# Introduction

Out of the 22,757 respondents to the survey, 6,564 indicated that they were entrepreneurial. These entrepreneurial alumni provided details on 8,979 ventures that they were involved in, suggesting an average of 1.37 ventures per alumni.

29% of alumni self-identify as entrepreneurial. This includes founders (19%), early employees (11%), board members (12%), and investors (7%).

*<p>We define entrepreneurial alumni as those who found new ventures, who are one of the first five employees of a new venture, who serve on the governing or advisory board of a new venture, or who provide capital to entrepreneurial ventures* (e.g., angel investors and venture capitalists). Ventures include for-profit businesses as well as non-profit organizations.</P

<p>Universities can be a significant engine for economic growth in their local communities and beyond. They are frequently large employers in their communities. They are large purchasers of goods and services. They often spend significantly on building and construction. They spend large amounts on research, attracting grants from the federal government and other sources. This research in turn can lead to intellectual property, such as patents, that is licensed to established companies and entrepreneurial spinouts. In some cases, this may encourage businesses to locate near the origin of that intellectual property. Last, but certainly not least, universities prepare and train students to participate in the workforce.</p>

<p>In this analysis, we focus on this last pathway by which universities help generate economic growth and create jobs. In particular, we examine – based on a survey undertaken in 2013 – the entrepreneurial efforts of the alumni of the University of Virginia.</p>

<p>This study complements previous studies on Stanford and MIT conducted by Batten Fellow and report coauthor Charles Eesley. The numbers are impressive. As of 2012, Stanford alumni created an estimated 39,900 active firms generating annual worldwide revenues of $2.7 trillion and employing 5.4 million people. A survey in 2003 showed that MIT alumni had founded 25,800 active firms that employed an estimated 3.3 million people and generated annual worldwide revenues of $2 trillion. In both cases, these efforts created substantial local spillovers. 25% of Stanford entrepreneurs founded their companies within 20 miles of the university. 27% of MIT entrepreneurial ventures active in 2003 were headquartered in Massachusetts, creating nearly 1 million jobs.</p>

<blockquote><p>Carefully extrapolated, the responses to our survey suggest that entrepreneurially active alumni have created approximately 65,000 companies. These efforts have contributed to the economy—notably, an estimated 2.3 million people have worked at companies founded or directly supported by U.Va. alumni. The organizations that are active today generate estimated global revenues of $1.6 trillion annually. </p></blockquote>

<p>This is one of the most comprehensive surveys that we are aware of concerning entrepreneurial alumni at a major public university. U.Va. is ranked among the top 25 universities in the United States and has been ranked the first or second public university since U.S. News began ranking public universities. As a public university, U.Va. receives funding in part from the Commonwealth of Virginia ($154M in 2013 or 5.8% of the university’s total budget). One of the motivations of the state in investing in higher education is to help generate economic growth within the Commonwealth. This report provides evidence of the impact that alumni entrepreneurs have on economic growth and job creation both in the Commonwealth and beyond, and suggests the state is receiving a substantial return on investment from this avenue alone, even ignoring the numerous other ways the University creates value.</p>

# Which Alumni Become Entrepreneurs?

As expected, more entrepreneurs had business degrees (24.6%) than non-entrepreneurs (16.3%). Surprisingly, while 27.1% of entrepreneurial alumni had technical degrees, 31.8% of non-entrepreneurial alumni had such degrees. Humanities degrees were represented nearly equally between entrepreneurial and non-entrepreneurial alumni.

Entrepreneurial alumni were more likely to have had experience working for a business with fewer than 100 employees (67.2% of entrepreneurs vs. 53.1% of non-entrepreneurs) or had close family members who were entrepreneurs (72.3% of entrepreneurs vs. 53.8% of non-entrepreneurs).

16.2% of alumni entrepreneurs indicated having some involvement with entrepreneurship classes and programs while at the University (compared with 8% among non-entrepreneur respondents). While there is likely self-selection into such activities by those who are inclined to be entrepreneurs, the number is surprisingly high considering that entrepreneurship offerings at the University are a relatively recent phenomenon and that many alumni entrepreneurs graduated before any entrepreneurial courses were available.

Consistent with recent analyses, including the Kauffman Foundation’s investigation of MIT graduates, many alumni pursue entrepreneurship at mid to late stages of their careers. The highest number of entrepreneurs in the survey were born in the mid-1950s suggesting an average age of approximately 60 at the time of the survey. This is despite a massive increase in the number of students and alumni starting in the early 1970s. Of course, entrepreneurial experience is cumulative and therefore will increase with age. However, if we look at the ratio of entrepreneurs to non-entrepreneurs by age, we see an increasing percentage of entrepreneurs as age increases, lending support to the notion that alumni are pursuing entrepreneurship later in their careers.

## Regression

A simple multivariate analysis provides insight into the relative sensitivity of entrepreneurial activity to demographic characteristics and experience. We find that females are 32% less likely than their male counterparts to be entrepreneurial while minorities are 61% more likely to be entrepreneurial.

# What Type of Ventures Do U.Va. Alumni Create?

The survival rate of U.Va. alumni ventures compares favorably to national averages, where approximately half of new firms survive more than five years and less than one-third survive more than ten years.

# Economic Impact

If our survey is a representative sample of all alumni, a simple extrapolation would suggest that entrepreneurial U.Va. alumni have been directly involved, in the four different roles, with the creation of close to 65,000 ventures, approximately 38,000 of which are still active. If we consider only founders and exclude investors, board members, and early employees, U.Va. alumni have started 21,000 currently active firms, which is respectable compared with Stanford (39,900 active firms) and MIT (25,800 active firms). In Virginia, U.Va. alumni have created, in different roles, about 21,000 ventures (out of the 65,000 worldwide), and 13,000 of those are estimated to be currently in operation. 22% of these Virginia ventures were started by alumni who had been out-of-state students at matriculation.

Across the 8,979 ventures for which alumni provided data, ventures employed 75 people on average during the period of their greatest employment. At the top end of the distribution were five businesses employing 10,000 or more employees each. The vast majority of ventures employed less than ten people. In total, active ventures started by entrepreneurial alumni in our survey employed over 232,000 people. Extrapolating out to the entire population of U.Va. alumni suggests that close to 2.3 million people have been employed worldwide by ventures in which U.Va. alumni are involved.

Examining the localized effects of these efforts, alumni-started ventures employed 50 people on average in the state of Virginia during the period of their greatest employment, with the largest employer providing jobs to 6,000 people. Total Virginia employees reported in the survey equaled 52,000, and extrapolation indicates that almost 371,000 Virginians work in alumni ventures.

Turning our attention to revenues, alumni ventures in our survey generated $36.8 million in annual worldwide revenues on average during their best year. 37 ventures generated over a billion dollars of revenue, with five organizations generating more than $8 billion in revenue. In total, survey respondents indicated that their active firms generated over $133 billion in annual revenues. Extrapolation to the entire population of U.Va. alumni suggests closer to $1.6 trillion of revenue generated. Focusing on the regional effects, active U.Va. alumni ventures headquartered in the Commonwealth generated an estimated $395 billion in annual revenue.

Expenditures are another way that ventures contribute to their local and national economies. Spending on goods and services drives economic growth up the supply chain and has spillover effects in job creation. Active alumni ventures in our survey spent $74 billion annually. Alumni-started ventures in the state of Virginia alone spent over $25 billion. Extrapolating these data indicates that worldwide expenditures exceed $898 billion and Virginia firms spent upwards of $279 billion. While it is likely that not all of these monies were spent within the Commonwealth, it is a safe bet that many of the dollars flowed to other enterprises within the state.

Finally, active businesses started by entrepreneurial alumni in our survey generated close to $111 billion cumulatively. In addition, nonprofit organizations raised donations of over $8 billion. Many of these dollars flowed into the Commonwealth, given the location of their corporate headquarters.

# Conclusion

Universities add value to their local community and broader region in a number of ways. The entrepreneurial efforts of university alumni are an important, yet often ignored, way in which universities help support the creation of jobs and economic growth. In some cases, alumni ventures grow directly out of the laboratories and research at the University and are reflected in reports on university licensing. In most cases, however, universities have no intellectual property claims on alumni ventures.

In this report, we analyze the impact of entrepreneurial alumni from the University of Virginia. They reported creating close to 9,000 ventures. Extrapolating from our survey sample to the population of U.Va. alumni as a whole suggests those numbers may be closer to 65,000 ventures, of which 38,000 are still active, employing 2.3 million people and generating $1.6 trillion in annual worldwide revenues.

Within the Commonwealth of Virginia, entrepreneurial alumni reported creating nearly 3,000 ventures that employed over 90,000 people within the state. Extrapolated, Virginia ventures generated revenues of about $395 billion and 371,000 jobs. When one considers the $154 million annual expenditure by the Commonwealth on the University of Virginia, these numbers suggest a substantial return on investment from just entrepreneurial alumni of the University, even ignoring all other ways the University creates value.

Of course, these individuals may have started ventures regardless of where, or even if, they received a college education. It is beyond our current analysis to resolve this possibility. However, it is interesting to note that much of the entrepreneurial activity of U.Va. alumni is concentrated within the Commonwealth. Given that the University of Virginia enrolls a sizable number of out-of-state students (27% in 2013), the University may be acting as a talent attractor, bringing in high-performing students who are then more likely to remain and start ventures in the Commonwealth. It is further interesting to speculate how many Virginians would leave the state to attend college if they were not admitted to the University of Virginia. Once again, given the tendency for localization of ventures founded by entrepreneurial alumni, this retention may increase the overall number of start-ups within the state.

This research seeks to uncover one of the many ways that universities generate value for their students, their regional economic ecosystems, and the global business environment. Alumni have launched thousands of firms and created millions of jobs, which is only a fraction of the many ways that university students bring value to the world. Future research focused on understanding which attributes of the university experience help evolve students’ entrepreneurial prowess could provide useful insights for all educational institutions’ ability to cultivate new entrepreneurs.

# Extrapolation Methods

For aggregate statistics in the report, estimation methods were necessary to account for alumni without response data. Scaling factors yielded the estimates included in this report. The scaling factors hinge on the assumptions that, a) the levels of entrepreneurial activity and success are similar between survey respondents and non-respondents, and b) respondents included information about all of their entrepreneurial activities. All estimates are derivations of the survey data, and no external data (patent filings, high-profile company filings, etc.) were used. The survey did not force responses, and approximately one-third of respondents omitted employment, revenue, and expenditure data. We populated the missing data with the mean of the existing data based on organization type. Through analysis of the response data and comparison with high-profile alumni data, we concluded that a scaling factor of 7.2 is reasonably prudent to accommodate response bias and missing data. We have included aggressive (9.2) and more conservative (5.4) scaled extrapolations that put our estimations in context. Our estimates for economic impact are derived from the organizations that respondents indicated were still in operation

# Response Bias

About 45% of the living U.Va. alumni are women, but in our survey men and women are almost equally represented. The minority races/ethnicities are slightly underrepresented among the respondents. Asian, Black, and Hispanic alumni are respectively 4.1%, 4.1%, and 1.6% of the survey respondents; the numbers are respectively 6.5%, 5.4%, and 1.6% for all the living alumni who have reported race/ethnicity.

51% of the respondents had earned more than one postsecondary degree. Of all the degrees awarded at U.Va., less than 14% were in the field of business. Among the survey respondents, 18.7% had at least one degree in business (whether from U.Va. or elsewhere). While these two numbers are not directly comparable, it indicates the possibility that the alumni with business education are over-represented in the survey sample. Of all the degrees awarded at U.Va. since 1940, 79% were awarded in the period after 1980. For the survey respondents, 78% of the degrees were awarded during this period.

Data for the overall alumni population can be found at www.virginia.edu/Facts/Glance\_Alumni.html.