An Updated Survey of Minnesota's Venture Capital Landscape: 1995-2016

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1. Introduction

Minnesota has made progress in its standing as a leading science and technology state, moving from 12th in the 2014 Milken Institute's Technology and Science Index rankings to seventh in the most recent rankings released in 2016. While Minnesota gets high rankings for the state's science and technology workforce and investments in human capital, the state lags behind in its rankings with respect to Risk Capital and Entrepreneurial Infrastructure, where it ranks 16th.

The Milken Institute's Technology and Science Index measures states on five categories, which include: Human Capital, R&D Inputs, Risk Capital, Workforce and Tech Concentration, each of which are composed of a number of subcomponents. While metrics related to venture capital (VC) are components of the Risk Capital metric, VC plays an important role in funding early- and late-stage startup enterprises.

The vitality of a state's VC environment is one indicator of a state's economic and innovation competitiveness. As Minnesota looks to compete with other states around the country to attract and retain a talented workforce and attract innovative businesses, it is important to know how Minnesota compares to the nation, especially some of the most competitive states.

This report is an update to a report published in early 2016. The reason for the updated report one year after its initial publication is that PriceWaterhouseCoopers's (PwC's) MoneyTree report now collects its data from CB Insights. This has resulted in a change of sector categorization from those used by PwC and Thompson Reuters. For example, the data published by CB Insights no longer have Biotechnology and Medical Devices & Equipment as sector categories, but instead rolls these and other sectors into a single Healthcare category. The data set also contains new categories, like Risk & Security and Leisure. CB Insights also uses different methodologies to collect its data than used by Thompson Reuters.

This updated report also contains new comparisons to the nation's top five science and technology states that were previously not available. The report aims to put Minnesota's VC investments in context, identifying the state's strengths and weakness with respect to those of other states. For example, from 1995 through 2001, four sectors–Healthcare, Internet, Software (Non-Internet or Mobile) and Computer Hardware & Services–accounted for 58.57 percent of VC dollars flowing to Minnesota companies. From 2009 through 2016, however, two sectors–Healthcare and Internet–accounted for 73.37 percent of VC dollars flowing to Minnesota companies, with Healthcare making up half of all VC investments during this timeframe.

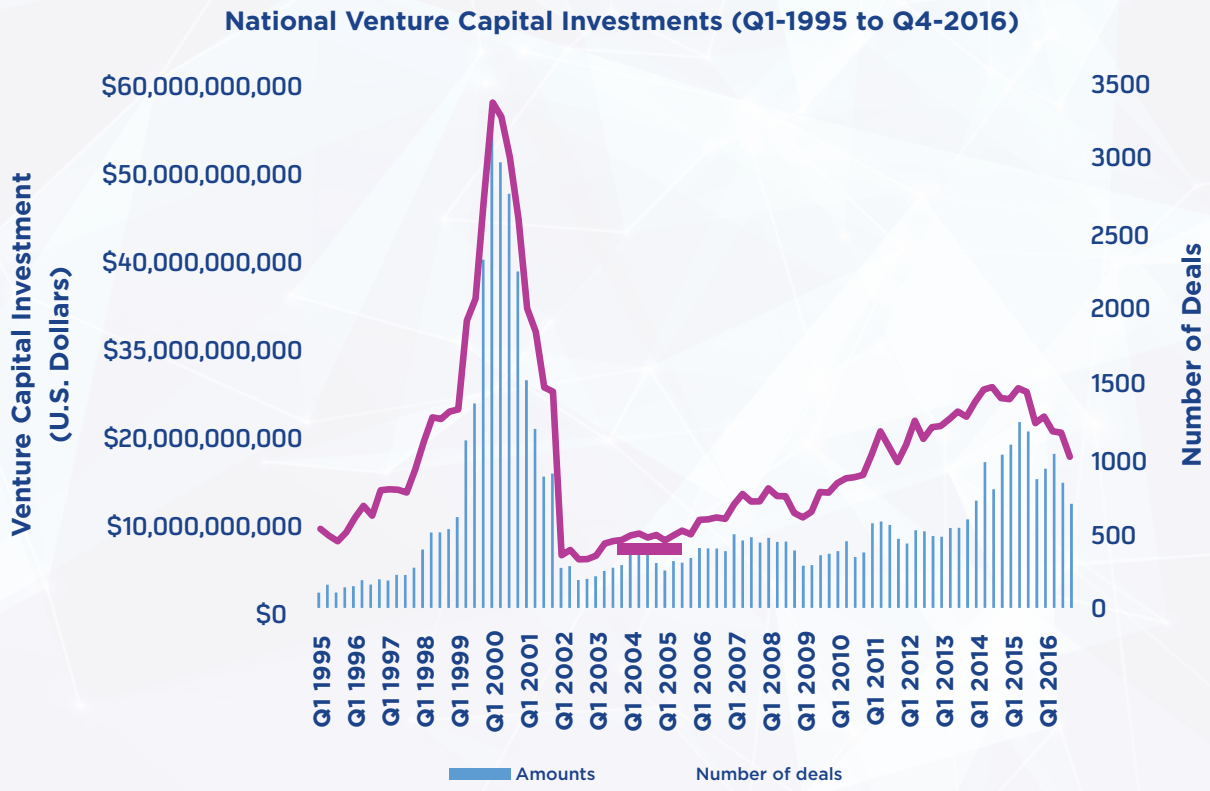
The remainder of the discussion compares Minnesota's VC investment climate to that of other states, and makes recommendations for how to improve the climate in Minnesota.

2. Overview of Venture Capital Investments Nationally

Drawing on data from PriceWaterhouseCoopers (PwC) and CB Insight's MoneyTree Report, this report reviews venture capital funding in Minnesota from 1995 through 2016, in private emerging companies.[1]

The deals tracked by the MoneyTree report include equity financing in emerging private companies. Data includes investments in rounds that have closed. Data excludes contingent funding; debt or loans (except convertible notes); private placements; government funding; buyouts, consolidations and recapitalizations. The MoneyTree report provides additional details on its data collection methodology and definitions.[2]

Since 1995 (the first year for which data is available from PwC) VC investments in U.S. businesses have surged from an average annual investment of nearly $4.5 billion to nearly $13 billion in 2016 (in nominal dollars).



1. https://www.pwc.com/us/en/technology/moneytree.html
2. https://www.pwc.com/us/en/technology/moneytree/moneytree-definitions.html#ETReport

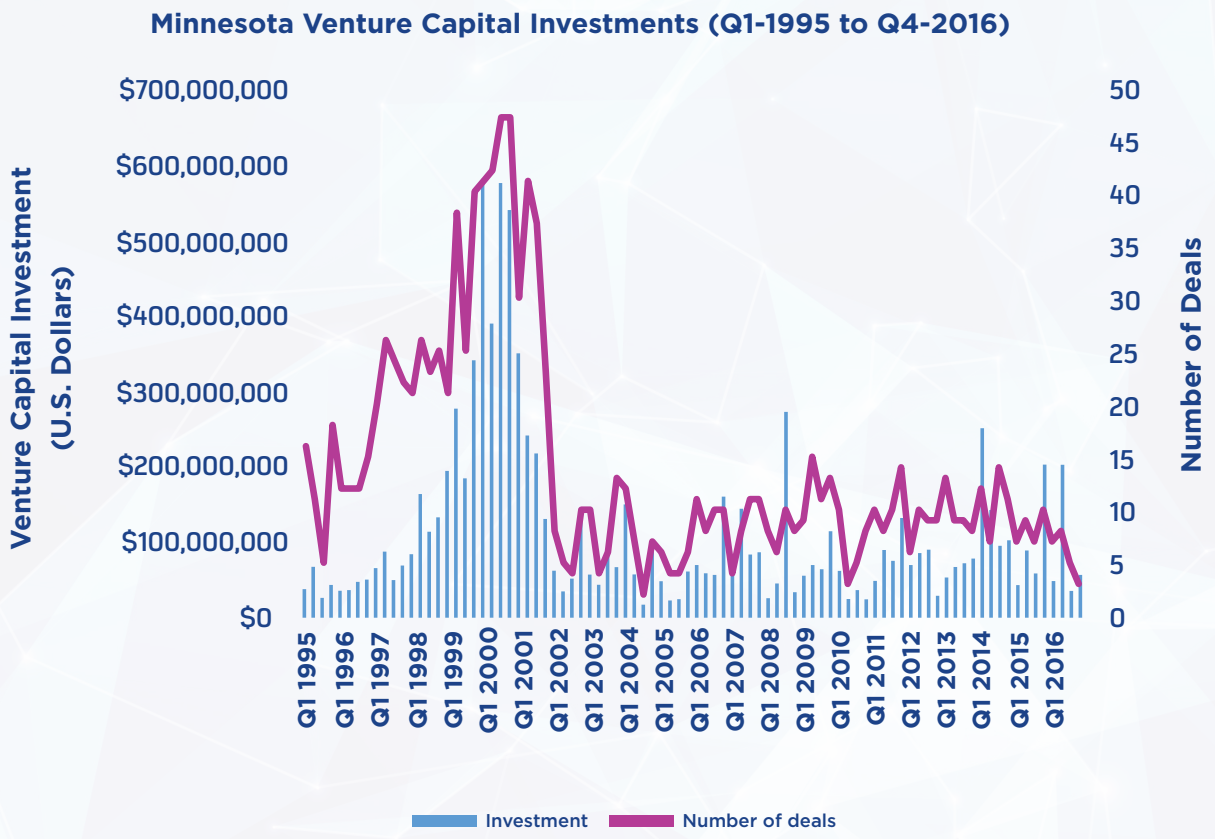
Indeed, as the chart on the previous page indicates, venture funding fluctuates from quarter to quarter. Perhaps most evident is the spike around the year 2000 corresponding to the dot-com bubble, reaching its peak in the first quarter of 2000 at $54.3 billion. As the bubble burst, venture financing levels declined from $37.7 billion in the fourth quarter of 2000 to $3.1 billion in the third quarter of 2002.

The chart also shows a dip in venture capital investments during the 2008-2009 Great Recession, followed by a rebound. More recently, the chart shows a steady climb out of the Great Recession, peaking at $20.8 billion in the second quarter of 2015 before declining through 2016. This increase in total venture capital investments might indicate an over-valuation of companies in the venture capital space and could be reflective of the increase in the number of "unicorns" (i.e. companies with valuations of more than $1 billion)–since CB Insights began tracking the number of unicorns back to 2009, the number of unicorns have increased from one to 186.[3]

[3] "The Increasingly Crowded Unicorn Club In One Infographic," CB Insights, https://www.cbinsights.com/blog/increasingly-crowded-unicorn-club/, accessed February 17, 2017.

3. Overview of Venture Capital Investments in Minnesota

Minnesota has a history of innovation in the healthcare and computing industry, from the world's first battery-powered pacemaker to the development of the supercomputer. While the computing sector in Minnesota today is not as robust as it once was, healthcare continues to dominate Minnesota's VC landscape.



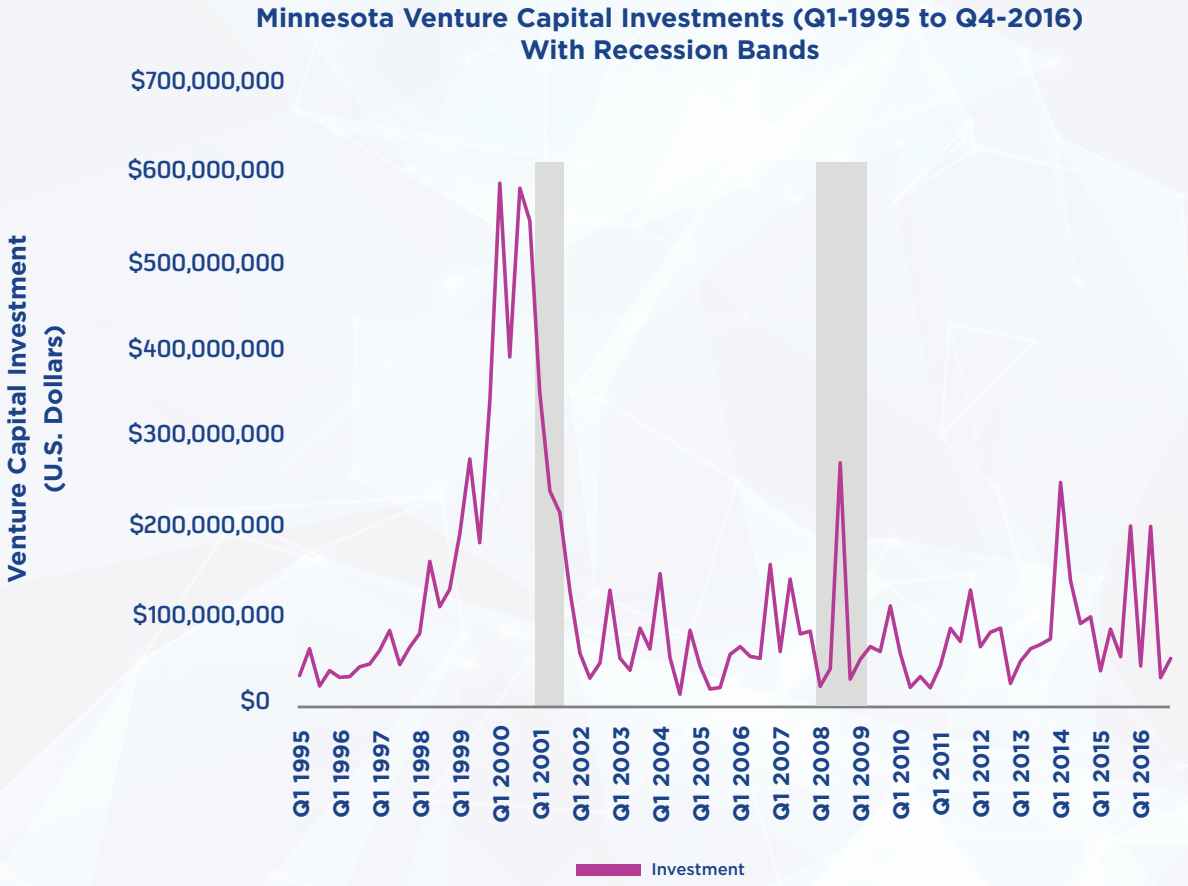
The chart above illustrates the number and value of venture capital deals by quarter in Minnesota. Similar to the national venture capital picture, Minnesota experienced an investment bubble around the year 2000, succeeded by a collapse in 2001. At the peak of the bubble, Minnesota generated nearly $575.15 million in VC investments in the first quarter of 2000. Unlike national VC trends, Minnesota has not experienced a significant recovery in its VC markets since the 2008-2009 Great Recession. Indeed, VC investments in Minnesota companies have remained relatively flat since 2003.

Overview of Minnesota VC Investment by Sector in Millions of Dollars (1995-2016)

Sector	N	Total	Average (Deal)	Average (Quarter)	Median (Quarter)	Interquartile Range (Quarter)
Agriculture	1	$2.25	$2.25	$2.25	$2.25	$0.00
Automotive & Transportation	2	$35.00	$17.50	$17.50	$17.50	$7.50
Business Products & Services	39	$395.83	$10.15	$10.15	$10.15	$25.28
Computer Hardware & Services	67	$601.83	$8.98	$8.98	$8.98	$12.36
Consumer Products & Services	44	$294.56	$6.69	$6.69	$6.69	$9.51
Electronics	49	$236.32	$4.82	$4.82	$4.82	$9.20
Energy & Utilities	29	$252.35	$8.70	$8.70	$8.70	$13.82
Financial	11	$50.87	$4.62	$4.62	$4.62	$2.18
Food & Beverages	10	$26.65	$2.67	$2.67	$2.67	$2.03
Healthcare	448	$3,757.06	$8.39	$8.39	$8.39	$36.39
Industrial	69	$316.56	$4.59	$4.59	$4.59	$12.22
Internet	171	$1,569.70	$9.18	$9.18	$9.18	$27.30
Leisure	8	$330.86	$41.36	$41.36	$41.36	$12.00
Media (Traditional)	49	$447.70	$9.14	$9.14	$9.14	$14.79
Metals & Mining	1	$0.57	$0.57	$0.57	$0.57	$0.00
Mobile & Telecommunications	56	$600.56	$10.72	$10.72	$10.72	$16.77
Retail	12	$78.87	$6.57	$6.57	$6.57	$8.35
Risk & Security	4	$37.50	$9.38	$9.38	$9.38	$11.25
Software (Non-Internet or Mobile)	152	$775.40	$5.10	$5.10	$5.10	$13.36

The table above displays various descriptive statistics related to Minnesota's VC investments by sector between the years 1995 and 2016. The Healthcare sector has generated the most VC investment at nearly $3.8 billion, with an average investment of $8.4 million across 448 deals. Minnesota's Internet sector generated the second most VC investment, bringing in nearly $1.6 billion of investment, with an average investment of $9.2 million across 171 deals. The Software (Non-Internet or Mobile) sector has drawn in more than $775 million between 1995 and 2016, across 152 deals, with an average deal of $5.1 million. Together, these three sectors account for more than 62 percent of the VC investments generated in Minnesota.

For these sectors–Healthcare, Internet and Software (Non-Internet or Mobile)–and others, the average quarterly investment is greater than the median quarterly investment. This suggests that a relatively few number of deals each quarter resulted in a higher average investment.



The chart above tracks total quarterly VC funding in Minnesota with respect to recent recessions. The grey bands denote the recession of March 2001 through November 2001 and the Great Recession from December 2007 through June 2009, as defined by the National Bureau of Economic Research.[4]

The series depicts the dot-com bubble around the year 2000 and subsequent deflation of the bubble and recession of 2001. Also evident in the series is the climb out of the recession from 2002 through 2007. While the total level of VC investment in Minnesota appears to fluctuate in the quarters preceding the Great Recession, it reaches a local maximum in the midst of the recession. It is not until after the recession that the total level of VC investments decline in Minnesota, before reaching a new local maximum in the first quarter of 2014.

A similar trend appears following the 2001 recession, as the United States enters an economic downturn between March and November 2001. Following the economic downturn, VC investments in Minnesota continue to ebb and flow on a downward trend through the third quarter of 2004.

[4] http://www.nber.org/cycles.html, accessed February 12, 2016.

Comparison of VC Dollars by Timeframe: Minnesota

Timeframe	1995 - 2001		2002 - 2008		2009 - 2016	
Sector	Total (Millions of Dollars)	Pct. of total	Total (Millions of Dollars)	Pct. of total	Total (Millions of Dollars)	Pct. of total
Healthcare	$1,185.96	23.34%	$1,248.89	59.82%	$1,322.21	50.04%
Internet	$662.11	13.03%	$291.06	13.94%	$616.53	23.33%
Energy & Utilities	$9.00	0.18%	$19.98	0.96%	$223.37	8.45%
Leisure	$130.86	2.58%	$0.00	0.00%	$200.00	7.57%
Software (Non-Internet or Mobile)	$601.00	11.83%	$90.15	4.32%	$84.25	3.19%
Industrial	$127.68	2.51%	$140.21	6.72%	$48.67	1.84%
Financial	$10.87	0.21%	$0.00	0.00%	$40.00	1.51%
Electronics	$176.90	3.48%	$28.48	1.36%	$30.94	1.17%
Mobile & Telecommunications	$427.92	8.42%	$144.55	6.92%	$28.09	1.06%
Food & Beverages	$0.00	0.00%	$0.00	0.00%	$26.65	1.01%
Computer Hardware & Services	$526.41	10.36%	$60.24	2.89%	$15.18	0.57%
Business Products & Services	$364.13	7.17%	$27.70	1.33%	$4.00	0.15%
Consumer Products & Services	$292.56	5.76%	$0.00	0.00%	$2.00	0.08%
Metals & Mining	$0.00	0.00%	$0.00	0.00%	$0.57	0.02%
Automotive & Transportation	$0.00	0.00%	$35.00	1.68%	$0.00	0.00%
Retail	$77.37	1.52%	$1.50	0.07%	$0.00	0.00%
Media (Traditional)	$447.70	8.81%	$0.00	0.00%	$0.00	0.00%
Risk & Security	$37.50	0.74%	$0.00	0.00%	$0.00	0.00%
Agriculture	$2.25	0.04%	$0.00	0.00%	$0.00	0.00%

Based on the recessions, we can split the VC investments into three groups: (1) 1995-2001, (2) 2002-2008, and (3) 2009-2016. The 1995-2001 group corresponds to the pre-dot-com bubble period; the 2002-2008 group corresponds to the post-dot-com/pre-Great Recession period; the 2008-2016 group corresponds to the post-Great Recession period.

Prior to the dot-com crash, four sectors–Healthcare, Internet, Software (Non-Internet or Mobile) and Computer Hardware & Services–accounted for 58.57 percent of VC dollars flowing to Minnesota companies. There were nine sectors during this time accounting for 92.21 percent of Minnesota's VC investments. Following the dot-com crash and preceding the Great Recession, two sectors–Healthcare and Internet–accounted for 73.76 percent of VC investments in Minnesota-based companies. During this time, there were five sectors accounting for 91.72 percent of Minnesota's VC investments. Following the Great Recession (2009-2016), two sectors–Healthcare and Internet–accounted for 73.37 percent of Minnesota's VC investments, with five sectors accounting for 92.58 percent of Minnesota's VC investments.

Minnesota's VC market has become more concentrated following the dot-com crash of 2001, shrinking from at least nine industries accounting for at least 90 percent of the share of Minnesota's VC dollars to at least five industries account for at least 90 percent of this share.

Comparison of Minnesota's VC Market by Sectors

Top 9 Sectors (1995-2001)	Share of VC Market	Top 5 Sectors (1998-2019)	Share of VC Market
Healthcare	23.34%	Healthcare	50.04%
Internet	13.03%	Internet	23.33%
Software (Non-Internet or Mobile)	11.83%	Energy & Utilities	8.45%
Computer Hardware & Services	10.36%	Leisure	7.57%
Media (Traditional)	8.81%	Software (Non-Internet or Mobile)	3.19%
Mobile & Telecommunications	8.42%		
Business Products & Services	7.17%		
Consumer Products & Services	5.76%		
Electronics	3.48%		
Total	**92.21%**	**Total**	**92.58%**

The shift in sector concentration highlights the strength of Minnesota's Healthcare sector and its Internet sector. The dominance of Healthcare with respect to VC investments is not surprising given the state's historical strength in that sector. The Internet sector continues to attract a greater share of VC investments than prior to the burst of the dot-com bubble or the Great Recession. The Software (Non-Internet of Mobile) sector of the VC market has declined in share from 11.83 percent between 1995 and 2001 to 3.19 percent between 2009 and 2016. This is likely due to the emergence of e-commerce sites and the online communications platforms, which fall under the Internet sector.

Additionally, the Energy & Utilities and Leisure sectors appear to be emerging areas of VC investment in Minnesota. Neither of these two top-five sectors in 2008-2016 were in the top nine sectors between 1995 and 2001. The Computer Hardware & Services, Media (Traditional), Mobile & Telecommunications, Business Products & Services, Consumer Products & Services and Electronics all fell out of the top sectors accounting for at least 90 percent of the VC market share.

Quantity of Minnesota VC Investments by Stage by Timeframe

Stage	Seed	Early	Expansion	Later	Other
Timeframe	**Amount**	**Amount**	**Amount**	**Amount**	**Amount**
1995 - 2001	$232,986,400 (4.6%)	$863,327,400 (17.0%)	$2,333,580,300 (45.9%)	$625,367,000 (12.3%)	$1,024,950,000 (20.2%)
2002 - 2008	$14,200,000 (0.7%)	$269,170,000 (12.9%)	$709,840,000 (34.0%)	$459,040,000 (22.0%)	$635,510,000 (30.4%)
2009 - 2016	$39,220,000 (1.5%)	$458,780,000 (17.4%)	$864,310,000 (32.7%)	$1,132,010,000 (42.8%)	$148,140,000 (5.6%)

The share of VC investments flowing to companies in the expansion stage has declined from 45.9 percent in during the 1995-2001 timeframe to 32.7 percent during the 2009-2016 timeframe. Where later stage investments accounted for 12.3 percent of all VC investments during 1995-2001, they have more recently accounted for 42.8 percent of all VC investments in Minnesota. This suggests that either investors have become increasingly risk adverse, with investors waiting until a company has shown significant traction before making an investment, or companies once in the expansion stage have advanced to later stage. If the latter is true, then there are fewer VC dollars as a percentage of all investments going to companies in the expansion stage.

Quantity of Minnesota VC Investments by Stage by Timeframe

Stage	Seed	Early	Expansion	Later	Other
Timeframe	**Number of deals**	**Number of deals**	**Number of deals**	**Number of deals**	**Number of deals**
1995 - 2001	89 (12.4%)	173 (17.0%)	297 (41.3%)	66 (9.2%)	95 (13.2%)
2002 - 2008	23 (10.8%)	40 (18.8%)	58 (27.2%)	20 (9.4%)	72 (33.8%)
2009 - 2016	45 (15.6%)	82 (28.4%)	81 (28.0%)	46 (15.9%)	35 (12.1%)

Consider instead the total number of deals by timeframe. Here, the picture is different. Companies in the expansion stages accounted for the greatest share (41.3 percent) of companies receiving VC investments during the 1995-2001 timeframe. By 2009-2016, the share of companies in this stage declined to 28.0 percent, with early stage companies accounting for 28.4 percent (compared to 24.0 percent during the 1995-2001 timeframe).

Average Minnesota VC Investments by Stage by Timeframe

Stage	Seed	Early	Expansion	Later	Other
Timeframe	**Amount**	**Amount**	**Amount**	**Amount**	**Amount**
1995 - 2001	$2,617,825	$4,990,332	$7,857,173	$9,475,258	$10,788,947
2002 - 2008	$617,391	$6,729,250	$12,238,621	$22,952,000	$8,826,528
2009 - 2016	$871,556	$5,594,878	$10,670,494	$24,608,913	$4,232,571

Now consider the average quarterly investment by timeframe by stage. As the above table indicates, the average seed-stage investment during the 1995-2001 timeframe was more than $2.7 million seed-stage investments during the 2002-2008 and 2009-2016 are significantly lower at $617,391 and $781,556, respectively. Notably, during the 1995-2001 timeframe investments across stage varied by a factor of 4.12. During the 2002-2008 timeframe, investments across stage varied by a factor of 37.18 and during the 2009-2016 timeframe, investments across stage varied by a factor of 28.24.

Investments during the 1995-2001 timeframe were much more uniform across company stage, compared to the 2002-2008 and 2009-2016 timeframes. Average investments in later-stage companies increased dramatically between the 1995-2001 timeframe and the 2002-2008 and 2009-2016 timeframes, from $9.5 million to $23 million and $24.6 million, respectively. Average investments in expansion-stage companies also increased between the 1995-2001 timeframe and the 2002-2008 and 2009-2016 timeframes.

There are also significant increases between early-stage and expansion-stage companies within both the 2002-2008 and 2009-2016 timeframes. This is not surprising because, as companies grow, they usually require more capital to continue their growth and reach new markets. This could also suggest that investors have become more risk adverse, with investors pulling back investments in seed-stage companies and investing more heavily in later-stage companies.

While the Healthcare and Internet sectors are strengths for Minnesota, how does Minnesota compare to other states? Which industries standout in other states, and how do they compare to those same industries in Minnesota?

How Minnesota Compares to Other States

The concentration of Minnesota's VC market appears to be shrinking, with at least five sectors accounting for at least 90 percent of Minnesota's VC market, which is down from nine prior to the dot-com market crash. How does this compare to other states, and what are the implications for Minnesota?

Traditionally, states like California and Massachusetts have been leaders in VC investments, and continue to lead the way. California generated nearly $181 billion in VC investments between 2009 and 2016, which is up from $71.4 billion over the 2002-2008 timeframe. California's Internet sector accounts for 39.43 percent of the state's VC investments, followed by Mobile & Telecommunications and Healthcare.

Over the 2009-2016 timeframe, Massachusetts generated $33.8 billion in VC investments, with nearly half (46.7 percent) of that investment going to the Healthcare sector. The Internet and Mobile & Telecommunications sectors accounted for 22.8 percent and 7.4 percent of the total VC investment, respectively. Prior to the Great Recession, from 2002-2008, Massachusetts generated $17.7 billion in VC investments, with the Healthcare sector accounting for 39.3 percent of that investment; the Internet sector accounting for 14.4 percent of the total investment, followed by Software (Non-Internet or Mobile) (11.6 percent) and Mobile & Telecommunications (11.3 percent).

In the previous section, we examined Minnesota's core industries with respect to VC investments. As with Minnesota, Massachusetts and California each experienced a contraction in the breadth of sectors accounting for at least 90 percent of each state's VC investments.

Minimum Number of Sectors Accounting for at least 90% of VC Investment

		Timeframe		
Overall Rank	**State**	**1995 - 2001**	**2002 - 2008**	**2009 - 2016**
1	Massachusetts	7	7	6
2	Colorado	7	7	7
3	Maryland	8	7	5
4	California	8	7	7
5	Washington	9	7	6
7	Minnesota	9	5	5

Indeed, as the table above highlights, other states have experienced similar contractions in the concentration of VC investments. Of the nation's top-five science and technology states, Colorado is the only state that did not experience a contraction in its sector concentration with respect to VC investments. Massachusetts's sectoral concentration has contracted only slightly, from seven to six sectors, between the 1995-2001 timeframe and the 2009-2016 timeframe. Of the top-five states, Washington experienced the greatest contraction, from nine to six sectors, between the 1995-2001 timeframe and the 2009-2016 timeframe–which is a reduction of 33.33 percent.

Minnesota, which ranks seventh nationally on the Milken Institute's technology and science index, experienced an even greater contraction of sector concentration, from nine to five, between the 1995-2001 timeframe and the 2009-2016 timeframe. The contraction from nine to five sectors is a reduction of 44.44 percent. While the majority of the top-five states experienced some contraction in the concentration of sectors receiving VC investments, no state experienced a greater contraction than Minnesota.

This contraction is consequential because, as Michael Porter's theory of clusters suggests, regions with a diversity of industry clusters are more resilient to variations in the economy, which, in turn, form the foundation of a competitive economy. The concentration of sector VC investments reflects the economic competitiveness of a region. The contraction of Minnesota's VC market suggests a weakening of Minnesota's entrepreneurial ecosystem over the last 20 years, the result of which is an ecosystem less resilient to downturns in the economy and specific sectors, in particular.

State Comparison: Minimum Number of Sectors Accounting for at least 90% of VC Investment (2009-2016)

Milken Institute Overall Ranking	State	Sector	Investment (Millions of Dollars)	Pct of State Total
1	Massachusetts	Healthcare	$15,786.64	46.68%
		Internet	$7,722.42	22.84%
		Mobile & Telecommunications	$2,495.44	7.38%
		Energy & Utilities	$1,859.36	5.50%
		Computer Hardware & Services	$1,607.19	4.75%
		Software (Non-Internet or Mobile)	$1,571.78	4.65%
2	Colorado	Internet	$1,980.03	29.96%
		Energy & Utilities	$1,257.25	19.02%
		Mobile & Telecommunications	$963.29	14.58%
		Healthcare	$950.59	14.38%
		Computer Hardware & Services	$450.73	6.82%
		Software (Non-Internet or Mobile)	$327.80	4.96%
		Consumer Products & Services	$111.17	1.68%
3	Maryland	Healthcare	$1,926.85	48.00%
		Internet	$878.73	21.89%
		Computer Hardware & Services	$507.99	12.65%
		Software (Non-Internet or Mobile)	$237.57	5.92%
		Mobile & Telecommunications	$168.13	4.19%
4	California	Internet	$71,313.45	39.43%
		Energy & Utilities	$32,763.09	18.11%
		Mobile & Telecommunications	$28,253.30	15.62%
		Healthcare	$9,780.79	5.41%
		Computer Hardware & Services	$9,198.67	5.09%
		Software (Non-Internet or Mobile)	$7,141.00	3.95%
		Consumer Products & Services	$5,808.81	3.21%
5	Washington	Internet	$2,953.61	35.59%
		Healthcare	$2,468.96	29.75%
		Mobile & Telecommunications	$946.66	11.41%
		Computer Hardware & Services	$544.29	6.56%
		Software (Non-Internet or Mobile)	$520.49	6.27%
		Consumer Products & Services	$207.32	2.50%
7	Minnesota	Healthcare	$1,322.21	50.0%
		Internet	$616.53	23.3%
		Energy & Utilities	$223.37	8.5%
		Leisure	$200.00	7.6%
		Software (Non-Internet or Mobile)	$84.25	3.2%

Now, we compare Minnesota's top industries (as defined by the fewest industries that yield at least 90 percent of the state's VC investment), during the 2009-2016 timeframe, to those of the nation's top five science and technology states (as identified in the 2016 Milken Institute technology and science index). For the 2009-2016 timeframe, Healthcare or Internet sectors received the greatest share of each state's VC investment for each of the nation's top-five states and Minnesota. At more than $1.3 billion, Minnesota's Healthcare sector accounts for 50.0 percent of the state's VC investment. Healthcare receives the greatest share (46.7 percent) of VC investment in Massachusetts over the 2009-2016 timeframe; here, however, the total investment is nearly $15.8 billion—more than 12 times that of Minnesota.

At least five of the following six sectors are included in the minimum number sectors accounting for at least 90 percent of each of the top-five state's VC investments: Internet, Mobile & Telecommunications, Energy & Utilities, Computer Hardware & Services and Software (Non-Internet or Mobile). In addition to these sectors, Colorado and Washington include the Consumer Products & Services sector; California includes the Electronics sector and Minnesota includes the Leisure sector.

In four of the top five states and Minnesota, two or three sectors account for approximately 70 percent of the state's total venture capital investment. In Massachusetts, the Healthcare and Internet sectors account for 69.52 percent of the state's VC dollars. The Internet, Energy & Utilities, Mobile & Communications and Healthcare sectors account for 77.94 percent of the VC investments flowing to Colorado. Maryland's Healthcare and Internet sectors account for 69.89 percent of the state's VC investments. California's Internet, Mobile & Telecommunications and Healthcare sectors account for 73.16 percent of the venture capital flowing to the state. In Washington, the Internet and Healthcare sectors account for 65.34 percent of the VC deals generated in the state. Finally, two sectors, Healthcare and Internet, account for 73.3 percent of the deals generated in Minnesota.

The table on the previous page identifies what might be considered internal sector strengths of each state, based on each sector's share of VC investment in each state. Although Internet and/or Healthcare standout in each state as generating the majority of VC investment, it does not necessarily imply that those same sectors are strengths relative to other states. Minnesota's Healthcare sector, for example, accounts for 50 percent of the VC investment generated in the state. Yet, this represents a small fraction of the total of investment generated by the Healthcare sector nationwide.

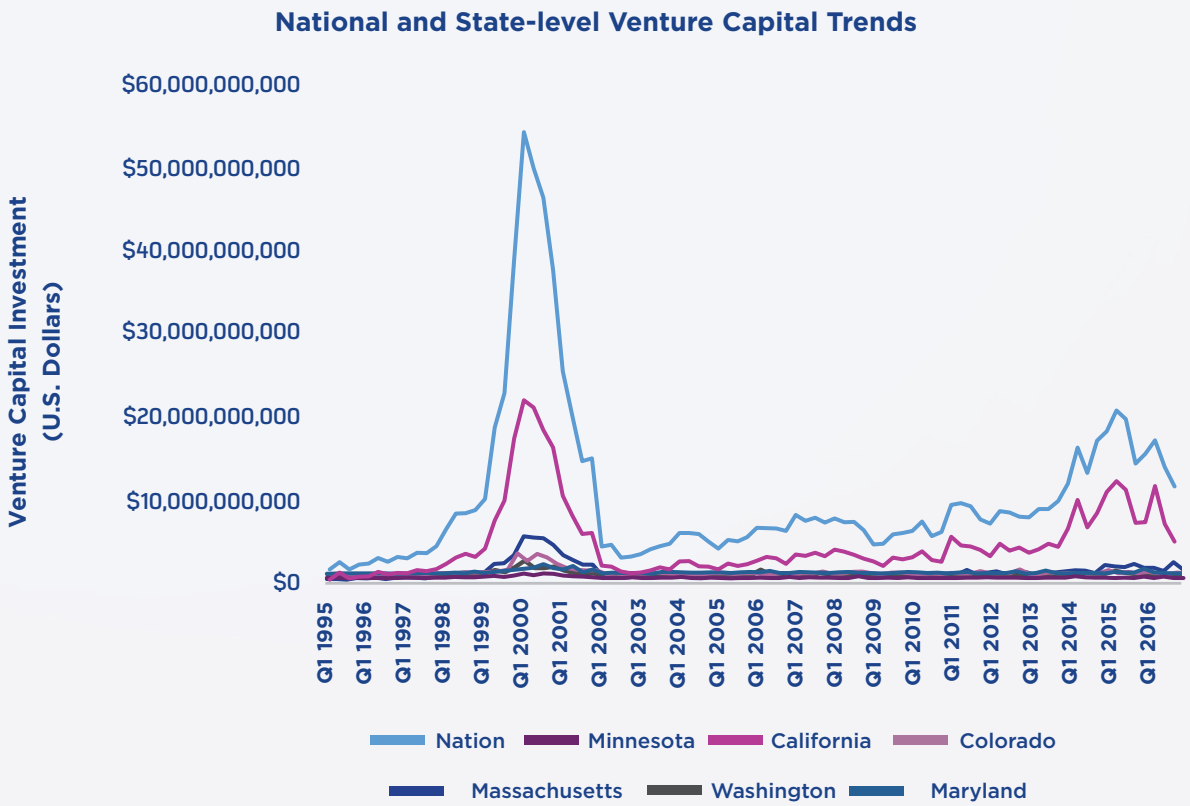
Share of Nation's VC Investment by State

Timeframe	Minnesota	Massachusetts	Colorado	Maryland	California	Washington
1995 - 2016	1.1%	10.2%	2.8%	1.6%	46.0%	3.0%
1995 - 2001	1.2%	10.3%	3.7%	1.7%	41.4%	3.0%
2002 - 2008	1.3%	10.9%	2.5%	2.4%	44.0%	4.1%
2009 - 2016	0.8%	9.9%	1.9%	1.2%	52.8%	2.4%

As a whole, Minnesota represents a small fraction of the nation's total VC activity. Between 1995 and 2016, Minnesota accounted for 1.1 percent of the nation's VC activity; between 2009 and 2016, Minnesota's share of VC activity declined to 0.8 percent. Meanwhile, during the 2009-2016 timeframe, California generated nearly 53 percent of the nation's VC investments, while Massachusetts generated nearly 10 percent of the nation's VC investments. While Colorado, Maryland and Washington each account for a greater share of the nation's venture capital activity than Minnesota (ranging from 1.5 to 3.0 times the share that Minnesota consumes), their share is relatively insignificant compared to Massachusetts and certainly California.

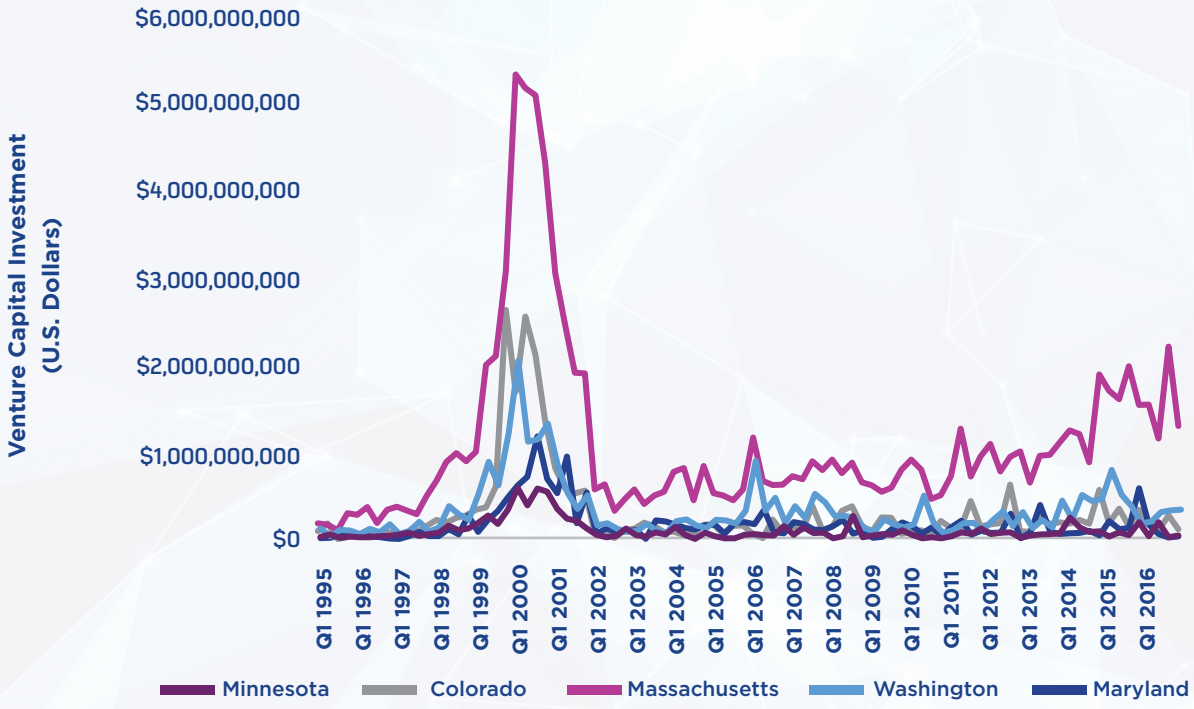
California experienced an increase in its share of the nation's VC investment between the 1995-2001 and 2009-2016 timeframes, from 41.4 percent to 52.8 percent, and is the only state noted above that experienced an increase. Each other state experienced a decline in the share of the nation's VC activity between the 1995-2001 and 2009-2016 timeframes.

This suggests that, just as there is an element of sector concentration occurring within states, there is a concentration of venture capital investment occurring between states, with California now accounting for more than half of the nation's VC activity. The sector-level concentration within states taken together with the concentration occurring between states, implies that there is less potential VC investments available for other states, as a share of national VC activity and, that of the available funds, more is being directed at fewer sectors.



The chart above illustrates the degree to which California dominates the nation's VC landscape, with national trends closely following those of California. Massachusetts is visible on the chart, with an accentuated bump during the tech bubble of 2000-2001. Massachusetts, however, does not exhibit the same recovery from the burst of the dot com bubble as exhibited by California. States like Minnesota, Colorado, Maryland or Washington account for such a small share of the nation's VC activity that they are nearly absent from the chart.

State-level Venture Capital Trends, Excluding California



The chart above displays venture capital trends for Minnesota, Colorado, Massachusetts, Washington and Maryland, excluding California. Massachusetts stands out among the other states, not only for the magnitude of the investments it generates, but also for the upward trend in investments following the tech bubble of 2000-2001. The other states included in the above chart do not exhibit the same recovery from the burst of the tech bubble, exhibiting some variation between quarters, but generally flat with respect to growth in VC activity.

Minnesota faces steep competition from the nation's top-five-ranked science and technology states with respect to venture capital contributions. If the venture capital market continue to become more concentrated, both between states and at the sector-level within individual states, it will become increasingly difficult for Minnesota to attract venture capital investments. With less of a share of the nation's investment available for Minnesota, and of that available, a higher proportion going to fewer sectors with which Minnesota competes with other states, companies seeking venture capital in Minnesota will face greater competition in a more homogeneous marketplace.

A more concentrated VC market in Minnesota could result in fewer, but higher-quality, companies being funded. As the market becomes more concentrated within a sector it also becomes more competitive as companies vying for funding must differentiate themselves.

On the other hand, a more concentrated VC market in Minnesota could result in a greater number of low-quality companies being funded. This could happen if, as the market becomes more competitive, companies do not differentiate themselves from each other. In this case, venture capitalist would likely begin leaving the state to look for potential deals elsewhere.

If Minnesota is to remain competitive with other states and increase its share of the nation's VC investment, it must produce a greater number of high-quality emerging companies seeking venture capital. This means fostering an environment of entrepreneurship and attracting the best talent to work on the most challenging problems in science and technology.

4. Conclusion

The character of Minnesota's venture capital activity has changed over the last two decades. Between 1995 and 2001, Minnesota had a relatively diverse set of sectors attracting investments from venture capitalists, encompassing nine sectors, from Healthcare and Internet to Software (Non-Internet or Mobile) and Electronics, in addition to five others. More recently, this diversity of sectors has become more concentrated during the 2009-2016 timeframe, continuing to encompass Healthcare and Internet but dropping Media (Traditional) and Media & Telecommunications and others, while others like the Energy & Utilities and Leisure sectors rising.

While this concentration suggests a strengthening of sectors within Minnesota, particularly among Minnesota's Healthcare and Internet sectors, there are some weaknesses and signs of trouble for Minnesota from a national perspective. Over the 2009-20126 timeframe, Minnesota's venture capital activity as a whole accounted for only 0.8 percent of the nation's venture capital activity, with nearly 53 percent of the nation's activity attributed to California.

If the national trend of increased VC investment concentration continues, and together with the continued sector concentration at the state level, states will see less VC investment going to fewer sectors. This is particularly troubling for most states, like Minnesota, which are already laggards.

The relative strengths of California and Massachusetts beg the question: why them and why not other states? There are at least two necessary conditions for a vibrant venture capital/risk capital ecosystem. The first requires venture capitalists; the second requires innovative companies in which investors want to make an investment. Given the interconnectedness of today's economy and ability for people and institutions to share information with each other, there are relatively few barriers to sharing information, including investment or company-specific details that might inform an investment decision, with one another. Regardless of the geographic location in which a company might start, it is relatively straightforward for investors (or company founders) in one location to share information with potential or prospective investors in another location.

The second requirement, the more challenging and most critical requirement, is the existence of companies in which investors choose to make an investment. That is, there must be a sufficient number of target companies to support the density of investments in a particularly geographic location. If the cost of sharing information between companies and investors is relatively low, then there are fewer barriers to connect investors with target companies. If capital flows to ideas and businesses, regardless of location, this seems to be the challenge facing Minnesota–a dearth of companies in which investors choose to invest capital.

A key attribute of states with strong VC activity is the proximity of the business and/or startup community to multiple–that is, more than one–leading research institutions. Leading VC states, like California and Massachusetts, are each home to at least two leading research universities and at least one leading research hospital. These research institutions develop novel technologies, therapies, etc. and have the resources to assist in commercializing technologies and other scientific discoveries. Although Minnesota is home to one of the highest concentrations of Fortune 500 companies in the country, it does not have a comparable number of research universities or hospitals to California (in particular, Silicon Valley and the San Francisco Bay Area) or Massachusetts (in particular, Boston).

The University of Minnesota does, however, have one of the nation's best technology transfer programs. The University of Minnesota's Office for Technology Commercialization (OTC) was recently ranked by the Milken Institute as the sixth-best U.S. public university for technology transfer, as it continues to make progress in commercializing technologies and developing companies.[5] In 2016, OTC marked a milestone of spinning out its 100th company.

Fostering more cutting edge research in Minnesota is key to helping strengthen the state's venture capital investment opportunities. Funding for research at the University of Minnesota, Mayo Clinic and research via the federal Small Business Administration's Small Business Innovation (SBIR) and Small Business Technology Transfer (STTR) programs are critical to making Minnesota more competitive and increasing the likelihood that innovative companies will develop here.

However, these alone are insufficient. The University of Minnesota has a limited capacity for research activities. The same is true for Mayo Clinic–and with Mayo Clinic located in Rochester, it does not directly benefit from the density and dynamism of the Minneapolis-St. Paul metro area. That is why policymakers should consider establish ing a state-funded research institution, located in the Minneapolis-St. Paul area, to complement the research strengths of the University of Minnesota.

Policymakers might also consider establishing a "grand challenge" program to tackle outstanding scientific or engineering problems, resulting in a cash prize for the winners. The nature of the problems could be determined by subject matter experts, with funding provided by the Legislature or via financial support from corporations, nonprofits or individuals. A robust grand challenge program with a substantial monetary award could help attract new entrants to Minnesota's entrepreneurial ecosystem.

[5] http://www.tcbmag.com/news/articles/2017/may/u-of-m-ranked-as-sixth-best-u-s-public-university, accessed June 1, 2017.

The University of Minnesota and Mayo Clinic could separately establish tenured-level positions whose responsibilities include research, development and commercialization of new technologies or scientific discoveries. This would incentivize some researchers to focus on commercialization instead of, or in addition to, the publication of peer-reviewed research. While the publication of peer-reviewed research is certainly important, a shift in focus for some researchers could help spur additional scientific discoveries and technological innovations, resulting in their commercialization and the formation of new companies.

State tax policies can help stimulate company formation and create an environment in which starts thrive. Tax policies, like the research and development (R&D) tax credit, can help incentivize companies to make critical investments in research activities in Minnesota. Recently, the Minnesota state legislature updated Minnesota's R&D tax credit, increasing the rate on the second tier (i.e. qualified research expenses in excess of $2 million) from 2.5 percent to 4.0 percent, while leaving the first tier (i.e. qualified research expenses up to $2 million) at 10 percent. Minnesota's R&D tax credit, however, is not refundable. Thus, companies without a tax liable, like many emerging companies, cannot claim the credit. Making the state's R&D tax credit refundable would create additional incentives for small and growing science and technology companies to conduct research and make additional investments in Minnesota.

Minnesota's angel investment tax credit is another tax incentive that can stimulate investment in, and encourage the development of, the state's emerging science and technology companies. As noted in this report, Minnesota's investment climate is cooler than that of other leading science and technology states. In 2010, the state implemented an angel investment tax credit program which provides a 25 percent tax credit to qualified investors that make qualified investments in qualified science and technology startups headquartered in Minnesota. The program is intended to encourage investment in the state's emerging science and technology companies, that would otherwise not happen. The program is reviewed every two years under its sunset, or expiration, clause, and is currently set to expire after December 31, 2017. In 2017, the state legislature decided to not fund the program going forward and allow it expire in 2018. More than $375 million of investment has been tied to the state's angel investment tax credit since it was established in 2010. In 2016 alone, more than 100 Minnesota-based startups benefited from the program. Now, unless the program is revived during the 2018 Legislative Session, it will disappear from state law.

Policymakers, businesses and investors in Minnesota should act decisively to encourage more venture capital investment in Minnesota's emerging science and technology businesses. Without such action, Minnesota may risk a decline in the formation of new science and technology businesses and the investments directed to them. A vibrant entrepreneurial ecosystem calls for robust policies that support research and development and the formation of new companies based on that activity.

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About The Minnesota High Tech Association

The Minnesota High Tech Association (MHTA) is a non-profit association of more than 300 science and technology companies and organizations. Together, we fuel Minnesota's prosperity through innovation and technology. Our members include some of the world's leading corporations, mid-sized companies and startups. We are united behind a common vision to make Minnesota one of the country's top five technology states. Minnesota High Tech Association members represent IT, bio-sciences, advanced manufacturing, clean, green and edtech. Once a company or organization joins MHTA, all of its employees become members.

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