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CYBERSECURITY INSURANCE AND WISCONSIN: COVID AND INCREASING ECONOMIC IMPACT

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Cybersecurity risk and breaches have grown increasingly important in recent decades (Campbell et al., 2003; Cavusoglu et al., 2004). In 2006, Wikileaks was founded with the purpose of publishing classified or otherwise censored government and corporate documents (wikileaks.org). As of 2017, 143 million Americans experienced identity theft due to the hacking of Equifax (Timberg et al., 2017). The situation worsened after the COVID-19 pandemic led many businesses to move employees on-line, starting in March, 2020. Surveys by Sophos in 2020 and 2021 found that the average ransomware resulted in total recovery costs of $761,106 in 2020, but $1.85 million as of 2021 (Sophos, 2021).

The development of cybersecurity risks led to the creation of a cybersecurity insurance (CSI) industry. Beginning in the 1990s, such insurance was offered to companies for online media or errors in data processing, which later came to provide first-party coverage (e.g., for those damaged in the Equifax hack), network security generally, and business interruption, network and extortion damages (Colony West, 2022).

In part because the development of CSI is relatively recent, economic analyses of CSI are scarce. Eling and Zhu (2020) analyzed the types of property-liability insurance companies offering CSI. They did so using annual data from 2015, when a statutory requirement to report cybersecurity and identity theft coverage was put in place by the National Association of Insurance Commissioners (NAIC). We use those same data, but from 2015 to 2020, as provided by SNL Financial (see spglobal.com). Those data divide the insurance across lines of CSI and identity theft insurance and, following Eling and Zhu, we ignore identity theft insurance.

Our purpose here is to shed some light on the scope and reach of CSI in the state of Wisconsin. We also set the stage to build a model to estimate the economic impact of cyber security before, during and after the Covid-19 era.

Some figures presented here are only rough approximations based upon limited data. That is the case with estimating the number of employers and employees covered by CSI. As of February, 2022, the U.S. Bureau of Labor Statistics (BLS) estimates that Wisconsin had 3,048,900 employees (2022a), For that same month, the BLS estimates that the U.S. had 158,458,000 employees (2022b), so the state accounts for approximately 2% of total U.S. employment.

In 2015, a survey on CSI was administered to 102 risk managers attending a Risk and Insurance Society Conference (Business Wire, 2015). They reported that 46% of respondents had expanded CSI coverage during the prior year, with only 32% having no CSI coverage. Given the sampling method likely overstated CSI coverage, it is prudent to suggest that at least 50% of employers had CSI as of 2015, with the figure rising in more recent years (more on this below).

It is worth noting that 63% of respondents to the survey represented employers with at least 1,000 employees. According to the BLS (2022c), employers with at least 1,000 employees cover 40.95% of all employees nationwide. Together, these figures suggest that: a) large employers are more likely to purchase CSI, and b) because they are large employers, the percentage of employees covered will be higher than the percentage of employers.

The NAIC data for the number of CSI policies in force each year only range from 2017 to 2020. As shown in Table 1, the total number of policies in force rose from 2.6m in 2017 to 4.0m in 2020, for an increase of 54.3%. Noting that these are annual data, most 2020 data reflects experience under the COVID-19 pandemic (beginning in March). Given the timing, it is not

surprising that there was a 20% increase from 2019 to 2020, and we expect that 2021 figures will rise still further. Above it was suggested that at least 50% of employers had CSI as of 2015. Even with no expansion from 2015 to 2017, the 2017 to 2020 expansion implies an increase such that more than 75% of employers now have CSI.

Table 1. Number of CSI policies, 2017-2020

Year	Number of Policies	Increase from 2017
2017	2,603,969	0%
2018	2,997,005	15.1%
2019	3,337,116	28.2%
2020	4,017,150	54.3%

Table 2 provides annual data on total CSI premiums for 2015 through 2020. The overall increase is large, with just under a 200% expansion from 2015 to 2020. However, the expansion from 2017 to 2020 is remarkably similar to that for the number of policies (52.2%). By implication, on average, CSI premiums were stable over the 2017 to 2020 period. However, it is also worth noting that there was an almost 100% increase in premiums from 2015 to 2017, suggesting the number of CSI policies grew rapidly from 2015 to 2017. By that logic, the possibility that 75% of current employers currently have CSI is likely an underestimate.

Table 2. Total CSI premiums, 2015-2020

Year	Total Premiums	Increase from 2015	Increase from 2017
2015	$883,366	0.0%	
2016	$1,201,206	36.0%	
2017	$1,740,614	97.0%	0.0%
2018	$1,934,444	119.0%	11.1%
2019	$2,172,654	146.0%	24.8%
2020	$2,649,495	199.9%	52.2%

Note: Total premiums measured in $1000s.

Figures parallel to those in Table 2 are presented for total CSI losses in Table 3. Losses from 2015 to 2017 increased by only 60.9%, which is well below the 97.0% expansion of total premiums. That situation reversed dramatically, with a 320.5% increase in losses from 2017 to 2020, which far outstripped the 52.2% increase in total premiums. Further, likely due to the pandemic, losses more than doubled by 2019 to 2020. While total losses only represented 35.9% of total premiums in 2020, as of 2017, losses accounted for only 12.9% of premiums. Together, these figures suggest that the profitability of CSI contracted substantially over the period. That finding fits Eling and Zhu's (2020) view that CSI insurance is inherently risky, which is due to the ever-changing nature of cybersecurity threats in tandem with the increase in on-line communication during the pandemic.

Table 3. Total CSI losses, 2015-2020

Year	Total Losses	Increase from 2015	Increase from 2017
2015	$140,597	0.0%	
2016	$196,344	39.7%	
2017	$226,261	60.9%	0.0%
2018	$393,732	180.0%	74.0%
2019	$458,796	226.0%	102.8%
2020	$951,342	676.6%	320.5%

Note: Total losses measured in $1000s.

A 2021 report from NAIC, using the 2020 and earlier data (NAIC Staff, 2021), revealed several relevant findings in terms of industries. Specifically, the report mentions two sectors as particularly susceptible to cybersecurity risks: financial services and health care. According to BLS figures for Wisconsin, financial services accounted for 155,000 employees and information services for 45,900 employees, with education and health services accounting for 445,300 employees as of February 2022 (BLS, 2022a). Together, these sectors account for approximately one-quarter of the 3m employees in the state at that time, suggesting cybersecurity risks and CSI coverage affect many employees in the state.

It is also important to note that CSI loss figures understate true economic losses for two reasons. First, there are stock penalties for publicly traded corporations that report cybersecurity incidents (Acquisti & Grossklags, 2005), which provides an incentive to underreport such incidents. Second, a recent study found that CSI policies were poorly constructed, with minimal change between 2012 and 2017 (Woods & Moore, 2019), such as few discounts for good cybersecurity practices, and loopholes for events such as ransomware attacks. In other words, the CSI market is inefficient.

Together, these findings suggest that a majority of Wisconsin employers likely already purchase CSI. The market, however, is poorly regulated, and the 2020 spike in losses will likely lead to large increases in premiums. Regulators in the state could act to ensure that CSI premiums respond to organizational investments in cybersecurity hardware, software, education, and practices, such that discounts reflect risk. To achieve that end, we next need to know which organizations in Wisconsin are purchasing CSI, relevant premiums and coverage, and expenses for covered and uncovered losses due to cybersecurity incidents.

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