

Overview and analysis of the performance of Spin-offs at the Swiss federal Institute of Technology Zurich and their effect on the Swiss Economy

Author: Vanessa Pinter

Editors: Dr. Matthias Hölling, Dr. Marjan Kraak, Dominik Wensauer

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Preface

High-tech startups and spin-off companies are popular. The idea that young people take the risk to spin-out an idea that they had during their studies and thus making technologies available to the public, which are presumably based on latest University research, creates sympathies among many politicians and members of the general public, alike. However, in the long run, such sympathies may not be enough to justify that incubators, coaching and other support are made available to these companies. It is normally not questioned that start-ups originating from a top institution like ETH Zurich, do have an impact on establishing a high-tech cluster around the place in which they are founded.

However, it is desirable to quantify the immediate economic effect that is caused by these spin-off companies based on tangible figures provided by those companies, and not just by making an extrapolation of general academic literature that is available on this subject. After having carried out an initial study on this in collaboration with the London Business School in 2008, we initiated this present work with an update on the numbers presented therein. This and the earlier study both capture the economic effects of our officially recognized and labelled "spin-off companies of ETH Zurich". The main criteria for the official recognition are the following:

- The company commercially exploits a technology, software and/or know-how developed at ETH Zurich,
- at least one of the founders comes from ETH Zurich and
- the business idea and the business plan are consistent and sustainable.

The numbers presented in this study fully rely on the feedback of the companies that were surveyed. Therefore, we can certainly say that direct jobs created by ETH spin-offs until the end of 2013 are close to 2'500 and these spin-offs produced revenues of 585 Mio CHF in 2013 alone. These numbers do not comprise extrapolations for companies that were sold or that did not participate the survey. Although there are quite a few such companies, we are convinced that we included the biggest contributors, so that the published results are a reasonable representative approximation for the ETH spin-offs. Taken this into account, these official numbers are nevertheless an underestimation of the immediate economic impact of the ETH spin-offs as the impact of the companies that did not participate cannot be considered.



Matthias Hölling



Marjan Kraak



Silvio Bonaccio

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1. Executive Summary

Spin-offs, as a way of knowledge transfer by universities, are important vehicles driving innovation, which in extension supports the economy in its ever-growing challenges. Because of this we present an overview of the development of spin-offs that came out of ETH Zurich, one of the most respected universities in the world. Through our study we could 1) show the exceptional and ongoing performance of ETH spin-offs 2) use the data to keep the information and services ETH transfer offers to young enterprises on a qualitatively high level 3) raise international awareness of the presence and strength of ETH spin-offs. Throughout our research we analyzed the data provided by 122 spin-offs founded between 1979 and 2013 as well as publicly available information of the total population of 315 ETH spin-offs founded since 1973. We were able to show, that performance of spin-offs developed at the ETH in comparison to Swiss start-ups as well as spin-offs developed at

other universities is well above average and these ETH spin-offs make a significant contribution to the Swiss economy. After analyzing the data we could conclude that the 125 ETH spin-offs created since their incorporation close to 2'500 direct jobs in 2013 and 122 of the ETH spin-offs produced revenues of CHF 585 Million in 2013 alone. Since 1992 the number of created jobs per ETH spin-off has increased from 2 up to 5 jobs per spin-off in 2013, this based on an increasing number of ETH spin-offs and on their positive performance and development. Additionally, our research has proven that these ETH spin-offs on average have a survival rate of 92% in their first five years of operations, this is more than 40% higher than other start-ups in Switzerland. Based on this we conclude that technologies and business ideas developed at ETH Zurich are an important contributor to the Swiss economy.

2. Background

The Swiss Federal Institute of Technology (ETH Zurich) is one of the world's leading universities for natural sciences and technology. Continuously ranked under the top 20 universities by the Academic Ranking of World Universities and the QS World University Rankings, it currently has more than 18,000 students specializing in the areas of engineering, architecture, mathematics, natural sciences, system-oriented sciences and management and social sciences. Since its founding in 1855, 21 university alumnae have received the Nobel Prize, further emphasizing the universities world class education and research.

In order to further emphasize their third major goal, the transfer of scientific findings to the private sector, in the 1990s the university has further increased their efforts in this area, appointing a specialized group to manage patenting and transfer of technology within the ETH. The group became a distinct unit "ETH transfer" with an individual budget and directly subordinate to the VP of Research and Corporate Relations. In the context of their activities ETH transfer supports the commercialization of research results and technologies from ETH Zurich by the following activities:

- 1) research collaborations with industry or educational institutions,
- 2) technology licensing and
- 3) supporting spin-off¹ creation.

Since the founding of the first ETH spin-off in 1973, 315 ETH spin-off companies have been created until the end of 2013. This is further supported by the fact, that in general between 60-80 new patent applications are filed each year². Throughout this period the university has continuously intensified its efforts in supporting spin-off companies. As part of its activities, ETH transfer is interested in determining the effectiveness of its undertaking. This has been done in 2004 in form of a review of survival rates and job creation by its spin-offs as well as in the report “The performance of spin-off companies at the Swiss Federal Institute of Technology Zurich“, published in 2008. In order to present the most recent data on the development of spin-offs as well as their contribution to the Swiss economy, this study has been executed. The study includes information on the ETH spin-offs as well as their performance compared to similar companies in other countries.

3. Data and Description

3.1. Data

The basis of this report is a selected population of 252 ETH spin-offs that have been created since 1979 (out of a total population of 315 companies), for which we were able to identify relevant data. The study is based on data gathered until the 31st of December 2013. The ETH has given the research team based at the Swiss Start-up Monitor³ full access to their spin-off database and offered their support in the data assembly. By analyzing the ETH spin-off web sites, their registrations in the Swiss commercial register as well as the data collected through interviews with representatives of the respective companies, we were able to include data on the founding and survival of companies, mergers and acquisitions, number of employees, revenue development, number of registered patents and awards won by the companies.

¹ The following definition provided by the ETH Zurich as well as corresponding to the definition found in academic literature has been used: „A spin-off company of ETH Zurich is a newly founded company by ETH employees or graduates based on research results of ETH Zurich“. As opposed to this, a „Start-up“ is a newly founded company independent of any relations with academic institutions.

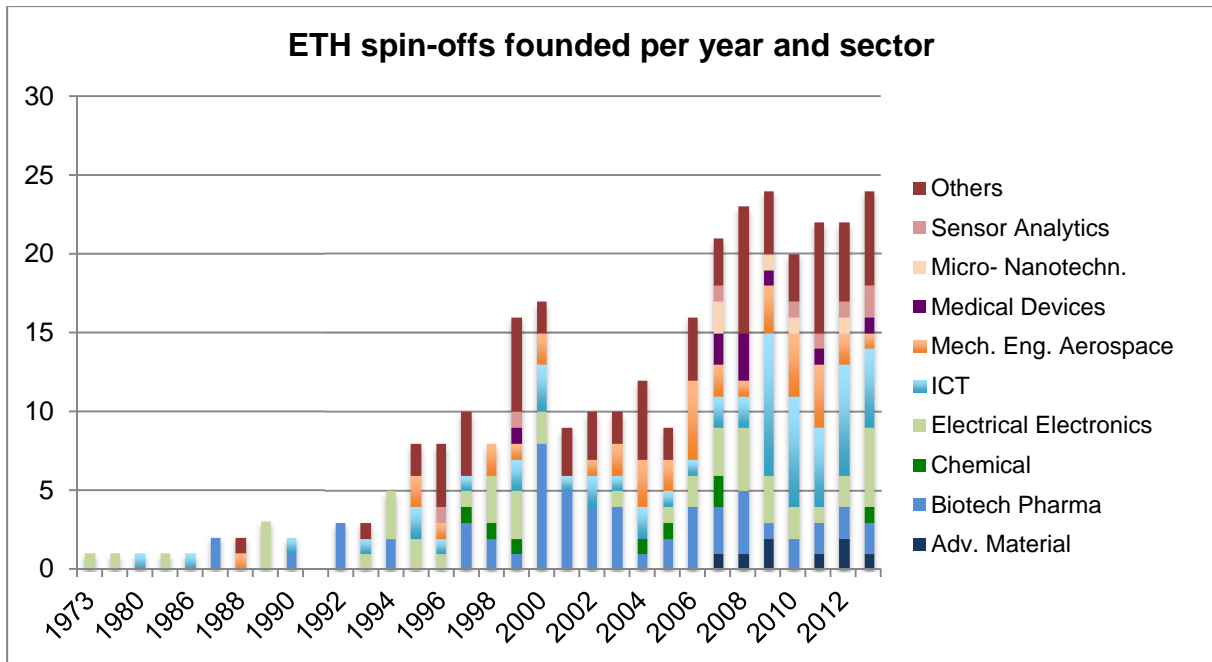
² ETH Zurich, Annual report 2013.

³ The Swiss Start-up Monitor is a non-profit, scientifically backed initiative. Their mission is to generate quantitative data and insights on the development of the Swiss start-up scene. <http://startupmonitor.ch>

We sent out an email request early December 2013 concerning the information required for our study. The spin-offs were given two options to provide the data; either through a standardized form or in cooperation with the Swiss Start-up Monitor. The Swiss Start-up Monitor is a non-profit science-based initiative from the University of St. Gallen, the University of Basel and ETH Zurich pursuing the quantification of the Swiss start-up scene as the main objective. This target is reached by offering founders a platform in which basic data about their start-ups can be entered and shared for instance with investors. The spin-offs were invited to register on the platform and enter the requested data. The information on the platform is kept confidential unless the company explicitly decides to share the information with the community. Out of the 252 spin-offs 217 were considered eligible for the report, as they were still active and registered in the commercial registry. We received 122 valid responses, offering us insights concerning their current status, revenue and employee development as well as patent registrations and awards received. This concludes a response rate of 56.2%. In order to be able to analyze and compare our results with other geographic areas and universities, we reviewed a number of publications and included comparisons from the following: Success of University Spin-Offs - Network Activities and Moderating Effects of Internal Communication and Adhocracy, Manoj A. Gupte, 2007, as well as the publications available from the Swiss Federal Statistical Office.

3.2. Description

The current total population of 315 ETH spin-offs can be split according to their year of incorporation as well as the corresponding sector. The graph shown below indicates the number of companies founded per year since 1973.



Graph 1 "ETH spin-offs founded per year and sector" N= 315

Even though the number of spin-offs slightly fluctuates throughout the years, we can see a continuous rise in the number of incorporations and a constant high of 20-24 spin-offs per year since 2007. This trend can especially be observed from the beginning of the 1990s on, keeping in mind that the ETH Zurich has assigned a designated group of professionals in that time to coordinate and mentor the aspiring entrepreneurs.

The sectors "Biotech Pharma" and "ICT" are by far the most popular among those shown above. At least one spin-off has been incorporated in the "Biotech Pharma" area every year since 1997. In total "Biotech Pharma" and "ICT" spin-offs each represent 23% of all ETH spin-offs. Additionally, we can see that the number of "Biotech Pharma" companies incorporated per year decreased. In 2000 a record of 8 "Biotech Pharma" ETH spin-offs were incorporated and a relatively stable development of about 2 new companies each year is observed since 2004. "ICT" has become continuously more popular since 2000, with 35 incorporations between 2008 and 2013 (4-8 "ICT" ETH spin-offs per year) and today totaling to 57 companies. "Mechanical Engineering and Aerospace" and "Electrical Engineering" are both represented with 15% and 18%, respectively. The smallest representation in the sample, "Micro- and Nanotech" and "Sensor Analytics", each make up for around 2% and 3% of the spin-offs. The spin-offs in consulting and those that could not be categorized under the designated areas are represented in the group "Others", which represents 13% of the population.

4. Analysis

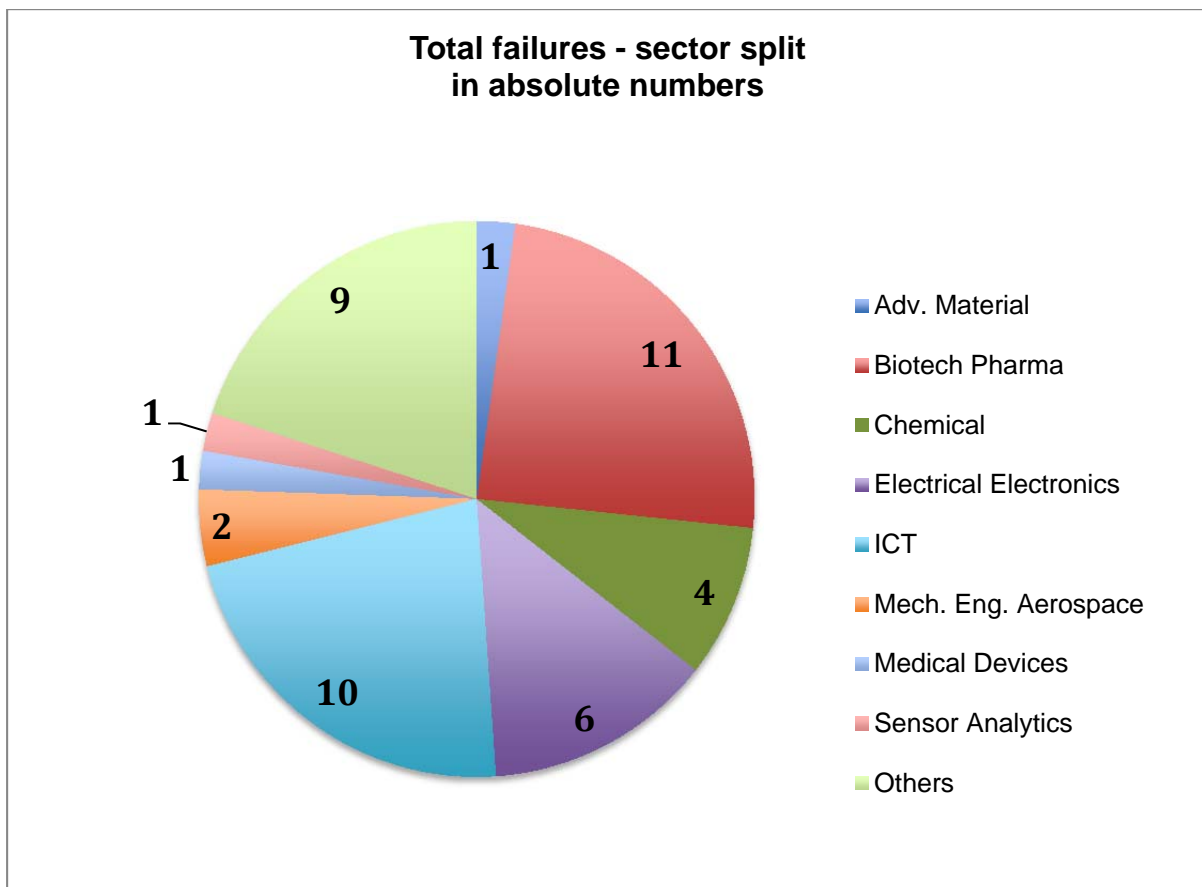
4.1. Failure, Survival and Success

Out of the total 315 ETH spin-offs founded since 1973, 41 have been liquidated and another 4 have ceased commercial activity although they were still registered in the Swiss commercial registry as of 31st of December 2013. Therefore the overall failure rate of 45 ETH spin-offs make up for 14.3% of the total sample and this leads to an overall survival rate of 85.7% (the survival rate over the first 5 years after incorporation is compared in 4.1.2). The companies have ceased their activity or were liquidated on average after 9.0 years, with a maximum of 21 years, a minimum less than a year and a standard deviation of 6.0 years. The graph below is an analysis of the timed failures, meaning the companies categorized according to their founding year and their rate of failure after 10 years of existence. 1997 had the highest failure rate, in which 4 out of 10 companies have been liquidated. This is followed by 1993, due to the fact that only 3 companies have been founded and one ceased its activity. The average rate of failure grows slightly over the first years of incorporation; this can be explained by the fact that companies, which are founded earlier, statistically have a higher failure rate.

Failure rate, after											
Vintage	Total Founded	1 Year	2 Years	3 Years	4 Years	5 Years	6 Years	7 Years	8 Years	9 Years	10 Years
1991	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1992	3	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1993	3	0%	0%	0%	0%	0%	0%	0%	0%	0%	33%
1994	5	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1995	8	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1996	8	0%	0%	0%	0%	0%	0%	0%	13%	13%	13%
1997	10	0%	0%	0%	0%	10%	10%	10%	20%	30%	40%
1998	8	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1999	15	0%	0%	0%	0%	7%	7%	7%	7%	7%	13%
2000	17	0%	0%	0%	6%	12%	12%	12%	12%	12%	12%
2001	9	0%	0%	0%	0%	0%	0%	11%	11%	11%	11%
2002	10	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2003	10	10%	10%	10%	10%	10%	10%	10%	20%	30%	30%
2004	12	0%	0%	8%	8%	8%	8%	8%	8%	8%	
2005	9	0%	0%	0%	0%	0%	11%	11%	11%		
2006	16	0%	0%	0%	6%	6%	13%	13%			
2007	21	0%	0%	0%	5%	14%	14%				
2008	23	0%	0%	0%	0%	4%					
2009	24	0%	0%	0%	8%						
2010	20	0%	0%	11%							
2011	22	0%	5%								
2012	22	0%									
Average		0%	1%	1%	2%	4%	4%	5%	6%	7%	10%

Graph 2 "Timed failure rates of ETH Zurich spin-offs" N= 315, failure rate in %.

In general most failures can be seen in Biotech Pharma (11 companies out of 45: 24.4%) followed by ICT (10 companies out of 45:22.2%) and Others (9 companies out of 45: /20.0%). Compared to their general representation in the sector split (“Biotech Pharma” and “ICT” both with 23% and “Others” with 13%, see 3.2), the failure rate for companies categorized as “Others” is relatively high. “Biotech Pharma” and “ICT” are both slightly underrepresented. The sectors with the smallest representation in the failure split are “Adv. Materials”, “Medical Devices” and “Sensor Analytics” with 2.4% (1 company) each, which are also underrepresented in comparison with the general sector split.



Graph 3 "Total failures: liquidated and ceased activities - sector split in absolute numbers" N=45 out of a total of N= 315.

4.1.1. Spin-off survival compared to other countries and universities

Over the past years there has been a number of studies examining the survival rate of spin-offs in different countries as well as universities. Most of them emphasize the high-scale performance of university spin-offs. Prof. Dr. Achim Walter and Manoj Gupte described some of these findings in their 2007 publication “Success of University Spin-Offs: Network Activites

and Moderating Effects of Internal Communication and Adhocracy". In their work they refer to Shane, who stated, that 68% of US university spin-offs incorporated between 1980 and 2000 were still active in 2001. Additionally, he reported that 80% of university spin-offs developed at MIT were still operational after 18 years and 94% of all spin-offs ever founded from the University of California were still active in 2004⁴. Similar findings have been published about universities in Europe, where survival rates have been reported to up to 95% (Queen's University) over a period of 20 years⁵. With an overall survival rate of 85.7% including all companies founded since 1973, ETH Zurich further confirms the excellent performance of ETH spin-offs.

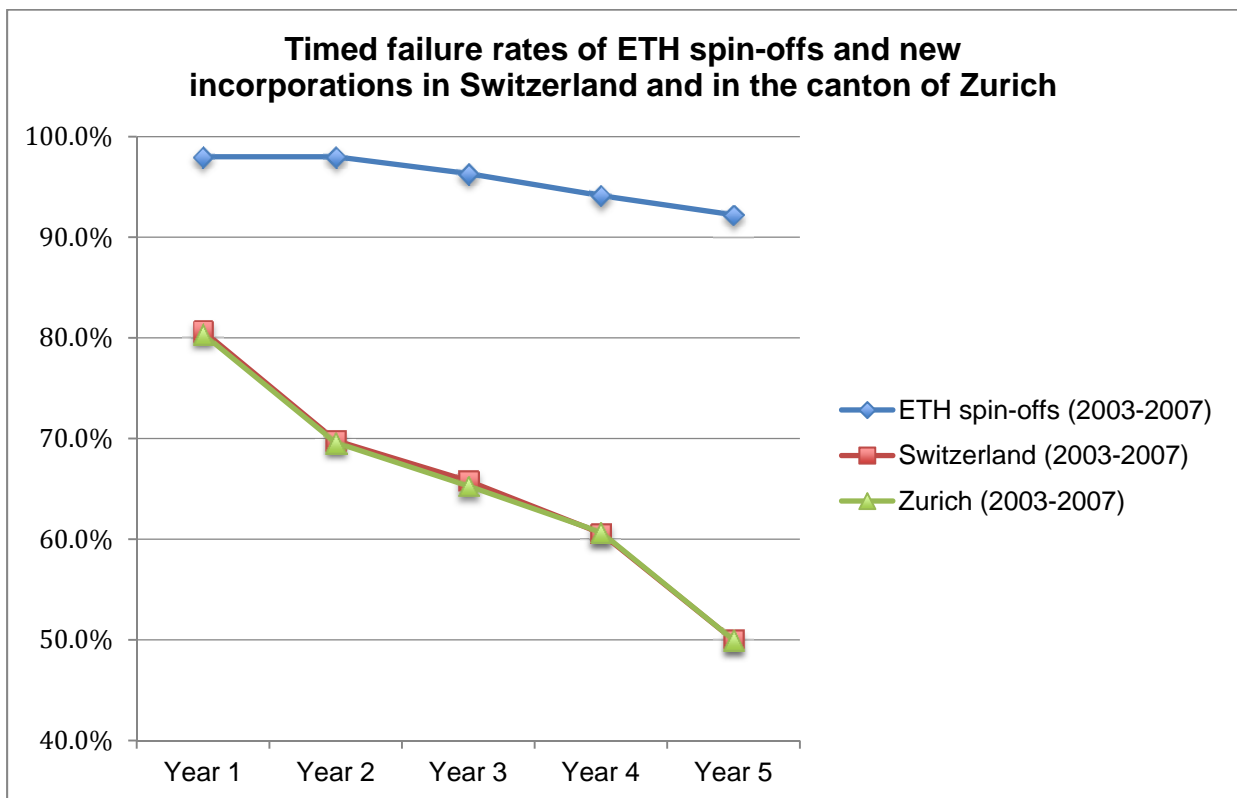
4.1.2. Spin-off survival compared to all start-up companies in Switzerland

In order to be able to present a complete picture of survival rates of start-up companies in Switzerland, we compared our data to those published by the Swiss Federal Office for Statistics. As already described by Ingvi Oskarsson and Alexander Schläpfer in "The performance of Spin-off companies at the Swiss Federal Institute of Technology Zurich", the survival rate over the first 5 years is far higher than for all start-up companies in Switzerland. In the graph below we compared companies founded between 2003 and 2007 to their survival rate as described in the timed survival rates above, therefore being able to infer the companies development one, two, three, four and five years after incorporation, respectively. The Swiss Federal Office for Statistics used a similar method, comparing the companies founded between 2003 and 2007 to their survival rate in 2008⁶. The 5 year survival rate of ETH spin-offs (2003-2007) is 92% compared to 50% for Swiss start-ups in general, which is 42.2% higher.

⁴ Manoj A. Gupte, Success of University Spin-Offs - Network Activities and Moderating Effects of Internal Communication and Adhocracy, 2007

⁵ Leitch, Harrison, 2005, p. 263

⁶ Swiss Federal Office for Statistics,
<http://www.bfs.admin.ch/bfs/portal/de/index/themen/06/02/blank/key/02/neugruendungen.html>



Graph 4 "Timed failure rates of ETH spin-offs and new incorporations in Switzerland and in the canton of Zurich" N=57

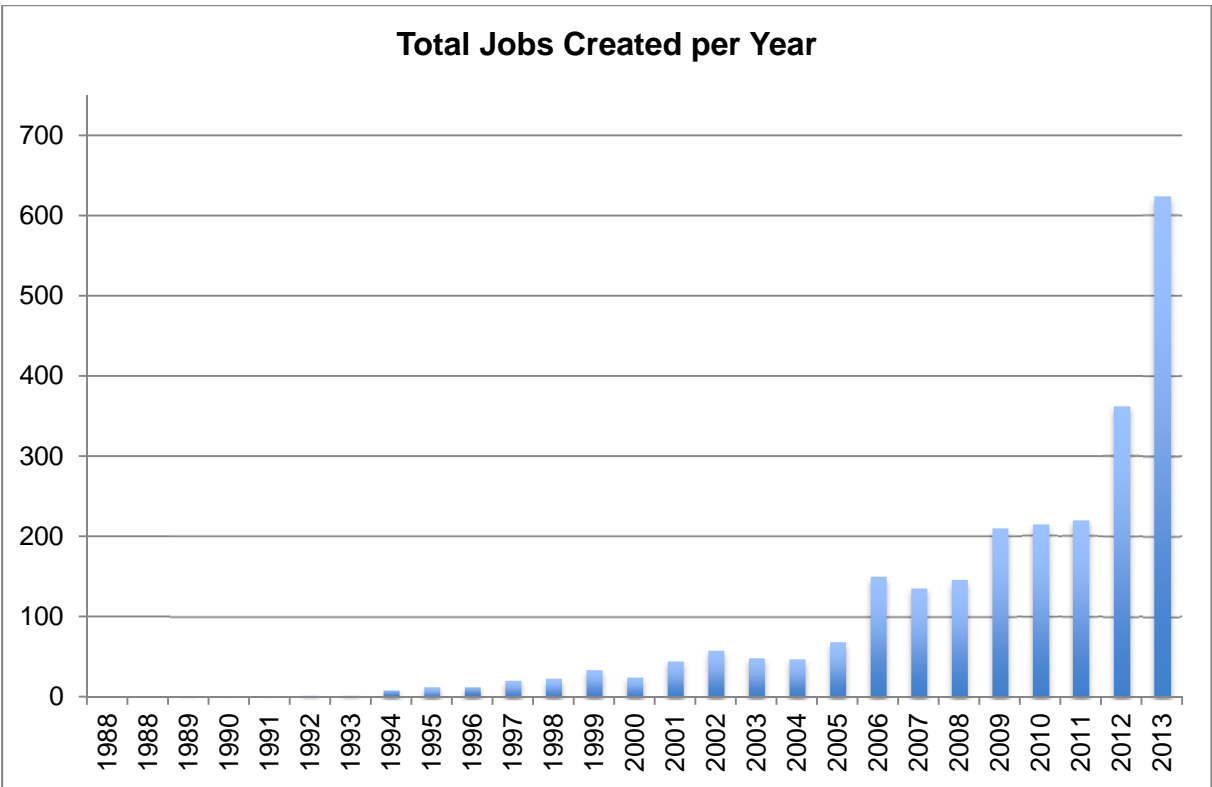
4.1.3 Acquisitions

Out of our sample of 252 companies 122 have contributed us valid answers concerning their performance. Further on, out of the 252 companies, we identified another 16 ETH spin-offs, which have been bought or merged with another company. Their incorporation took place between the years 1997 and 2009 and their average age at the time of the acquisition is 7.8 years. 5 ETH spin-offs were acquired in "ICT", 4 in "Electrical Engineering", 3 in "Biotech Pharma" and 2 each in "Mechanical Engineering" and "Others" which is in line with the number of spin-offs founded in each sector (see 3.2)

4.2. Job Creation

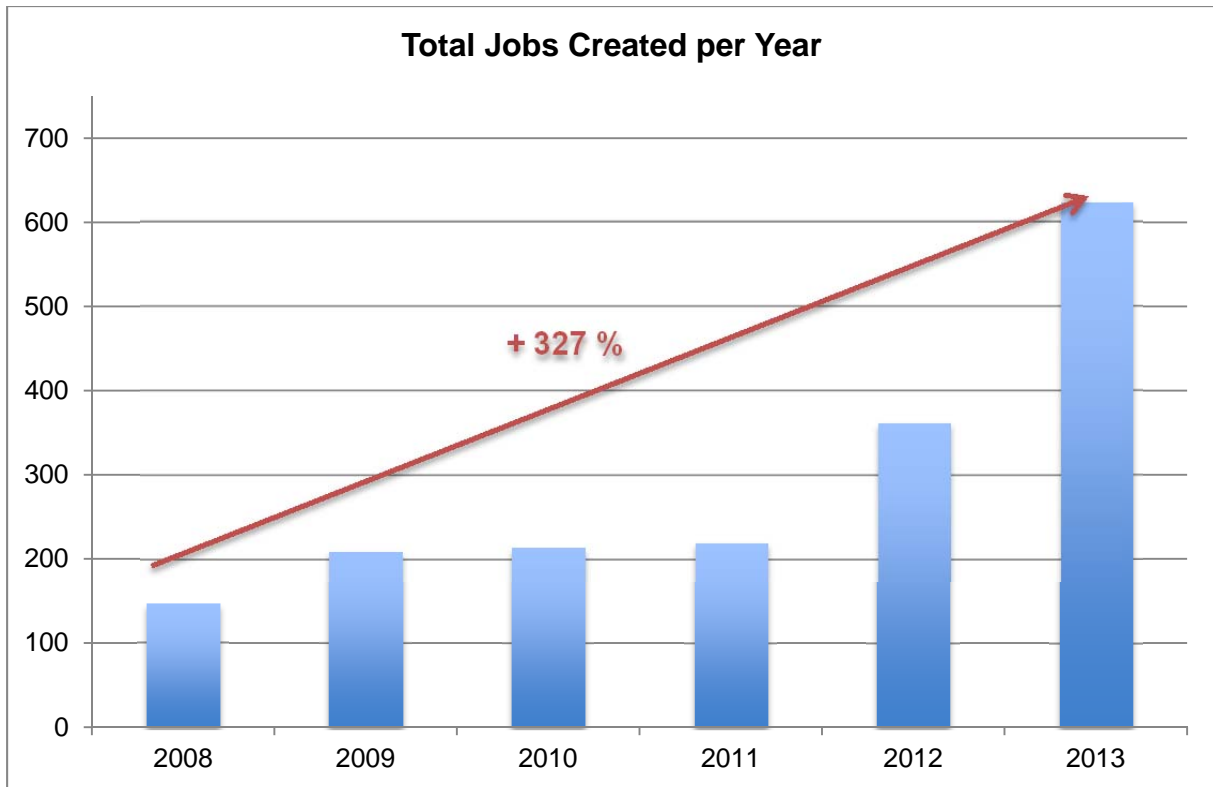
Concerning the job creation we received answers from 125 ETH spin-offs, which have created a total of 2'497 direct jobs since their incorporation. On average each spin-off

created in total 19.9 new jobs. As seen in the graph below the number of jobs per year has constantly risen over the past 30 years. This is partially due to the rising number of ETH spin-offs. In addition, we can make an estimation concerning the spin-offs, which have not provided us employment data. Out of 315, 125 ETH spin-offs were taken into account in the figures described in the graphs below. Concerning the not included 190 spin-offs, we can estimate that each of these spin-offs is employing between 1 and 5 employees. This makes up to between 190 and 950 jobs not considered in our evaluation. If we include this data to our study, the total number of 315 ETH spin-offs created between 2'600 and 3'500 jobs since their incorporation.



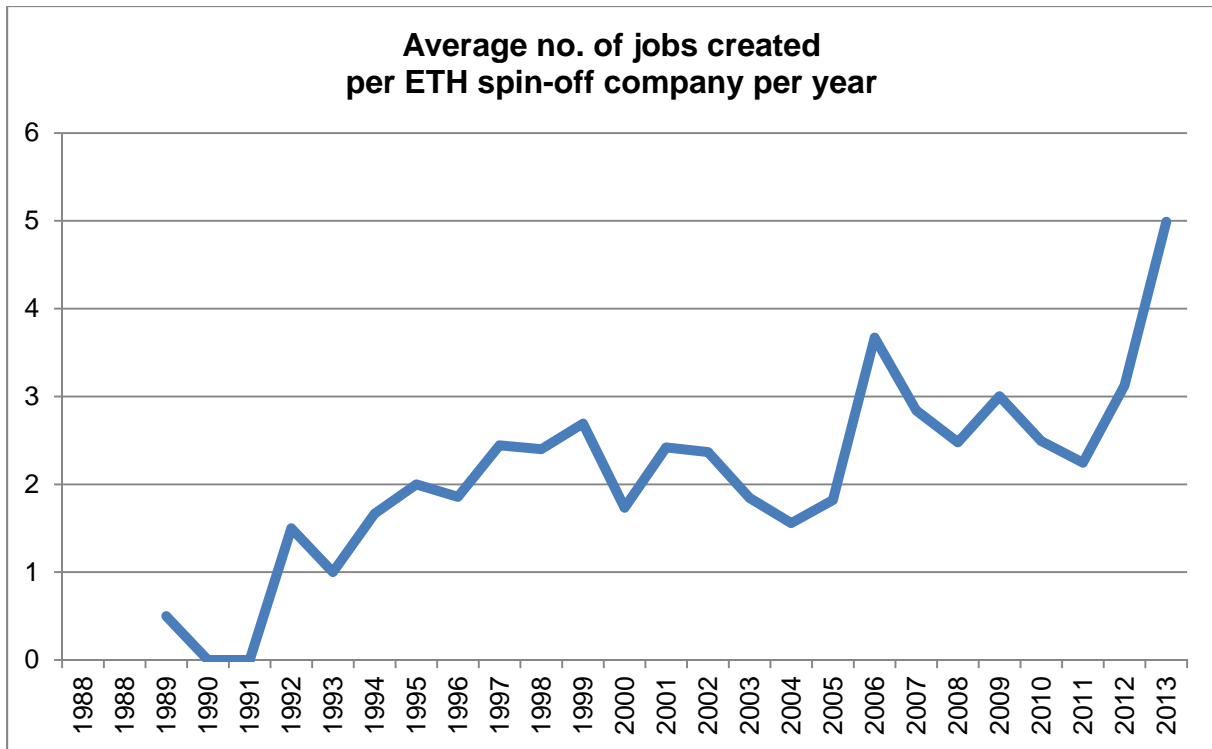
Graph 5 "Total jobs created per year" N=125

Especially taking into account the development of the last 6 years, the number of jobs created by ETH spin-offs has more than tripled. As seen in the graph below, the number of jobs created by ETH spin-offs in 2013 has increased by 327% as compared to 2008.



Graph 6 "Total jobs created by ETH spin-offs per year 2008-2013" N=125

However, as we can see in graph 7 below, the number of jobs per spin-off and year has significantly increased as well. Since 1992 the number of created jobs per ETH spin-off has increased from 2 up to 5 in 2013. Due to this we can conclude, that the increasing number of jobs is not only due to an increasing number of ETH spin-offs, but also due to their positive performance and development.

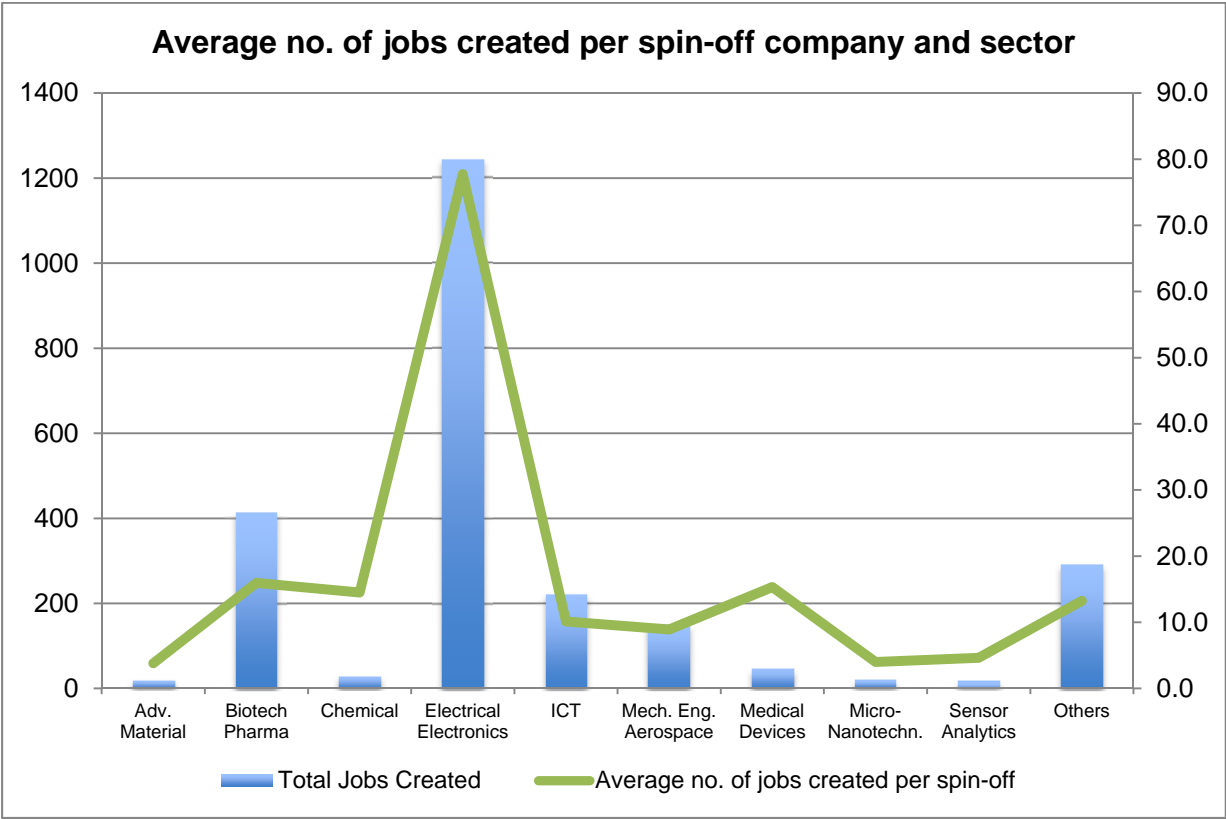


Graph 7 "Average no. of jobs created per spin-off company per year" N=125

Additionally, we analyzed the number of jobs offered by sector. By far the most jobs in absolute numbers have been created by companies in “Electrical Electronics” (1244). This is largely due to the success of a limited number of spin-offs (Remark: in the study of 2008 one of these companies was classified as “Sensors and Analytics”). This shows a very successful category, the “Electrical Electronics” spin-offs created 77,8% of all jobs and only represent 18% of all companies in the sample. The fields following are “Biotech Pharma” (414), “Others” (291) and “ICT” (222). On the lower end are “Sensor Analytics” (18) and “Micro- and Nanotechnology” (20), which correspond to their overall representation in the sample.

Further on, we can make conclusions based on statistical sources. According to the Swiss Federal Office for Statistics 41’300 people in Switzerland in 2013 were employed in the sector “Pharmaceutical Products”. Following discussions with experts at the ETH we can conclude that 10% of these are placements for highly qualified personnel (4’130). The employment possibilities by ETH spin-offs are considered to be highly qualified positions. Therefore we can make a rough estimation that around 10% of highly qualified positions in this sector have been created by ETH spin-offs in the “Biotech Pharma” category (414 out of 4’130). The sector “Pharmaceutical Products” is the only sector provided by the Swiss Federal Office for Statistics, which is comparable to our sector split even though our “Biotech Pharma” category covers spin-offs in a slightly broader field. It is important to note that this

conclusion is based solely on expert opinions and estimations made throughout our research, and is therefore a qualitative result of this study.

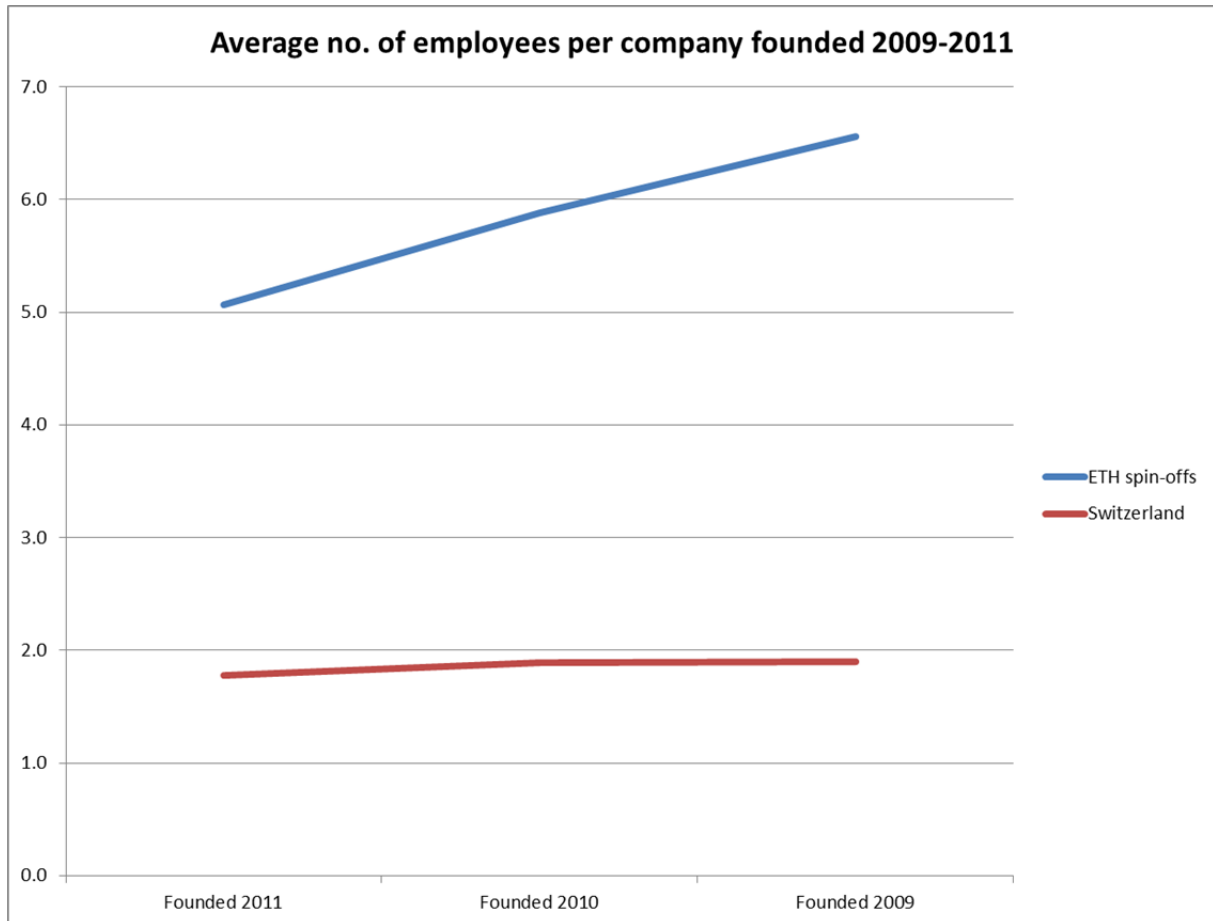


Graph 8 "Average no. of jobs created per ETH spin-off company and sector" N=125

4.2.1. Job creation compared to all start-up companies in Switzerland

As seen in the graph 9, we compared our data from ETH spin-offs with the data by the Swiss Federal Statistical Office. The companies we evaluated were incorporated between the years 2009 and 2011. On average ETH spin-offs create 3 jobs more already after 1 year. In the

years 2 and 3 of activity the spin-offs add on average one additional employee per year in contrast with Swiss start-ups, for which the number of employees stays relatively stable.



Graph 9 "Average no. of employees per company founded 2009-2011" N=44

4.3. Revenues

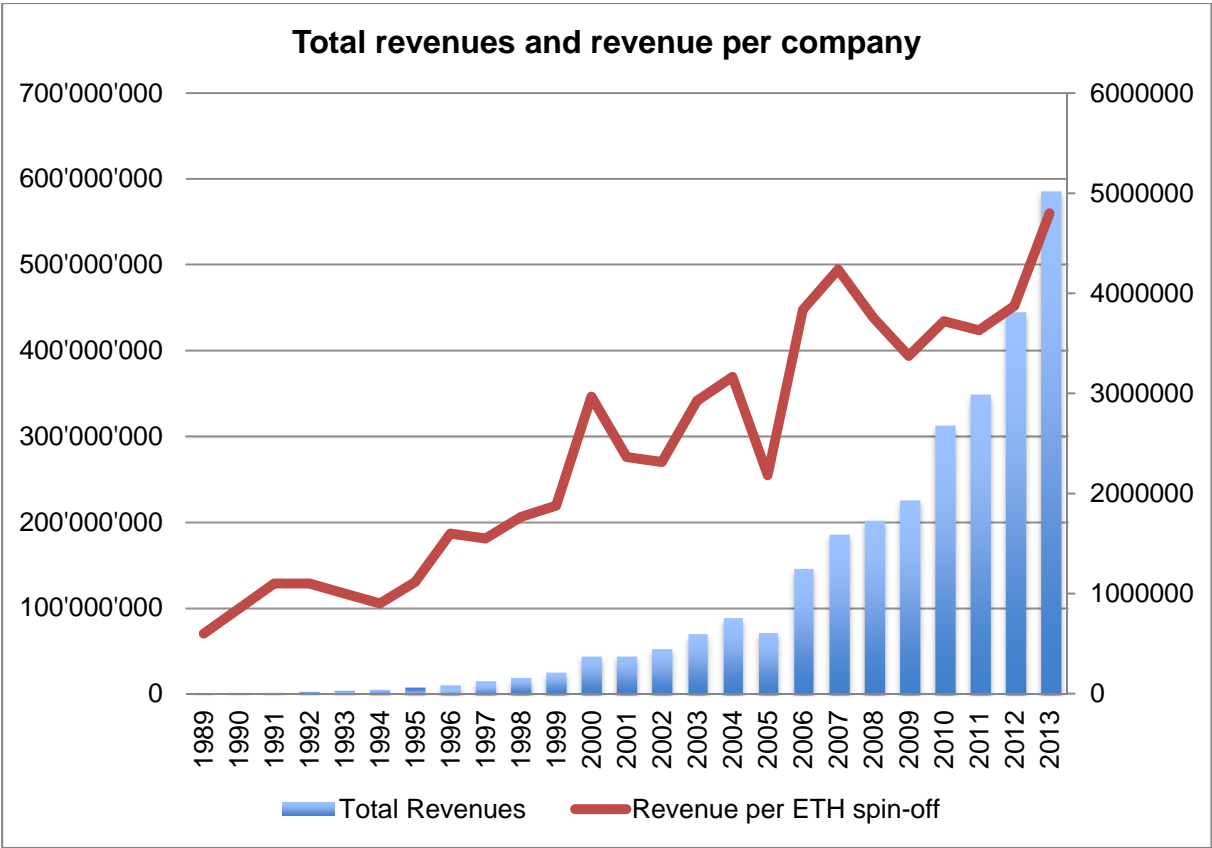
Roberts and Malone⁷ have used revenues as one of the indicators for the contribution of MIT spin-offs to the economy. In their 1996 publication they stated that MIT spin-offs annually contribute 10 billion US Dollars. In 1997 Wallmark made a similar statement, stating that the

⁷ Roberts, E., & Malone, D., Policies and structures for spinning off new companies from research and development organizations. R&D Management, 1996.

ten to fifteen corporations originating from the Chalmers University in Sweden every year contribute more than 100 Million US Dollars to the economy.⁸

Here, we can only consider direct revenues of the ETH spin-offs alone, taking only those into account that were not acquired. There are most likely further contributions to the economy especially by companies that underwent an acquisition. E.g. some ETH spin-offs in “Biotech Pharma” were bought by large pharma corporations and drugs were or will be brought to the market that will be a billion dollar business alone.

Revenues are not only one of the companies’ key performance indicators, but also a fundamental indicator of their contribution to the economy. This is why we have decided to review the financial performance of ETH spin-offs through the development of their revenues. We were able to obtain financial information from 122 ETH spin-offs. As we can see in the graph the amount of revenue has constantly increased over the years, with a minor downfall in 2005. In 2013 the ETH spin-offs have collectively produced revenues of 585 Million CHF and therefore contributed to the Swiss economy with nearly 0.6 billion CHF. As we were able to see on the topic of job creation, the rising revenues cannot solely be attributed to an increased number of spin-offs. The average revenue per ETH spin-off and year was 4.8 Million CHF per company in 2013, which is a 62% increase between 2000 and 2013.

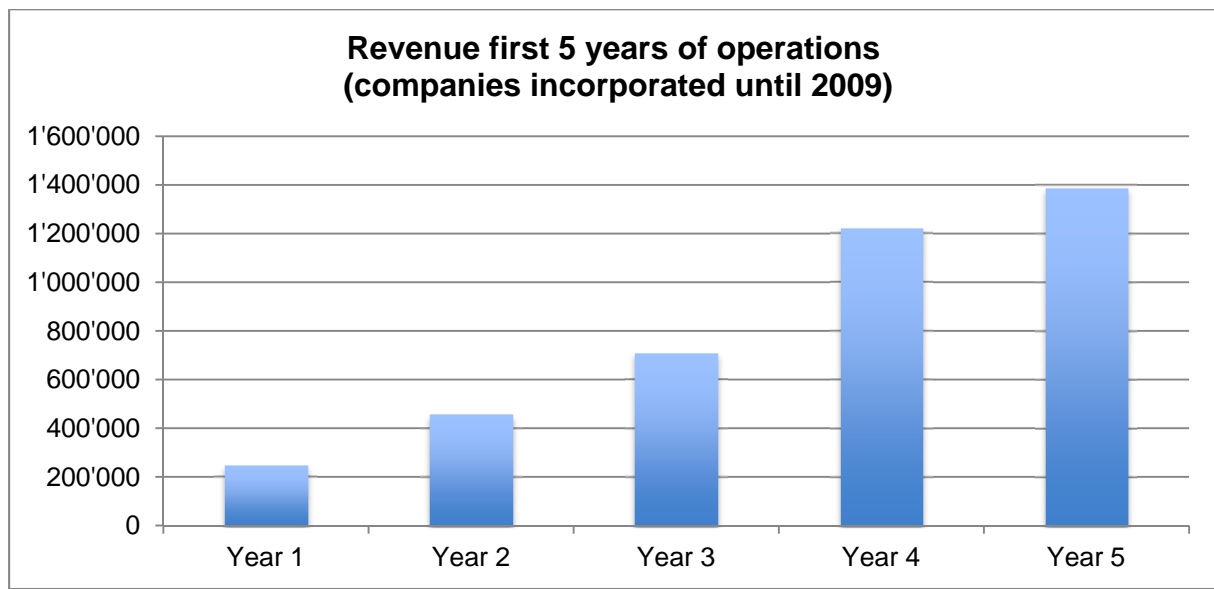


Graph 10 "Total revenues and revenue per company" N=122

⁸ Manoj A. Gupte, Success of University Spin-Offs - Network Activities and moderating Effects of Internal Communication and Adhocracy, 2007

4.3.1. Revenues segmented by years after founding

In order to see the companies' development in their first years of operations, we analyzed the companies incorporated until 2009 (69 companies) and their respective revenues. We can observe a strong positive trend, as on average the companies increased their revenues by over 460% to 1.4 Million CHF per company in their fifth year of operations.



Graph 11 "Revenue first 5 years of operations (companies incorporated until 2009)" N=69

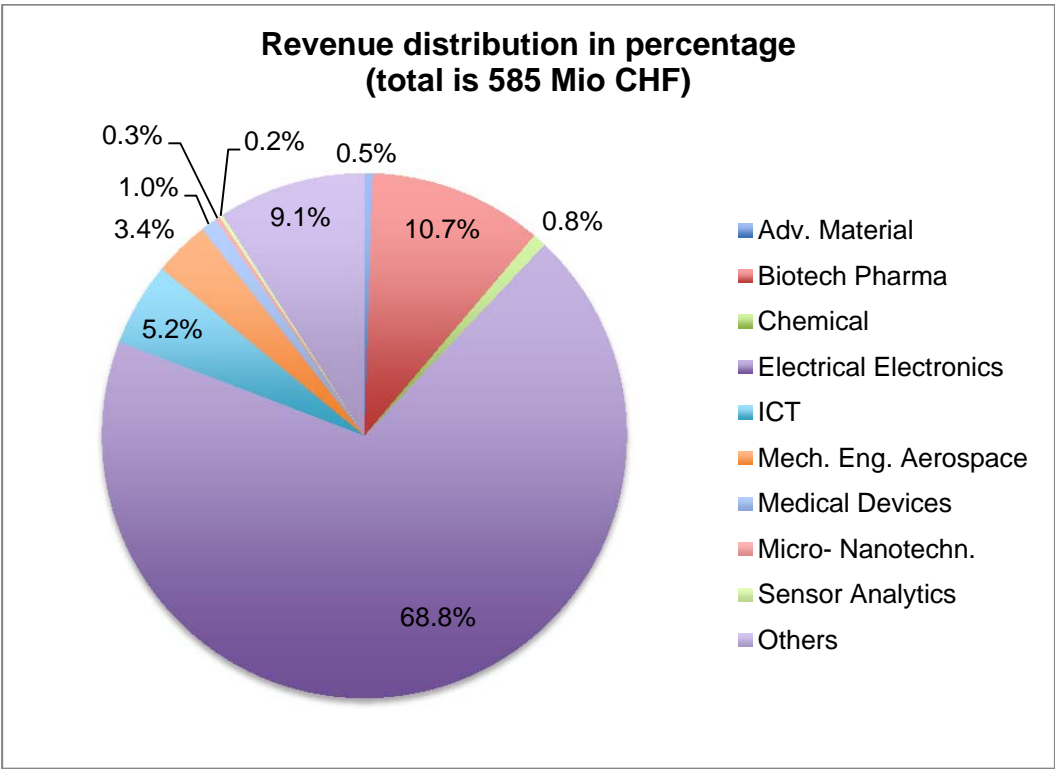
4.3.2. Revenues segmented by sector

As mentioned above, the sector Biotech Pharma represents one of the two biggest shares of ETH spin-offs with 23% of all companies. However, as seen in the graph below, our analysis of the spin-offs' revenues has shown that by far the biggest share of revenues in 2013 has been contributed by companies in the sector "Electrical Electronics". This is largely due to the success of a small number of spin-offs (Remark: in the study of 2008 one of the successful companies was classified as "Sensors and Analytics"). The field contributes, with in total 402'671'000 CHF in revenues in 2013, 68,8% to the total sample. The second largest sector, "Biotech Pharma", makes up for only 10,7% of the sample with 62'617'400 CHF in contrast to their representation of the total number of ETH spin-offs. The distinction between "Biotech Pharma" and "Electrical Electronics" is mostly due to the fact, that companies created in the sector " Biotech Pharma" require a very long period of time (> 10 years) to develop a product, which is ready for the market, and are often acquired before they have reached the point of receiving returns on that product. Revenues in "Biotech Pharma" are therefore

mainly based on milestone payments, development and service contracts and less on product sales.

The revenues in the ICT sector (23% of all spin-offs) are relatively low which is in line with the total jobs created by these spin-offs. On the one hand this sector only became popular since 2000, next to this we observe many “lifestyle” companies among the ICT companies and a couple of the successful ICT spin-offs were acquired and are therefore missing out in this section.

The smallest share of revenues in the respective year has been earned by companies in the fields of Adv. Materials, Chemicals, Micro- and Nanotech and Sensor Analytics, all of which are slightly underrepresented in comparison to their total representation of the number of companies.

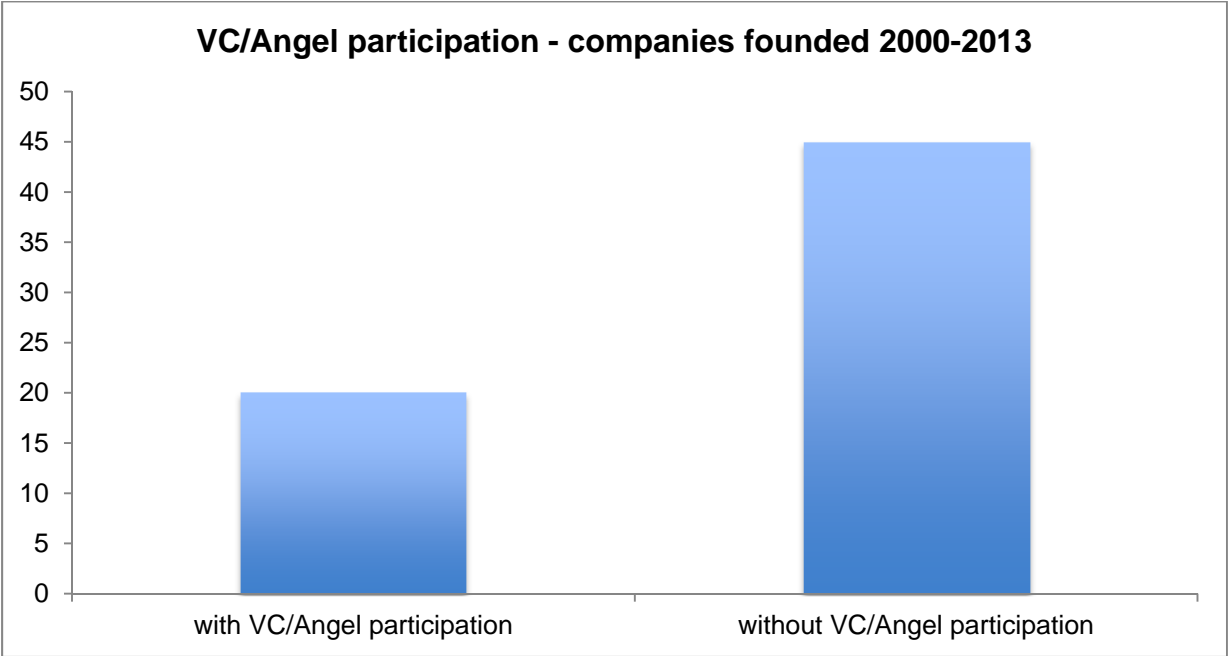


Graph 12 "Total revenues of ETH spin-offs in 2013" N=122

4.4 VC/Angel backing

As part of our survey, we assembled data concerning the financial backing of the spin-offs. Out of the 122 valid responses, 65 companies were willing to share this information with us. The results as seen in the graphs below overall correspond to the 2008 findings of the study

written by the London Business School. 45 out of 65 companies did not receive any funding by venture capital or angel investors. However, if we take a closer look at the second table below, the total equity raised with VC and angel investors represents 89,1% of all funding.



Graph 13 "VC/Angel participation - companies founded 2000-2013" N=65

Total money raised (CHF)	Founders and Others (n=45)	VC/Angel (n=20)	Total
Non-VC/Angel-backed	12'270'840	-	12'270'840
VC/Angel-backed	19'547'200	159'470'600	179'017'800
Total	31'818'040	159'470'600	
%	17.8%	89.1%	

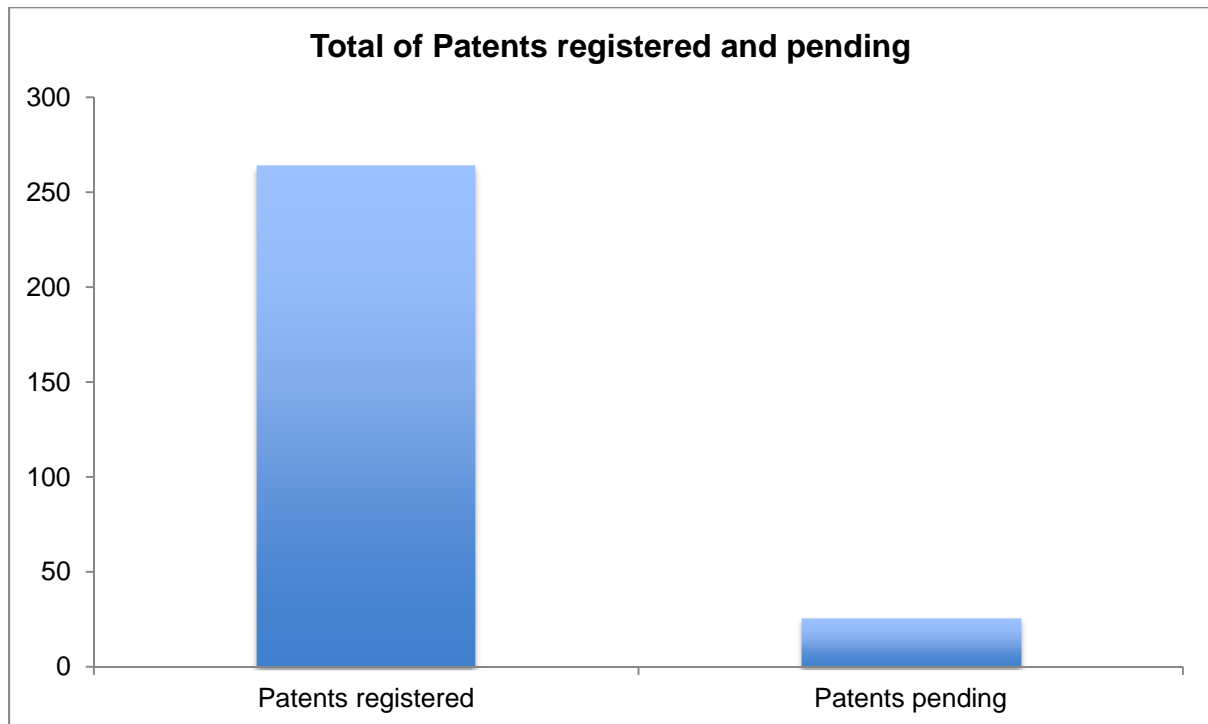
Table 14 "Total money raised" N=65

In the 2008 study 27% of the ETH spin-offs were VC backed, in this study we see a slight increase of up to 30.8% VC backing.

4.5 Patents

According to the IMD, following their conclusion in the 2000 World Competitiveness Report, Switzerland has the highest number of patents per capita and is considered to be world

leader in per capita R&D expenditure.⁹ Over the last 4 years (2009-2013) companies from Switzerland have registered 26'000 patents in the world, which concludes around 8'000 patents per year¹⁰. Concerning the 122 ETH spin-offs who contributed valid answers, 42 have stated to have patents either registered or pending. Out of those, on average each spin off has 6.3 patents registered and 0.6 patents issued, each with a standard deviation of 9.8 or 0.8, respectively.



Graph 15 "Patents registered and pending by ETH spin-offs" N=42

4.6 Awards & prize money

According to ETH Zurich's press release (6 Jan. 2014), ETH spin-offs have won awards, which totaled CHF 1.2 million in 2013, further confirming the successful ideas developed at the university. Since many years ETH spin-offs have continuously been participating in the most important awards, namely Venture, Venture Kick, ZKB "Pionierpreis" and De Vigier. 14 Prizes alone were won at one of the three Venture Kick stages since 2010, offering the start-ups up to CHF 130'000 each¹¹. The initiative, supported by the Gebert R f, Ernst G hner and Avina Foundation to name only a few, has set itself the goal to support start-ups at a very early stage where the high risk is covered neither by public funding nor by private

⁹ Istituto Dalle Molle di Studi sull'Intelligenza Artificiale

¹⁰ Swiss Global Enterprise, <http://www.s-ge.com/global/invest/en/blog/switzerland-top-patent-registrations>

¹¹ Venturekick, <http://www.venturekick.ch>

investors. By closing this funding gap, the initiative is helping ambitious start-ups further develop their ideas as well as fostering the innovative spirit in Switzerland. Almost half of the applications for Venture Kick originate either at the ETH Zurich or EPFL¹². ETH spin-offs have proven not only to be remarkable innovators, but their business model as an equally successful one. Therefore, it is not surprising that each year a number of start-up initiatives come forward to further support their ongoing development.

5. Conclusions

5.1. The value and benefits to the economy

In 2013 Switzerland has been confirmed as one of the most competitive economies in the world in the World Competitiveness Report by the Global Economic forum¹³. The report further emphasizes Switzerland's strength in innovation, with a special focus on innovation and its labor market. Switzerland has consistently proven its efforts in supporting its academic institutions as well as the interactive collaboration between research facilities and economy. ETH spin-offs are a good example of an effective collaboration between a university and the business sector. The state is making continuous efforts to support the entrepreneurial spirit of students, which was additionally enforced in the establishment of the ETH transfer unit at ETH Zurich. The results of our study have shown a successful integration of technology into business and their contribution to the economy. This fact is not only supported by quantitative data, like the summarized revenues of CHF 585 Million in 2013 by ETH spin-offs and 2500 direct jobs created by ETH spin-offs in 2013, but also the enhanced spirit and innovation clusters being built in Zurich. The clusters are further supported by organizations like the CTI Commission for Technology and Innovation¹⁴ or Venturelab¹⁵. Finally, research institutions, as the ETH, combined with private and state funding, offer the economy a competitive advantage, which is of long term profitability for the economy as well as society.

5.2. How does the ETH Zurich contribute to the development of spin-offs?

¹² Inno-swiss.com, <http://www.inno-swiss.com/article/view/810>

¹³ World Economic Forum, Global Competitiveness Report 2012-2013

¹⁴ Commission for Technology and Innovation, <http://www.kti.admin.ch/index.html?lang=en>

¹⁵ Venturelab,

<http://www.venturelab.ch/index.cfm?CFID=211385609&CFTOKEN=14924712&page=118306>

Since the 1990s the ETH Zurich has put increased efforts into supporting the development of sustainable business models for technologies developed at the university. ETH transfer supports its students and faculty in transforming an idea into a sustainable business model from the beginning, offering them guidance, infrastructure and connecting them to continuous education options in form of workshops and networking events. Part of this represents the collaboration with different industry representatives and consultants as e.g. the Technopark Zurich or McKinsey & Company. Since 2010 the ETH Pioneer Fellowship Grant has been initiated offering MSc or PhD students after their graduation with 150'000 CHF support for 18 months to further develop their research into marketable products. In 2012 the Innovation and Entrepreneurship Labs (ieLab) were founded, serving as an incubator for the Pioneer Fellows, supporting the potential entrepreneurs with coaching, entrepreneurial trainings and covering all aspects of successfully launching a business. Therefore, the ETH constitutes an essential part of the entrepreneurial and innovative ecosystem in Zurich as well as in Switzerland. We conclude, that these efforts have proven to be effective in bringing young ideas into action, while creating a collaborative environment further increasing Switzerland's position as innovation leader.

ABOUT THE AUTHOR



Vanessa Pinter

Currently, Vanessa is conducting her Master in Business Innovation at the University of St. Gallen. Before her research project at ETH Zurich, Vanessa obtained her B.Sc. at the Vienna University of Economics and Business, specializing in Entrepreneurship and Innovation, and International Business. During her studies she conducted a technology transfer project in collaboration with CERN, based in Geneva, an IP-Strategy project in collaboration with Quipos, based in Salzburg and she obtained professional experience in finance, accounting and marketing at various companies in Vienna and Moscow.

ABOUT THE EDITORS



Dr. Matthias Hölling

Since Nov. 2014 Matthias is the Managing Director of the Technopark Foundation, before this he was heading the spin-off group at ETH transfer, the technology transfer office of ETH Zurich. He received his diploma in electrical engineering from the University of Karlsruhe (now KIT) (DE) and his PhD from ETH Zurich.



Dr. Marjan Kraak

As of Nov. 2014 Marjan is heading the spin-off group at ETH transfer, before that she was Business Development Manager at the technology transfer office. She built up the Innovation and Entrepreneurship lab in the life sciences (ieLab HPL). Marjan has a PhD in Biotechnology from ETH Zurich and she has 10 years of experience in the life science industry.



Dr. Alexander Ilic, Ass. Prof.

Dr. Ilic is the Director of the Auto-ID Labs ETH Zürich / University of St. Gallen, an Assistant Professor at University of St. Gallen, Founder of Swiss Start-up Monitor, and Chairman and Founder of Dacuda.



Dominik Wensauer

Dominik is Managing Director of TechBridge which focuses on helping corporates to identify, evaluate and set up partnerships with start-ups in the DACH area. Prior to that Dominik co-founded and built up the Start-up Monitor Initiative and also a series of educational programs for entrepreneurs at the NPO Startup Weekend Switzerland.



This report has been conducted in collaboration with the Swiss Start-up Monitor, a non-profit, science-based initiative of the University of St.Gallen, the University of Basel and the ETH Zurich. Its main goal is to quantify the Swiss start-up scene in order to be able to understand how young entrepreneur's activities influence the Swiss economy. Following a scientific approach the Swiss Start-up Monitor wants to increase the visibility of start-ups and provide the general public, interested stakeholders, and the research community with facts about the start-up scene, which will be extracted from an established database. Further, it aims to foster the communication between start-ups and drive the start-up ecosystem. In order to do so it offers a platform, where start-ups as well as community members (e.g. investors, coaches) are able to present themselves through own profiles and use of the platform services as financial tools, business planning services and job platform.

Contact

ETH Zurich – ETH transfer
Raemistrasse 101, HG E 43-49
8092 Zurich, Switzerland
phone +41 44 632 23 82

www.transfer.ethz.ch
www.spinoff.ethz.ch

Title picture: Georg Aerni

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