

99 Centers for Disease Control and Prevention, "FluAid 2.0," http://www.cdc.gov/flu/tools/fluaid/; and *US Homeland Security Council, National Strategy for Pandemic Influenza* (Washington, D.C.: The White House, November 2005).

100 Congressional Budget *Office, A Potential Influenza Pandemic: Possible Macroeconomic Effects and Policy Issues* (Washington, D.C.: Congressional Budget Office, 8 December 2005; revised 27 July 2006).

101 W. J. McKibbin and A. A. Sidorenko, Global Macroeconomic Consequences of Pandemic Influenza (Sydney, Australia: Lowy Institute for International Policy, February 2006). The ANU/Lowy Institute model uses these estimates for their "ultra" scenario.

102 Mathematically, this is 300 million people multiplied by 30 percent

103 Mathematically, 90 million multiplied by 2.5 percent.

104 Mathematically, losses from (a) the deceased (2.25 million/300 million = 0.75 percent) plus (b) losses from the sick ((87.5 million/300 million)*(3 weeks/50 weeks) = 1.75 percent) equals (c) 2.5 percent.

105 Mathematically, losses from (a) the deceased (2.25 million/300 million = 0.75 percent) plus (b) losses from the sick ((87.5 million/300 million)*(3 weeks/50 weeks) = 1.75 percent) equals (c) 2.5 percent.

106 W. J. McKibbin and A. A. Sidorenko, *Global Macroeconomic Consequences of Pandemic Influenza* (Sydney, Australia: Lowy Institute for International Policy, February 2006).

107 Centers for Disease Control and Prevention, "Fact Sheet: Key Facts about Influenza and the Influenza Vaccine," http://www.cdc.gov/flu/keyfacts.htm.

108 W. J. McKibbin and A. A. Sidorenko, *Global Macroeconomic Consequences of Pandemic Influenza* (Sydney, Australia: Lowy Institute for International Policy, February 2006).

109 These influenza-specific measures include: percent of the nation's population that is "covered by an existing or pre-ordered stockpile of Tamiflu," an anti-viral medication; the country's manufacturing capacity to produce antivirals; the number of National Influenza Centers and Laboratories in the country that are members of the World Health Organization (WHO) Influenza Network/Global Influenza Programme; and whether the country has a publicly available National Influenza Preparedness Plan. Source: W. J. McKibbin and A. A. Sidorenko, *Global Macroeconomic Consequences of Pandemic Influenza* (Sydney, Australia: Lowy Institute for International Policy, February 2006).

110 W. J. McKibbin and A. A. Sidorenko, *Global Macroeconomic Consequences of Pandemic Influenza* (Sydney, Australia: Lowy Institute for International Policy, February 2006).

111 Warwick McKibbin, "Assessing the Impact of Pandemic Flu," *A Brookings Economic Studies and Global Economy & Development Briefing*, 19 October 2006.

112 Congressional Budget Office, *A Potential Influenza Pandemic: Possible Macroeconomic Effects and Policy Issues* (Washington, D.C.: Congressional Budget Office, 8 December 2005; revised 27 July 2006).

113 Ibid.

114 *Fitch Ratings*, "Bird Flu-Will It Ruffle The Industry's Feathers?" 27 March 2006, www.fitchratings.com.

115 Steven Weisbart, Insurance Information Institute, "Pandemic: Can the Life Insurance Industry Survive The Avian Flu?" 17 January 2006 (updated 1 November 2006), http://server.iii.org/yy_obj_data/binary/768534_1_0/Bird_Flu.pdf.

116 Congressional Budget Office, *A Potential Influenza Pandemic: Possible Macroeconomic Effects and Policy Issues* (Washington, D.C.: Congressional Budget Office, 8 December 2005; revised 27 July 2006).

117 Dr. S. Cooper, *The Avian Flu Crisis: An Economic Update* (Toronto, Ontario: BMO Nesbitt Burns, 13 March 2006).

118 Ibid.

119 Steven James and Timothy Sargent, *The Economic Impact of an Influenza Pandemic* (Ottawa, Canada: The Department of Finance, Canada, 9 June 2006).

120 "Fly-By Virus," Interview of David Kotok, Chief Investment Officer of Cumberland Advisors, by James Picerno, Editor of *The Capital Spectator* (capitalspectator.com), 21 March 2006, http://www.cumber.com/special/FLYBY_Virus.pdf.

121 Lars Jonung and Werner Roeger, *The Macroeconomic Effects of a Pandemic in Europe: A Model-based Assessment* (Brussels, Belgium: European Commission, June 2006).

1707 H Street, NW, 7th Floor
Washington, DC 20006
(t) 202-223-9870
(f) 202-223-9871