

# THE HAWAII RESEARCH ACTIVITY TAX CREDIT:

## IS IT EFFECTIVE AND HOW CAN IT BE IMPROVED?

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### ABSTRACT

In 2013, the Hawaii State Legislature enacted a tax credit for Hawaii technology firms engaged in qualified research activities satisfying requirements for the federal research tax credit. After reviewing studies in the economics literature on the effectiveness of research tax credits in other states and countries, we conclude that a research tax credit can be an effective policy instrument to increase R&D spending by Hawaii technology firms. However, in 2018, Hawaii's research tax credit program operated at a very small scale, with only 20 firms claiming \$2.4 million in tax credits. One clear implication of the very small scale of this program is that it cannot substantially contribute to future economic growth. The state limits total annual claims for this credit to \$5 million, and we argue that this cap interacts with the first-come, first-serve rule for rationing credits to discourage technology firms from applying for the credit. We recommend that the annual credit cap be gradually raised to \$20 million over a 4-5 year period and that the state consider better coordination and evaluation of its fragmented policies designed to support new and emerging technology firms.

### 1. INTRODUCTION

For the last fifty years, Hawaii policymakers and economist have debated the best way to foster start-up and expansion of new and existing firms engaged in research activities. Policymakers tend to target this type of firm not just because their research activities have the potential to generate substantial economic growth but because benefits from their research activities spill over to other firms and workers. Working with data from U.S. firms spanning three decades, Brian Lucking, Nicholas Bloom, and John Van Reenen (2019) estimate a marginal social return to research and development (R&D) spending at 58 percent, compared with a marginal private return of 14 percent. The high private return and the incredibly high social spillovers from firm R&D spending suggest a possible role for state and federal governments to provide incentives or direct support to existing firms to increase their R&D spending and to new R&D-oriented firms struggling to emerge. This issue is particularly relevant for Hawaii, as the state has persistently ranked among the lowest ten U.S. states in per capita R&D spending. For example, in 2017 Hawaii ranked number 49 among the US states in R&D spending by private firms as a percentage of private output: 0.24 percent for Hawaii compared to a U.S. average of 2.35 percent.<sup>1</sup>

Since the 1970s, Hawaii policymakers have experimented with an array of state interventions to promote R&D activities. In some cases, the state has provided subsidies to public research organizations designed to foster R&D spending in a particular geographic location or designated field. A moderately successful example is the Natural Energy Laboratory of Hawaii Authority (NELHA), set up in 1974 to administer an ocean science and technology park on state land near the Kailua-Kona Airport on the

<sup>1</sup> Private R&D spending as a percent of private-industry output is available for U.S. states from 1997-2017 at <https://nces.nsf.gov/indicators/states/indicator/business-performed-rd-to-private-industry-output/map/2017> (last access 13 December 2020).

Island of Hawaii. Under the auspices of the Hawaii Technology Development Corporation, the state has subsidized several successful accelerator and incubator programs that provide a variety of services to new and emerging technology firms. And under the auspices of the (now closed) Hawaii Strategic Development Corporation, the state contributed funds to several venture capital programs providing capital to emerging Hawaii technology firms. In this paper, we examine a more hands-off alternative to these state-directed subsidy programs, the provision of tax incentives to promote spending on research at Hawaii technology firms.<sup>2</sup>

Twenty years ago, the State of Hawaii embraced generous tax credits to technology firms as a key component of its strategy for diversifying the economy. In 2001 the Hawaii Legislature enacted Act 221 providing tax credits to reimburse private businesses for 100 percent of qualified high technology research spending spanning a broad array of technology categories. The tax credits produced more than \$1.7 billion of liabilities for the state, were subject to widespread fraud and abuse by the firms claiming them, and generated few successful technology firms. The program was an unqualified disaster, and the Hawaii Legislature repealed the credits in 2010.

In 2013, the Legislature passed Act 270, which provided for a more narrowly formulated, much less generous research tax credit. Since its enactment in 2013, an average of 22 firms per year have claimed the state research tax credit, with the average claim per firm amounting to \$110,000.<sup>3</sup> Over the 2014-2018 period, the total annual amount claimed varied between \$2.4 and \$3.1 million. Placed in the context of Hawaii's overall GDP of \$92.76 billion (\$2019) in 2017 and overall private R&D spending of \$554 million (\$2019) in 2017, the tax incentive program is just too small to jumpstart Hawaii's technology industry or contribute substantially to future economic growth.

Our tasks in this policy brief are straightforward. First, we consider whether research tax credits have been effective in other states and countries in increasing research spending and employment by private technology firms. Second, we consider why the Hawaii research tax credit is claimed by just a few firms and argue that its effectiveness is sharply limited by the \$5 million cap on annual claims by research firms and the first-come, first-serve rule used to prioritize claims on the \$5 million fund. Finally, we consider whether and how the tax credit program might be fixed and recommend that the state reorganize administration of its many policies designed to support emerging technology firms to make them more coherent and effective.

## **2. WHAT ARE THE EFFECTS OF R&D TAX CREDITS?**

### **Effect of R&D tax credit on research activity of private firms**

Have state R&D tax credits increased R&D spending by private firms in other U.S. states? Between 1982—when Minnesota enacted the first state R&D credit—and 2000, this question was hotly debated by social scientists and their empirical studies came to different conclusions. Some social scientists argued that firm research activities are driven primarily by new scientific developments and demand for new products and that state R&D tax incentives are unlikely to be big factors driving activities of technology firms.<sup>4</sup> Since 2000, the economics literature on this topic has expanded, using new statistical tools and better firm-level and state-level data. Bettina Becker's 2015 survey of this literature shows that study results have converged, finding that the presence of a state R&D tax credit led to more R&D spending by private firms. So how big is the effect? In response to a one percent decrease in the cost of R&D spending (induced by the tax credit), what is the percent increase in R&D expenditures by private firms?

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2 See Slattery and Zidar (2020) for a full discussion of state and local business tax incentives in the United States.

3 See State of Hawaii, DBEDT (2020). *Report on Hawaii Tax Credit for Research Activities for Tax Year 2019*, Table 15.

4 See Bloom, van Reenen, and Williams (2019), pp. 169-170.

Four recent studies of this question come to similar but slightly different results (Table 1). A 2009 study by Daniel Wilson finds that state R&D tax credits awarded to a firm in a given year generate additional R&D spending by that firm for several more years after the tax credit is claimed. Wilson finds that firms had a smaller response to the tax credit in the short run than in the long run, that a 10 percent decrease in the user cost of R&D spending [induced by the state tax credit] led to an increase in firm R&D spending within the state of 12.1% in the short run and 21.8% in the long run (p. 434). Wilson’s study warns that virtually all of the tax credit-induced increase in R&D spending by in-state firms comes at the expense of reduced R&D spending by firms in other (mostly neighboring) states. Wilson’s finding, that one state’s R&D gain is often another state’s R&D loss, provides a cautionary note for Hawaii policymakers, as R&D spending by Hawaii private firms depends not just on whether the State of Hawaii offers an attractive R&D tax credit but also on whether other states decide to enact or enhance R&D tax credits. Enhanced or new R&D tax credits in larger states in the U.S. West or Mountain West regions could prompt Hawaii technology firms to reduce R&D activities in Hawaii and increase R&D activities in those states. On a positive note, Wilson’s findings also imply that enhancements in Hawaii’s research tax credit are unlikely to set off an “arms race” among competing states in the U.S. West or Mountain West regions to enhance their credits. This is because the small size of the Hawaii economy and its small clusters of technology firms leave Hawaii off the radar screen of these states, i.e., Hawaii’s technology sector and state assistance programs are too small to merit a response.<sup>5</sup>

**TABLE 1: SUMMARY OF USER-COST ELASTICITIES FOR RESEARCH TAX CREDITS**

Article	Short-Run User Cost Elasticity	Long-Run User Cost Elasticity
Wilson (2009)	-1.21	-2.18
Thomson (2017)	-0.50	-4.00
Guceri and Liu (2019)		
Small-medium enterprises	-1.60	NA
Firms in small profits tax bracket	-2.25	NA
Blandinieres, Steinbrenner, and Weiss (2020) for U.S.	-1.80 to -1.90	0.00

A well-designed 2017 study by Russell Thomson uses an international data set covering 29 industries in 26 highly developed countries over the 1987-2006 period to estimate the effectiveness of research tax credits. Thomson finds that the effects of an R&D tax credit on private firm spending are much smaller in the short run than in the long run: A 10 percent decrease in the user cost of research spending leads to 5 percent more R&D spending by private firms in the short run and 40 percent in the long run. A 2019 study by Irem Guçeri and Li Liu examines a 2008 change in tax incentives for R&D spending by medium-size enterprises in the United Kingdom. Using data from “the universe of corporation tax filings” in the UK, they estimate a user cost elasticity of -1.6, which translates into a £1 - 1.50 increase in firm R&D spending for each £1 in additional tax credits claimed.

In a 2020 study, Florence Blandinieres, Daniela Steinbrenner, and Bernd Weiß conduct a meta-study (which is a statistical study of previous statistical studies of a topic) of 22 previous studies of R&D tax credits offered by U.S. states and national governments of developed countries. Two central conclusions emerge. First, they find that the long-run effects of state and national government R&D tax credits are smaller than indicated in many of the individual studies. Second, they find substantial variation across countries in how much additional research spending is stimulated by the R&D tax credit, with firms in U.S. states showing a relatively strong response in research spending relative to firms in other countries.

<sup>5</sup> See Bonham and Coffman (2017) for a recent examination of technology clusters in Hawaii.

From these four studies, what do we learn about the effects of state and country R&D tax credits on research spending by private firms? First, each study finds that research spending is responsive to an R&D tax credit. In three of the four studies, an extra dollar in R&D tax credits claimed translates into substantially more than a dollar of additional research spending by private firms, while in the fourth study it translates to one dollar of additional research spending. Second, the size of the response varies considerably across countries and states. Finally, there is some uncertainty regarding the long-run effects of the tax credits on research spending. While the three studies (discussed above) of tax credits in U.S. states, developed countries, and the United Kingdom find the long-run effects to be larger than the short-run effects, the meta-study finds that the long-run response tends towards zero.

### **EFFECT OF R&D TAX CREDIT ON RESEARCH ACTIVITY OF SMALL- AND MEDIUM-SIZE FIRMS**

Recent studies also show that federal and state tax credits are effective in increasing R&D spending conducted by or on behalf of small firms. One reason for this is that smaller firms typically face more stringent financing constraints than larger firms and are more likely to embrace the credits as a source of finance. Ajay Agrawal, Carlos Rosell, and Timothy Simcoe (2020) study what happened when Canada liberalized eligibility rules for its Scientific Research and Experimental Development (SRED) tax credit, which was specifically designed for small firms conducting R&D activities. In 2004 the Canadian government changed the tax credit from being nonrefundable to refundable, i.e., the credit can be claimed even when the firm does not have a federal tax liability. Agrawal et al. find that after the tax credit is made refundable, R&D expenditures of small Canadian-owned firms increase by an average of 17 percent. They point out that this finding is relevant to small firms in the United States, as in December 2015 the U.S. Congress passed legislation to allow refunds of the federal R&D tax credit against federal payroll tax obligations. They conclude that this made “the R&D credit essentially refundable for small firms” as all firms are required to pay payroll taxes for employees regardless of whether the firm is earning enough income to pay federal corporate income tax.

Fulvio Castellacci and Christine Mee Lie (2015) review almost all of the studies on U.S. state and country R&D tax credits published through 2014 and conduct a meta-analysis of these studies to figure out whether state R&D tax credits have produced different effects on research activity conducted by different size firms. They find that the effect of state R&D credits on research spending is larger for small- and medium-size enterprises (SMEs) than for large enterprises. This finding is particularly relevant to Hawaii because all research spending by Hawaii technology firms is done by SMEs. There are no large technology firms located in Hawaii, whereas in the continental United States, two-thirds of all research spending is done by just 200 very large firms (Foster and Grin, 2010).

### **EFFECT OF R&D TAX CREDIT ON EMPLOYMENT IN TECHNOLOGY FIRMS**

Does the presence of a state R&D tax credit lead to more employment in the state’s technology firms and in the state as a whole? A study by Enrico Moretti and Daniel Wilson (2014) addressed both questions for biotech firms.<sup>6</sup> They argue that state R&D tax credits raise the return to research activities and, as a consequence, also raise the demand for star scientists to conduct research. For the biotech sector, they show that both state R&D credits and direct biotech subsidies increase the number of star scientists located in states offering these incentives and that overall employment in these states’ biotech sectors also increases substantially. In addition, they “uncover large effects on employment in the non-traded sector due to a sizeable multiplier effect, with the largest impact on employment in construction and retail” (p. 21).

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<sup>6</sup> See also Moretti and Wilson (2017) and Moretti (2019).

In a 2018 study, Brian Lucking finds that state R&D tax credits were effective in raising overall state employment. Using confidential US Census Bureau data “containing the universe of [U.S.] business establishments from 1980-2015”, Lucking (p. 2) identifies “the employment effects of state R&D tax credits by comparing the relationship between the cost of doing R&D in a state with the differential employment growth of R&D-performing versus non-R&D-performing establishments.” Lucking’s results show that overall state employment growth increases in response to enactment of a research tax credit and that the increase in one state does not come at the expense of falling employment in other states.

Interestingly, Lucking also finds that state employment growth typically increases when *neighboring states* establish or enhance R&D tax credits. This phenomenon arises because research firms often have facilities in several neighboring states; when the facilities in one state expand due to the state’s establishment or enhancement of an R&D tax credit, complementary research activities spill over to neighboring states. Needless to say, it is unlikely that firms in Hawaii would be the beneficiary of such spillovers due to the long distance in miles and time zones between Hawaii and the closest West Coast states.

### EFFECT OF R&D TAX CREDIT ON RESEARCH ACTIVITIES OF FIRMS IN DIFFERENT SECTORS

Castellacci and Lie’s (2015) meta-study of R&D tax credits focuses specifically on the issue of how effects of R&D tax credits vary across industries. Surprisingly, they find that the R&D tax credit “seem to have been more effective to support R&D investments carried out by firms with a low R&D intensity, and specifically [small- and medium-size enterprises] SMEs, firms in the service sector and enterprises in low-tech industries.” They hypothesize that this could be due to more restricted access to financial markets by SMEs and service firms than hi-tech firms or to the tax credit providing a bigger boost to initially small R&D efforts by these firms. This is a potentially important finding for Hawaii which has just a few relatively small clusters of high-technology firms but more and much larger clusters of lower-technology and service firms. Several studies have expressed concerns that research activities conducted by low-tech and service firms may not have the same spillover effects as research activities conducted by high-tech firms, and, therefore, may not generate as much new demand and positive spillover effects in these relatively mature industries.

### EFFECT OF DESIGN OF R&D TAX CREDIT ON RESEARCH ACTIVITIES OF TECHNOLOGY FIRMS

Finally, the design of the research tax credit matters. One feature emphasized by several studies is whether the tax credit is claimed against *incremental* research expenditures over a base of prior expenditures or against the full *volume* of research expenditures made in the particular tax year (Blandinieres et al., 2020; Castellacci and Lie, 2015).<sup>7</sup> The design can be important, as it involves a tradeoff between providing sufficiently strong incentives and a relatively straightforward administrative mechanism for establishing eligibility for the credit and making the claim. An incremental scheme tends to be administratively more complex but lowers the risk of subsidizing research activities that would have occurred in the absence of the credit. Blandinieres et al. (p. 5) argue that “SMEs are less likely to benefit

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<sup>7</sup> In a *volume system*, a firm’s research tax credit is a set multiple of the amount of a firm’s qualified research spending during its tax year. If the firm has \$100 in qualified research expenditures during the current tax year and the tax credit is 14% of qualified research expenditures, then it would be eligible for a \$14 credit. In an *incremental system*, the research tax credit is calculated using the difference between qualified research expenditures during the current tax year and an average of qualified research expenditures over the last, say, three tax years. Suppose a firm has \$100 in qualified research expenditures, the tax credit is 14% of qualified research expenditures, and the firm spent an average of \$75 annually on qualified research over the last three years. Then the firm would be eligible for a credit  $(\$100 - \$75) \cdot .14 = \$3.50$ .

from [an incremental] scheme ... by having less persistent R&D expenditures due to financial constraints ... [and] a lack of skilled staff dedicated to know-how to minimize the tax burden.” By contrast, the volume scheme is easier to administer but runs the risks of subsidizing research investments that would have occurred without the credit and increases the risk that a firm will “relabel” non-research activities as research activities. Blandinieres et al. (2020) argue that a hybrid incremental-volume system is to be avoided as it tends to reduce incentives and increase claim complexity. These tradeoffs are potentially important in the Hawaii context as in 2019 the Hawaii Legislature enacted Act 261 which switched the state from an incremental to a volume scheme for determining research spending eligible to be claimed against the tax credit.<sup>8</sup> The change embeds Hawaii research firms in a hybrid tax system, as federal research tax credits are determined by incremental expenditures and Hawaii tax credits by volume expenditures.

### 3. THE RISE, FALL, AND RESURRECTION OF THE HAWAII R&D TAX CREDIT

#### ACT 221 QUALIFIED HIGH-TECHNOLOGY TAX CREDITS

During the 1990s, Japan’s economic and financial crisis led to declines in foreign investment and visitor arrivals from Japan to Hawaii. Hawaii suffered throughout the “lost” decade of the 1990s, when real Hawaii GDP declined by a total of -1.9 percent and real U.S. GDP increased by a total of 34.6 percent. Governor Ben Cayetano’s administration (1995-2002) conducted an exhaustive search for ways to stimulate economic growth.<sup>9</sup> The late 1990s saw new internet-digital-based firms driving U.S. stock market valuations and many policymakers saw encouraging growth of Hawaii-based high-technology firms as a promising strategy for Hawaii. In the late 1990s Hawaii lawmakers passed several pieces of legislation that offered tax credits to induce investment in selected high-technology industries.<sup>10</sup> When these early measures failed to generate much new investment, the Legislature responded in 2001 by passing Act 221. This legislation allowed Hawaii firms conducting business in specified high-technology industries to claim over a five-year period a tax credit equal to 100 percent of their investment. Act 221 capped annual research investments per firm at \$2 million but placed no overall cap on program tax expenditures.

Act 221 became highly controversial a couple of years after its enactment. Critics blasted it for providing far too generous subsidies; giving firms incentives to relabel themselves as high-technology firms; and allowing financial skullduggery in the multi-layered leveraging of tax credits that ensued during its early years.<sup>11</sup> Proponents believed that the small state of Hawaii needed to take giant actions to signal to potential entrepreneurs that the state was serious about its goal to build new clusters of high-technology firms. In 2001 other states also offered research tax credits but the magnitude of their subsidies to investment was much smaller, ranging between 10 and 60 percent.<sup>12</sup> No other state allowed an individual firm to claim more than \$500,000 per year. During the nine years it was in effect, Act 221 generated liabilities for

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8 Act 261, S.B. No. 1314, S.D. 1, H.D. 1, C.D. 1. HRS §235-110.91 Tax credit for research activities. (b) “All references to Internal Revenue Code sections within sections 41 and 280C(c) of the Internal Revenue Code shall be operative for purposes of this section [.]; provided that references to the base amount in section 41 of the Internal Revenue Code shall not apply, and credit for all qualified research expenses may be taken without regard to the amount of expenses for previous years.” The underlined section was added to the original language in Act 270.

9 See Grandy (2002) for a thoughtful discussion of the economic problems of the 1990s and the search for potential solutions.

10 See Kato, La Croix, and Mak (2009) and La Croix (2019).

11 For several examples of how Act 221 tax credits could be leveraged to provide tax savings to multiple layers of investors, see Kato, La Croix and Mak (2009), pp. 645-646.

12 Office of the Auditor, State of Hawaii (2015). Credits Continue to Tax the State: Follow-Up on Recommendations Made in Report No. 12-05, *Audit of the Department of Taxation’s Administrative Oversight of High-Technology Business Investment and Research Activities Tax Credits*. Report No. 15-11, September 2015, p. 2.

the state of more than \$1.7 billion in tax revenues<sup>13</sup> and, despite its generosity in subsidizing investment by qualified high technology firms, yielded little increase in R&D spending per capita in Hawaii.<sup>14</sup> Few prominent technology-based firms emerged from the program. When consultants retained by the State Tax Review Commission tried to study the program's operation and performance, the task proved virtually impossible as little information was available to the public and even to Tax Review Commission members and consultants regarding aggregate and individual firm activities.<sup>15</sup> At least as problematic was the Hawaii Dept. of Taxation's (DOTAX) stance that the identity of firms receiving these tax credits was confidential and could not be released to the public, lawmakers, or researchers investigating the effectiveness of the credits. A hugely expensive program was operating almost entirely without public scrutiny or government audit.

In 2007 the Hawaii Legislature passed legislation to require reports from the Dept. of Taxation that provided more information about the program as well as the names of the firms receiving the credit. Once this information became publicly available, the extent of the debacle was revealed: Firms with only post office boxes for addresses or without any employees applied for and received the credit (Kato et al., 2009). Most importantly, the Hawaii Dept. of Taxation audited only 3 percent of Act 221 claims between 2001 and 2004.<sup>16</sup> With liabilities from the program mounting and the state's projected budget deficit rising in FY2009 due to the Great Recession, the 2009 Hawaii Legislature cut the credit from 100 percent to 80 percent reimbursement of qualified research expenses. The Legislature killed the program in 2010.<sup>17</sup>

## THE "NEW" ACT 270 RESEARCH TAX CREDIT

Now fast forward to 2013. Once again, the Legislature passed a tax credit (Act 270) designed to subsidize the activities of Hawaii technology firms engaged in research activities. Using the same eligibility qualifications as the federal research tax credit, Act 270 offered a research tax credit to "qualified high technology" businesses, which are defined as businesses for which research amounts to 50 percent or more of their total activities. Act 270 restricted state research tax credits to Hawaii firms that also claimed a federal research tax credit. The Hawaii research tax credit is specified to be exactly the same amount as the federal credit.<sup>18</sup> Since the *simplified* federal tax credit is set at 14 percent of eligible expenses over a specified base of previous R&D expenditures by the firm, federal and state credits together provided roughly 28 percent of incremental R&D expenditures over a base of previous expenditures from the past three

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13 Office of the Auditor, State of Hawaii (2015), p. 3. Through 2018, firms had claimed \$1.13 billion in high-tech credits. See State of Hawaii, Dept. of Taxation (2020), Tax Credits Claimed by Hawaii Taxpayers. [https://tax.hawaii.gov/stats/a5\\_1annual/a5\\_4credits/](https://tax.hawaii.gov/stats/a5_1annual/a5_4credits/); and Office of the Auditor, State of Hawaii (2015), p. 4.

14 The ratio of private-industry R&D and private-industry output in Hawaii had an inverted-U shape between 2000 and 2017: 2000=0.28, 2003=0.35, 2007=0.42, 2008=0.51, 2010=0.48, 2013=0.36, 2017=0.24

15 Requests by the State Tax Review Commission to review confidential information on Act 221 tax credits were rejected by the Department of Taxation.

16 State Auditor Report (2012), p. 35.

17 Firms were allowed to roll over their credits indefinitely. In 2018, eight years after Act 221 was repealed, the State of Hawaii paid out \$12.3 million in Act 221 tax credit claims.

18 "There shall be allowed to each qualified high technology business subject to the tax imposed by this chapter an income tax credit for qualified research activities equal to the credit for research activities provided by section 41 of the Internal Revenue Code and as modified by this section; provided that, in addition to any other requirements established in this section, in order to qualify for the tax credit established in this section, the qualified high technology business shall also claim a federal tax credit for the same qualified research activities under section 41 of the Internal Revenue Code, as enacted on December 31, 2011 ..." Some Hawaii technology firms also conduct research activities in other states, and cannot claim out-of-state spending towards the Hawaii credit. In these cases, the Hawaii credit applies only to qualified in-state research spending.

tax years.<sup>19</sup> Aggregate annual state R&D credits were capped at \$5 million per year, with credits certified on a first-come, first-serve basis.<sup>20</sup> Act 270 established 31 Dec. 2020 as the sunset date for the credit, and specified that all firms applying for the research tax credit “shall” complete a survey of their activities conducted by DBEDT.<sup>21</sup>

In its 2019 session, the Hawaii Legislature passed Act 261 which made several changes to the research tax credit. Most importantly, Act 261 changed the basis for establishing eligible research expenses from an *incremental basis* on expenditures above a base set by expenditures for the previous three years to a *volume basis*, in which all eligible research spending during the current tax year can be claimed against the tax credit. Hawaii research firms without incremental research spending in a given tax year cannot claim a federal credit but can claim a Hawaii credit on the volume of their eligible research spending. Hawaii’s switch to a volume basis will almost surely increase aggregate firm claims for the Hawaii credit up to the \$5 million cap. Act 261 also extended the sunset date to December 31, 2024 and switched initial responsibility for determining eligibility for the tax credits from the Department of Taxation to the Department of Business, Economic Development and Tourism.

The new state R&D tax credit is less likely to be subject to abuse and fraud than the Act 221 tax credits in place during the 2000s decade. First, the provision tying receipt of the state R&D tax credit to a claim for the federal R&D tax credit means that Hawaii firms claiming the state and federal tax credits will be subject to enforcement by the Internal Revenue Service (IRS) regarding their eligibility for the credit and the amount claimed.<sup>22</sup> Federal auditing is potentially important because the Hawaii Dept. of Taxation rarely audited R&D tax credits claimed under Act 221 between 2001 and 2018.<sup>23</sup> Moreover, the extent of DOTAX audits on 2013–2019 claims for the new research tax credit is unknown. Still, it is a mistake to overemphasize how strict federal enforcement has been or will be, as the inflation-adjusted budget of the IRS declined by more than 25 percent over the last decade, sharply curtailing its ability to audit corporate and individual returns.<sup>24</sup>

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19 Firms claiming the federal credit can also choose to use the *regular* credit system which has a statutory rate of 20 percent but is calculated on a base involving gross receipts of the firm over extended periods as well as qualified research expenses. Under this system, the effective tax credit rate could be more or less than the simplified rate of 14 percent.

20 Act 270 specified that “(f) If in any taxable year the annual amount of certified credits reaches \$5,000,000 in the aggregate, the department of business, economic development, and tourism shall immediately discontinue certifying credits and notify the department of taxation. In no instance shall the department of business, economic development, and tourism certify a total amount of credits exceeding \$5,000,000 per taxable year. To comply with this restriction, the department of business, economic development, and tourism shall certify credits on a first come, first served basis. The department of taxation shall not allow the aggregate amount of credits claimed to exceed that amount per taxable year.”

21 Unfortunately, between 2014 and 2018, 40.9 percent of firms receiving the tax credit (and that claimed 53.1 percent of the allocated credits) never filled out the required DBEDT survey. Information regarding these firms’ activities or identities is unavailable to the public, lawmakers, DBEDT staff, or independent researchers investigating the effectiveness and operation of the law. The 2013 state law establishing the R&D tax credit (Act 270) requires that “a qualified high technology business that claims the credit ... **shall** complete and file with the department of business, economic development, and tourism [DBEDT], through that department’s website, an annual survey on electronic forms prepared and prescribed by [DBEDT].” And “[DBEDT] **shall** also identify each qualified high technology business that is the beneficiary of tax credits claimed under this section.” HRS §235-110.91 Tax credit for research activities, sections i-l. Bold emphasis added. Act 261 changed these provisions, effective in the 2020 tax year, to overcome administrative difficulties encountered by DBEDT staff with requiring firms receiving the credits to fill out the survey.

22 Tying the state to the federal R&D tax credit only works to increase state enforcement if the state credit is revoked whenever the federal credit is denied. It is unclear whether this linkage occurs.

23 See also Kato, La Croix, and Mak (2009).

24 See Marcy Gordon and Paul Wiseman, “A lesson from Trump taxes: An underfunded IRS is outmatched.” Associated Press, September 30, 2020. Available at <https://apnews.com/article/donald-trump-technology-archive-c99697ac657534d6015894377d04eb1f> (last access on 12 December 2020).

Second, the size of the Hawaii research tax credit—roughly 14 percent of all qualified research expenditures—is much smaller than the 100 percent credit from all qualified research expenditures specified in Act 221. This reduces the potential for fraud and abuse by firms claiming the credit because the potential benefits to them from engaging in illegal activity are much lower than under Act 221.

As we discussed above, Agrawal et al. (2020) show a substantial impact of the R&D tax credit on R&D spending by small firms. This is an important finding for Hawaii as almost all of the Hawaii firms with capacity to conduct R&D are small-to-medium sized firms. Unlike most other state tax credits, the Hawaii R&D tax credit is refundable, and this allows small firms without state corporate tax liabilities to still receive the credit.<sup>25</sup> Allowing small start-up research firms to receive the credit is an important feature of Hawaii's credit. Research by Fazio, Guzman and Stern (2020) using panel data for U.S. states has shown that the presence of a research tax credit in a state leads to substantial and statistically significant effects on the rate of new business formation. These effects do not happen immediately. They find that “[w]hile state-level R&D tax credits have little to no effect on the rate or composition of new firm formation in the first few years following their introduction, these incentives lead to a 20% increase in the quantity and quality-adjusted quantity of entrepreneurship over a 10-year period” (Fazio, Guzman, and Stern, 2020, p. 189).

### THE \$5 MILLION ANNUAL CAP ON PAYOUTS OF RESEARCH TAX CREDITS

Calendar year 2018 is the latest calendar year for which Hawaii Dept. of Taxation reports complete data on tax credits claimed; for 2018, 54 Hawaii firms claimed R&D tax credits.<sup>26</sup> The amount claimed has been declining, falling from \$3.1 million in 2016 to \$2.5 million in 2017 and \$2.37 million in 2018. Why are so few firms claiming the Hawaii research money and not reaching the aggregate \$5 million cap? We argue that the law is generally well designed to achieve its purposes but for two critical provisions: (1) the aggregate annual cap of \$5 million in payouts for research tax credits and (2) the first-come, first-serve scheme for rationing the \$5 million fund. Consider first the \$5 million cap. Assume that Hawaii firms claim the full \$5 million in tax credits and, following the literature reviewed in Section II, that each \$1 in tax credits claimed generates an additional \$1-\$2 in additional research spending by private firms. In this case, the maximum annual impact of the credits on Hawaii research spending is \$5 - 10 million. In the context of a roughly \$96 billion state economy in 2019, even if an additional \$10 million of additional research spending is induced by the R&D tax credit, this amounts to just 0.01 percentage point of Hawaii state GDP in 2019. To put it bluntly, the \$5 million cap guarantees that the research tax credits will be unable to meaningfully contribute to current or future economic growth in Hawaii.

The actual impact of the Hawaii research tax credit is even smaller than outlined above, because actual tax credits claimed each year amount to much less than \$5 million. Table 2 presents tax credit claims over calendar years 2013-2018. Consider the \$2.4 million in R&D tax credits awarded in 2018. If each \$1 in tax credits claimed generates an additional \$1-\$2 in additional research spending by private firms, then the maximum additional research spending induced by the tax credit is \$2.4 million to \$4.8 million, or just 0.003 -0.005 of a percentage point of Hawaii state GDP (\$92 billion) in 2018. We note that tax credits claimed fell over the last three years for which they were reported, from \$3.1 million in 2016 to just \$2.4 million in 2018.

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25 HRS §235-110.91. “(g) If the tax credit for qualified research activities claimed by a taxpayer exceeds the amount of income tax payment due from the taxpayer, the excess of the tax credit over payments due shall be refunded to the taxpayer ...” In 2019, 36 other states had a research tax credit, with the credit being refundable in some cases in a few states, e.g., Connecticut, Iowa, and Nebraska.

26 State of Hawaii Dept. of Taxation (2020), pp. 10, 22.

**TABLE 2: RESEARCH ACTIVITY TAX CREDITS CLAIMED WITH HAWAII DEPT. OF TAXATION, 2013-2018**

Tax Year	Claimed with Hawaii DOTAX			Credit Amount	Reported in DBEDT Survey	
	All	Individuals	Corporations		Number of QHTBs that Completed Survey	Credit Amount
2013	25	13	12	\$1.3 M	10	\$1.1 M
2014	69	49	20	\$2.9 M	13	\$1.3 M
2015	57	33	24	\$2.9 M	12	\$1.1 M
2016	58	31	27	\$3.1 M	11	\$1.3 M
2017	54	35	19	\$2.5 M	15	\$1.3 M
2018	54	34	20	\$2.4 M	14	\$1.4 M
2019	NA	NA	NA	NA	10	\$1.6 M

Note: Data from Dept of Business, Economic Development, and Tourism (2020), Table 1 and p. 10. QHTB stands for Qualified High Technology Business.

Why was less than half of the \$5 million in available research tax credits claimed in 2018? One might think that 2018, the seventh year of a slow but steady economic expansion for the Hawaii economy, would be a good year to start a new business. Perhaps owners of technology firms were worried about expanding their operations and then being unable to find highly-skilled workers with particular skills in Hawaii's thin labor markets. Or perhaps new research-oriented firms in Hawaii found the federal and state eligibility requirements for classification as a technology business to be too strict for the small scale of their enterprises. It is notable that of the 10 firms that chose to fill out the DBEDT questionnaire, not one of them was a new firm. All had received the credits previously and thereby had gained some administrative expertise regarding its use. It is also possible that owners of new firms were not well informed regarding how to structure their organizational and legal architecture so as to be eligible to claim the credits.

Another possibility is that the \$5 million cap on research tax credits is so small that it distorts the basic incentive that the tax credit was supposed to create—a reduced after-tax cost of research activities. Hawaii law does not restrict how much a particular firm can receive annually from the \$5 million fund and the Department of Taxation allocates tax credits by firms on a first-come, first-serve basis.<sup>27</sup> Since a firm's research spending must occur prior to the filing of its application for the tax credit, the first-come, first-serve system creates considerable uncertainty regarding receipt of the tax credit when the firm's application is filed. An early filer with a \$5 million claim could use up all of the credits, leaving later filers with a zero return for their administrative and organizational efforts to claim the credit. In many ways, the first-come, first-serve system favors large firms that have the administrative resources to claim the credit quickly; firms that have prior experience in making the claims and filing with the Department of Taxation; and firms that can more easily monitor the potential for competing claims.

Consider the 14 percent tax credit on incremental expenditures above a base of previous expenditures that was in effect during 2019. If the tax credit cap is not binding, then the presence of the credit should have the effect of lowering the cost of additional R&D expenditures by 14 percent. Suppose, however, that there are 10 identical firms each considering spending \$1 million on qualified research activities. If each firm has equal first-come, first-serve access to being among the first five firms filing at Dept. of Taxation, then each firm has a probability of only 50 percent of actually claiming a credit under the \$5 million cap. This lowers the expected reduction in the after-tax cost of research activity from 14 to 7 percent.

<sup>27</sup> Other states that ration research tax credits on a first-come, first-serve basis include Arizona, Georgia, Florida, and Maryland.

How would a firm respond to these diminished incentives? A variety of (Nash-equilibrium) solutions is possible. One equilibrium is that all ten firms decide not to make the incremental investment given the risk of not being awarded the credit. In this case, the \$5 million fund goes unclaimed. Another possible and diametrically opposite equilibrium is that all ten firms make the incremental investment and file tax returns simultaneously. In this case, the Department of Taxation essentially chooses the five firms to receive the credit via a lottery. In this case, the first-come, first-serve credit rationing system creates a powerful leveraging mechanism for inducing more research activity, as \$5 million of state research credits are leveraged into twice as much initial research spending and its attendant high social benefits. Consider, however, a more realistic third equilibrium. Suppose that the ten firms competing for the credits are not identical and that three firms have experience that make them more capable of filing tax returns before the other seven firms can file. If the ten firms understand these circumstances, then it could be an equilibrium for the three “higher ability” firms to each file for a \$1 million credit and for the other seven firms to decide not to undertake the incremental investment given the risk of not receiving tax credits despite incurring significant administrative and organizational costs to ensure eligibility for the credits. In this case, the equilibrium is that the state research tax credit stimulates only \$3 million in research activity, with \$2 million of the \$5 million cap going unclaimed. We note that since the credit started in the second half of 2013, Hawaii firms have never claimed more than \$3.4 million in total credits in any given year and in some years have left more than half of the \$5 million fund unused. The state’s switch to a hybrid claim system should increase the amount of claims awarded to Hawaii research firms while leaving the problematic incentives of a first-come, first-serve allocation mechanism still in place.

#### 4. RECOMMENDATIONS

We have two recommendations for the Hawaii Legislature to improve the effectiveness of the research tax credit program. First, the Legislature should raise the annual cap on total R&D tax credit claims from \$5 million to at least \$20 million. The increase could be accomplished over a multi-year schedule, say 4-5 years, with the increments announced in advance, say \$10 million in FY2023, \$15 million in 2024, \$20 million in 2025. As we argued above, it is possible that the \$5 million cap deters potential program participants due to the risk that the cap will be exhausted by claims from other firms under the current first-come, first-serve system. On the other hand, retaining a cap on overall annual program expenditure is clearly a reasonable and prudent way to minimize the state’s fiscal risk from the program operating in unanticipated ways. Raising the cap would, however, allow the program to operate eventually at a large enough scale to make a substantial difference in the growth of Hawaii’s technology sector. While increases in the cap would very likely come at the cost of some tax revenue, a cap increase would also help to reveal whether the mechanics of the tax credit are holding back firms’ participation in the program or the Hawaii business environment for technology firms is just too difficult for the research credit to be of much use. Increasing the research tax credit during fiscal years (FY2021 and FY2022) with huge projected state budget deficits due to the COVID-19 pandemic may not be feasible, but the Hawaii Legislature should consider setting a schedule of cap increases for future years to allow research firms to plan future research spending.

Second, we urge the Legislature and the Governor to consider whether the various state programs in place to aid emerging technology firms amount to a coherent policy. During the decade of the 2010s, the Hawaii Strategic Development Corporation (HSDC) contributed funds to a number of venture capital funds to increase access to capital markets by new and emerging technology firms. The HSDC program was very small, became mired in scandal in 2017, and was merged into the Hawaii Technology Development

Corporation (HTDC) in 2018.<sup>28</sup> Few traces of its activities remain. The HTDC currently subsidizes several incubator and accelerator programs, most of which seem to have achieved reasonable degrees of success. DBEDT oversees another small program designed to attract out-of-state businesses to Hawaii.

But do these programs fit together? Are they achieving a measurable impact? The bottom line is that the State of Hawaii has numerous small programs in place to aid start-up and emerging technology firms but does little to coordinate them or to evaluate their collective impact. It is unclear whether they are collectively large enough to achieve very much. The time seems ripe for administration of these programs to be better coordinated and for a single office in a single agency to be responsible for their operation.

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<sup>28</sup> For details of the scandal involving the Mbloom venture capital fund, which was partially funded by HSDC, see Jason Rushin, "State Pulls Plug On Mbloom, But Still Wants To Help Tech Startups," *Civil Beat*, June 29, 2016. Available at <https://www.civilbeat.org/2016/06/state-pulls-plug-on-mbloom-but-still-wants-to-help-tech-startups/>.

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