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**The Economic Costs of Disruption from a Snowstorm**  
*Study Prepared for the American Highway Users Alliance by IHS Global Insight*

## Executive Summary

This study, commissioned by the American Highway Users Alliance and carried out by renowned global consulting firm IHS Global Insight, quantifies the economic impact of a one-day snow-related shutdown in sixteen states and two Canadian provinces. As winter comes to a close after an abnormally heavy snow season, the study shows the significant expense, both directly and indirectly, a major storm has on businesses and government because of impassable roads, as much as \$300-700 million in some states for just a one-day shutdown.

As a result of the study, we have reached three broad conclusions:

1. Among all economic classes, snow-related shutdowns harm hourly workers the worst, accounting for almost two thirds of direct economic losses.
2. The indirect economic impacts of snow-related shutdowns, including loss of retail sales and income and sales tax revenues, roughly double the initial economic impact.
3. The economic impact of snow-related closures far exceeds the cost of timely snow removal. Although states and localities may be hesitant to expend significant upfront resources in the short-term, the long-term payoff more than justifies the expense.

It is hoped that this data will highlight to state and local authorities, as well as the federal government, the immense costs incurred during these storms, and spur them to plan more aggressively for periods of heavy snow.

The report is organized below into two distinct sections, an explanation of the study's methodology, followed by the data, organized by state and province. States and provinces selected represent areas of higher than average snowfall, and include each of the major snow-bearing metropolitan areas in the United States.

--The American Highway Users Alliance

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# **The Economic Costs of Disruption from a Widespread Snowstorm: Methodology for States**

**[Canadian equivalents in brackets]**

The economic losses that would result from a widespread snowstorm include lost earnings of hourly workers who are paid only for time actually worked and lost revenue of certain types of retail businesses where spending would not subsequently be recouped. Both of these types of losses would result in lost tax revenue at the federal and local levels. Moreover, there are indirect effects that must be taken into account since the ripple effects through the economy of the earnings and revenue that are lost would also not occur. IHS Global Insight's methods of estimating all aspects of the economic impact of a widespread snowstorm are summarized here.

## **Direct Economic Losses**

### **Lost Wages by Industry**

In the event of a temporary shutdown of the majority of industry, the loss of employee income would be limited to workers paid by the hour. We assume that salaried workers would still collect their annual wage, and the work would be made-up at a later date. The Bureau of Economic Analysis (BEA) [SEPH] publishes data on wage and salary disbursements by industry for all employees by state. However, these data do not separate the incomes of salaried from hourly paid employees. The

proportion of workers who are paid by the hour can vary considerably from industry to industry. It is very low in educational services and the finance and insurance industries but is very high in construction and manufacturing industries. To make these estimates for states, we assumed proportions would be similar to those in the Canadian provinces for which such data are published.

### **Essential Services**

We assume that even in a widespread snowstorm not all essential services will be closed. To account for the operation of essential services under a skeleton staff, we constructed scaling factors for the proportion of employees that would work. The following service industries were classified as essential services: local and interurban passenger transit and health services. We assumed that 25 percent of the hourly paid staff in these industries would work through the shutdown.

### **Income Regained**

Although hourly employees will lose income during the days in which the area is shut down, a portion of this income will be regained from overtime. Income is not assumed to be regained uniformly across industries. In manufacturing and construction the regain factor is high, while in public administration it is very low. Regain factors were constructed for each industry to account for income made up due to overtime. In addition, it was assumed that a portion of this overtime work was paid at time and a half.

### **Lost Tax Revenue**

There would be lost tax revenues for state and local [provincial] governments

as well as the federal government. Both lost income and retail sales would give rise to lost direct and indirect tax revenues. We calculated an average effective (or implicit) personal tax rate by taking the ratio of taxes paid to state and local governments relative to personal income. The same calculation was made for each state's average effective federal income tax rate. These effective tax rates were applied to the lost income – both direct and indirect.

Statutory tax rates that apply to retail sales in each state [province] were employed to calculate lost tax revenues for state governments arising from lost retail sales. The statutory rate was applied to lost retail sales after the scaling adjustment was made.

### **Retail Trade**

We assume that sales lost due to a widespread snowstorm that would not be recouped subsequently would be limited to gasoline stations, department stores and other general merchandise stores. As with the estimates of lost earnings, scaling factors were developed to implement assumptions about the proportion of each store type's sales that would be recovered in the days following a statewide shutdown.

The starting point for calculating retail sales losses was IHS Global Insight's [Statistics Canada] estimates of retail sales by store type by state for 2009. These estimates were developed from the relationship of retail sales by store type to personal income in each state as reported in the Census of Retail Trade, applied to personal income by state in 2009.

### **Indirect Impacts**

In addition to the direct loss of income and sales, there is an indirect component

associated with the rippling effect through the economy that would have been stimulated by the wages and sales that are lost. This is the "Derived" effect that is reported in the economic impact tables. We assume that all of the people who lost income as a result of the shutdown would have spent the majority of that income in the local economy. Lost sales in the local economy will amount to a potential loss of income by most retailers and their employees. The impact ripples further as retailers and employees curtail their purchasing activity.

Multipliers used to estimate these indirect effects were derived from the widely-used IMPLAN economic impact software package. This methodology calculates the changes in output, employment, and value added as the result of changes in final demand for one or more industries. The software calculates two impacts – indirect and induced. Indirect impacts are the changes in interindustry purchases that result from the direct impact. Induced impacts represent the changes in household spending due to changes in production. For the purposes of the study, we are combining the indirect and induced impact into what we call a "derived" impact. [Canada's multiplier on lost earnings was 1.34. Source: IHS Global Insight's macroeconomic model].

### **Other Economic Effects**

IHS Global Insight recognizes that there are additional effects of dangers associated with untreated snow-covered roads. The health, insurance and repair expenses from increased accidents could, in fact, be quite large. However, they are beyond the scope of this report.

<b>Illinois</b>	
<b>Total Economic Impact</b>	<b>\$ Millions</b>
Direct	182.27
Derived	218.47
Total	400.73

<b>Wages &amp; Salaries</b>	
Direct	114.72
Derived	153.72
Total	268.44

<b>State &amp; Local Taxes</b>	
Direct	3.56
Derived	4.78
Total	8.34

<b>Federal Taxes</b>	
Direct	10.64
Derived	14.25
Total	24.89

<b>Retail Sales</b>	
Direct	53.35
Derived	45.72
Total	99.07

<b>Iowa</b>	
<b>Total Economic Impact</b>	<b>\$ Millions</b>
Direct	33.40
Derived	36.89
Total	70.28

<b>Wages &amp; Salaries</b>	
Direct	20.14
Derived	26.98
Total	47.12

<b>State &amp; Local Taxes</b>	
Direct	0.95
Derived	1.28
Total	2.23

<b>Federal Taxes</b>	
Direct	1.35
Derived	1.81
Total	3.16

<b>Retail Sales</b>	
Direct	10.96
Derived	6.82
Total	17.78

<b>Indiana</b>	
<b>Total Economic Impact</b>	<b>\$ Millions</b>
Direct	73.12
Derived	83.52
Total	156.64

<b>Wages &amp; Salaries</b>	
Direct	45.11
Derived	60.44
Total	105.55

<b>State &amp; Local Taxes</b>	
Direct	1.99
Derived	2.66
Total	4.65

<b>Federal Taxes</b>	
Direct	3.32
Derived	4.45
Total	7.76

<b>Retail Sales</b>	
Direct	22.71
Derived	15.97
Total	38.68

<b>Kentucky</b>	
<b>Total Economic Impact</b>	<b>\$ Millions</b>
Direct	46.58
Derived	49.45
Total	96.03

<b>Wages &amp; Salaries</b>	
Direct	25.61
Derived	34.31
Total	59.92

<b>State &amp; Local Taxes</b>	
Direct	1.41
Derived	1.89
Total	3.30

<b>Federal Taxes</b>	
Direct	1.78
Derived	2.38
Total	4.16

<b>Retail Sales</b>	
Direct	17.79
Derived	10.87
Total	28.66

<b>Maryland</b>		
<b>Total Economic Impact</b>		<b>\$ Millions</b>
Direct		84.16
Derived		99.35
Total		183.51
<b>Wages &amp; Salaries</b>		
Direct		53.82
Derived		72.12
Total		125.94
<b>State &amp; Local Taxes</b>		
Direct		4.17
Derived		5.59
Total		9.76
<b>Federal Taxes</b>		
Direct		4.88
Derived		6.54
Total		11.43
<b>Retail Sales</b>		
Direct		21.28
Derived		15.10
Total		36.38

<b>Michigan</b>		
<b>Total Economic Impact</b>		<b>\$ Millions</b>
Direct		116.92
Derived		134.15
Total		251.07
<b>Wages &amp; Salaries</b>		
Direct		72.73
Derived		97.45
Total		170.18
<b>State &amp; Local Taxes</b>		
Direct		2.72
Derived		3.64
Total		6.35
<b>Federal Taxes</b>		
Direct		5.36
Derived		7.18
Total		12.53
<b>Retail Sales</b>		
Direct		36.12
Derived		25.88
Total		62.00

<b>Massachusetts</b>		
<b>Total Economic Impact</b>		<b>\$ Millions</b>
Direct		119.42
Derived		145.69
Total		265.12
<b>Wages &amp; Salaries</b>		
Direct		82.95
Derived		111.16
Total		194.11
<b>State &amp; Local Taxes</b>		
Direct		4.62
Derived		6.19
Total		10.82
<b>Federal Taxes</b>		
Direct		8.44
Derived		11.31
Total		19.74
<b>Retail Sales</b>		
Direct		23.41
Derived		17.04
Total		40.45

<b>Minnesota</b>		
<b>Total Economic Impact</b>		<b>\$ Millions</b>
Direct		76.27
Derived		91.19
Total		167.46
<b>Wages &amp; Salaries</b>		
Direct		48.14
Derived		64.51
Total		112.65
<b>State &amp; Local Taxes</b>		
Direct		2.69
Derived		3.60
Total		6.29
<b>Federal Taxes</b>		
Direct		4.09
Derived		5.48
Total		9.57
<b>Retail Sales</b>		
Direct		21.35
Derived		17.60
Total		38.95

<b>Missouri</b>	
<b>Total Economic Impact</b>	<b>\$ Millions</b>
Direct	74.06
Derived	87.57
Total	161.63
<b>Wages &amp; Salaries</b>	
Direct	46.10
Derived	61.78
Total	107.88
<b>State &amp; Local Taxes</b>	
Direct	2.03
Derived	2.72
Total	4.76
<b>Federal Taxes</b>	
Direct	3.44
Derived	4.61
Total	8.05
<b>Retail Sales</b>	
Direct	22.48
Derived	18.46
Total	40.94

<b>New York</b>	
<b>Total Economic Impact</b>	<b>\$ Millions</b>
Direct	322.40
Derived	377.78
Total	700.17
<b>Wages &amp; Salaries</b>	
Direct	198.92
Derived	266.55
Total	465.47
<b>State &amp; Local Taxes</b>	
Direct	15.00
Derived	20.10
Total	35.10
<b>Federal Taxes</b>	
Direct	20.44
Derived	27.39
Total	47.83
<b>Retail Sales</b>	
Direct	88.04
Derived	63.74
Total	151.78

<b>New Jersey</b>	
<b>Total Economic Impact</b>	<b>\$ Millions</b>
Direct	132.58
Derived	156.77
Total	289.35
<b>Wages &amp; Salaries</b>	
Direct	85.97
Derived	115.19
Total	201.16
<b>State &amp; Local Taxes</b>	
Direct	4.15
Derived	5.56
Total	9.72
<b>Federal Taxes</b>	
Direct	8.49
Derived	11.38
Total	19.86
<b>Retail Sales</b>	
Direct	33.97
Derived	24.64
Total	58.61

<b>Ohio</b>	
<b>Total Economic Impact</b>	<b>\$ Millions</b>
Direct	139.54
Derived	160.89
Total	300.43
<b>Wages &amp; Salaries</b>	
Direct	87.96
Derived	117.87
Total	205.84
<b>State &amp; Local Taxes</b>	
Direct	4.87
Derived	6.53
Total	11.40
<b>Federal Taxes</b>	
Direct	6.47
Derived	8.67
Total	15.15
<b>Retail Sales</b>	
Direct	40.23
Derived	27.82
Total	68.05

<b>Pennsylvania</b>	
<b>Total Economic Impact</b>	<b>\$ Millions</b>
Direct	167.43
Derived	202.13
Total	369.56
<b>Wages &amp; Salaries</b>	
Direct	107.88
Derived	144.56
Total	252.44
<b>State &amp; Local Taxes</b>	
Direct	5.28
Derived	7.07
Total	12.35
<b>Federal Taxes</b>	
Direct	9.04
Derived	12.12
Total	21.16
<b>Retail Sales</b>	
Direct	45.22
Derived	38.37
Total	83.59

<b>Virginia</b>	
<b>Total Economic Impact</b>	<b>\$ Millions</b>
Direct	120.30
Derived	139.56
Total	259.86
<b>Wages &amp; Salaries</b>	
Direct	76.36
Derived	102.32
Total	178.68
<b>State &amp; Local Taxes</b>	
Direct	3.78
Derived	5.07
Total	8.85
<b>Federal Taxes</b>	
Direct	6.95
Derived	9.31
Total	16.26
<b>Retail Sales</b>	
Direct	33.21
Derived	22.86
Total	56.07

<b>Utah</b>	
<b>Total Economic Impact</b>	<b>\$ Millions</b>
Direct	30.68
Derived	35.68
Total	66.36
<b>Wages &amp; Salaries</b>	
Direct	18.29
Derived	24.51
Total	42.81
<b>State &amp; Local Taxes</b>	
Direct	0.85
Derived	1.13
Total	1.98
<b>Federal Taxes</b>	
Direct	1.42
Derived	1.90
Total	3.32
<b>Retail Sales</b>	
Direct	10.12
Derived	8.14
Total	18.26

<b>Wisconsin</b>	
<b>Total Economic Impact</b>	<b>\$ Millions</b>
Direct	69.35
Derived	79.33
Total	148.68
<b>Wages &amp; Salaries</b>	
Direct	44.00
Derived	58.96
Total	102.97
<b>State &amp; Local Taxes</b>	
Direct	2.23
Derived	2.99
Total	5.22
<b>Federal Taxes</b>	
Direct	3.59
Derived	4.81
Total	8.41
<b>Retail Sales</b>	
Direct	19.52
Derived	12.57
Total	32.09



<b>Ontario</b>		
<b>Total Economic Impact</b>		<b>\$ Millions</b>
Direct		205.30
Derived		268.28
Total		473.59
<b>Wages &amp; Salaries</b>		
Direct		152.74
Derived		204.68
Total		357.42
<b>State &amp; Local Taxes</b>		
Direct		9.93
Derived		12.87
Total		22.79
<b>Federal Taxes</b>		
Direct		19.55
Derived		25.81
Total		45.37
<b>Retail Sales</b>		
Direct		23.08
Derived		24.93
Total		48.01

<b>Quebec</b>		
<b>Total Economic Impact</b>		<b>\$ Millions</b>
Direct		108.52
Derived		141.56
Total		250.08
<b>Wages &amp; Salaries</b>		
Direct		79.47
Derived		106.49
Total		185.96
<b>State &amp; Local Taxes</b>		
Direct		8.11
Derived		10.61
Total		18.72
<b>Federal Taxes</b>		
Direct		7.95
Derived		10.42
Total		18.37
<b>Retail Sales</b>		
Direct		13.00
Derived		14.04
Total		27.04