Public Private Equity:
An Evaluation of Public Early Stage Risk Capital Initiatives in Norway

By

Simen Berger Oeby

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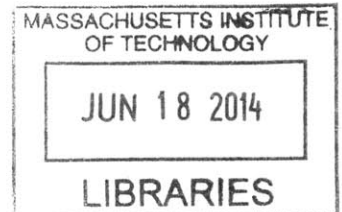Norwegian School of Economics, 2010

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Signature redacted

Signature of Author: _____

MIT Sloan School of Management
May 9, 2014

Signature redacted

Certified By: _____

Yael Hochberg
Visiting Associate Professor of Finance
Thesis Supervisor

Signature redacted

Accepted By: _____

Michael A. Cusumano
SMR Distinguished Professor of Management
Program Director, M.S. in Management Studies Program
MIT Sloan School of Management

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ABSTRACT

Access to finance limits the ability to grow for many early stage ventures. To mitigate this limitation, the Norwegian State has initiated seed funds partly financed by public funds. The funds carried out many investments during the late 1990s and 2000s. This thesis describes and evaluates the performance of the "second wave" of seed funds established 2006 to 2008. The investments made by the seed funds are compared with investments made by other private equity investors during the same time period. Firstly, the thesis describes the characteristics of companies receiving investments. Secondly, it analyses the development in selected accounting metrics until (and including) 2012. Finally, regression analyses are used to identify the relationship between multiple variables and growth in revenue, operating income and wages. Among these variables is ownership by the second wave of seed funds. The regressions seek to establish a relationship between receiving investments from the seed funds and the subsequent development in revenues, operating income and wages.

ACKNOWLEDGEMENT

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Problem Statement

This thesis investigates the performance of seed investments conducted by private equity (PE) investors on behalf of the Norwegian The Ministry of Trade, Industry and Fisheries. The analysis compares the accounting performance of companies that have received investments from "wave 2" of public seed funds with companies that did not receive investments from these funds.

Definitions

"Public" and "Private" funds

In the following I will use "public" and "public companies" to denote companies that received investments from the second wave of public seed funds. "Private" and "Private companies" will refer to all investors and portfolio companies that are not "public". "Portfolio Companies" will refer to companies owned by private equity investors – private or public. T0 will refer to year in which a portfolio company received an investment.

Seed financing

Seed financing is defined by the Finnish Venture Capital Association as "Financing provided to research, assess and develop an initial concept before a business has reached the start-up phase"[i]. Investopedia.com has a similar definition: "The initial capital used to start a business. Seed capital often comes from the company founders' personal assets or from friends and family. The amount of money is usually relatively small because the business is still in the idea or conceptual stage. Such a venture is generally at a pre-revenue stage and seed capital is needed for research & development and to cover initial operating expenses until a product or service can start generating revenue, and to attract the attention of venture capitalists".[ii]

Data sources

The data used in this thesis come from three sources: The Ministry of Trade, Industry and Fisheries provided an overview of their seed fund portfolio as of June 2013, The Norwegian School of Economics (NHH) provided an extensive database of PE transactions and the Brønnøysund Register Center provided tax data.

Figure 1: Basis for univariate accounting comparison

 # companies by public acquisition year   *# companies by private acquisition year*

	public	private
2006	5	72
2007	26	76
2008	35	70
2009	17	54
2010	20	38
2011	7	23
2012	4	19
Non-org	4	
Total	118	352
Bankrupt 2012	2	5
Not present	13	62
Non-org	4	
Accounting data 2012	99	285
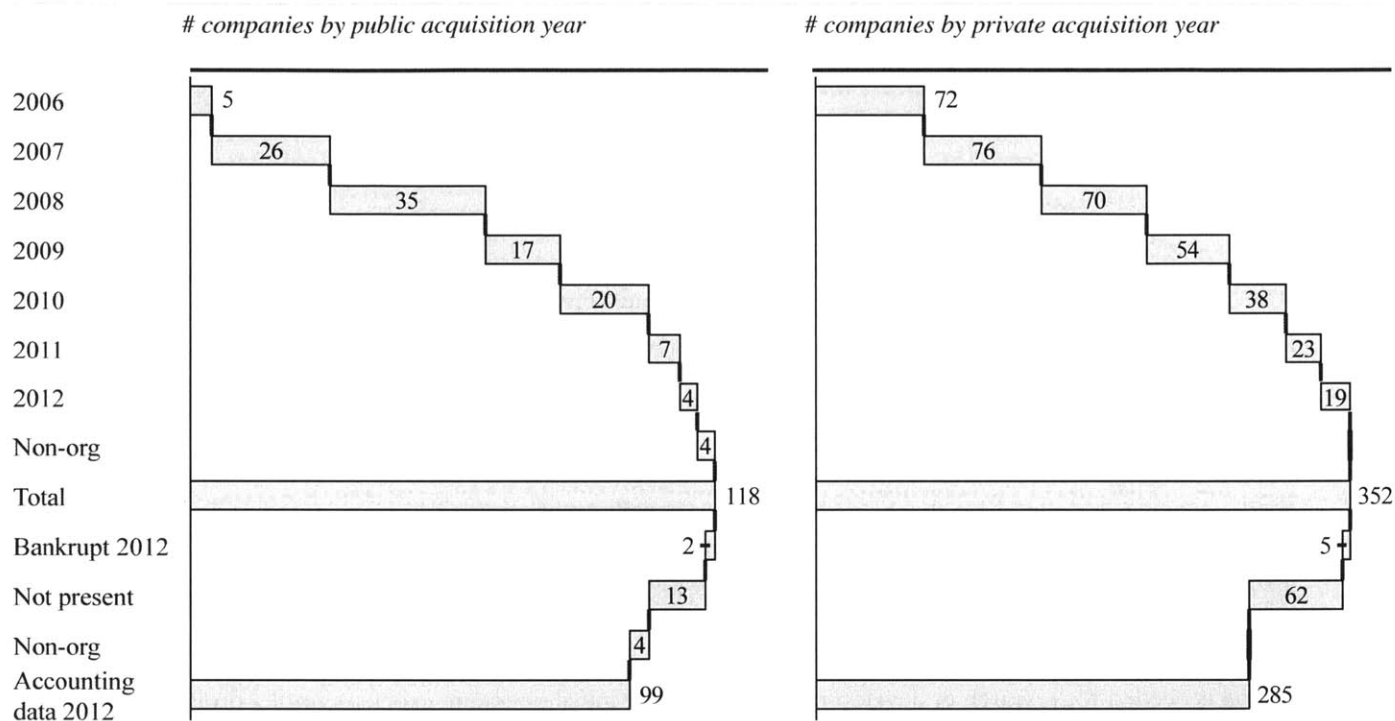
The data was cleaned before performing analysis. From the NHH-dataset of nearly 6000 PE-transactions, the transactions used are those:

- Where the company involved has a Norwegian Organization Number. For some transactions, the organization number is not specified. These transactions are excluded as they cannot be linked with accounting data
- Transactions that was conducted between 2006 and 2012

With the filter described above, 118 companies with public PE investors and 352 with private are identified. Companies that have organization numbers that are not listed in the tax numbers for 2012 are most likely bankrupt, but could also have moved their tax residency abroad.

Out of the total amount of companies identifies, two public and five private of these have the status as "bankrupt" in the 2012 tax data, 13 public and 62 private were not present (i.e. most likely bankrupt before 2012) and 4 public companies had inaccurate information. The univariate analysis was carried out on the remaining companies. The regression analysis also includes those companies that were missing or bankrupt in the 2012 tax registry.

Background on the Public Early Stage Capital initiatives in Norway

First wave[v]

The first Norwegian early stage capital initiatives, "såkornfondene" (the seed funds) were rolled out in 1998-2000. The initiative consisted of five funds with regional investment focus and one fund with a countrywide focus. The aggregate capital of the funds was 775.5 mNOK spread on 175 investments.

Second wave[vi]

2006 to 2009 saw the second roll out of seed funds, this time five with a rural focus ("distrikt") and four with a countrywide investment focus. The table below shows the number of companies invested in per fund and year[vii]:

Table 1: Number of Organizations Invested in per Fund and Year

	2006	2007	2008	2009	2010	2011	2012	2013		Total
Rural	3	9	19	9	13	4	5	1		63
FjordInvest SørVest			3	2	2	2				9
KapNord Fond	3	5	9	3	3	1				24
Midvest			1	2	4	1	3	1		12
Norinnova Invest		4	6	2	4		2			18
Country wide	1	18	20	9	12	3	1	1	1	66
Alliance Venture		5	3	4	1					13
ProVenture Seed	1	5	4	3	2	1		1	1	18
Sarsia Seed		6	8	1	6	1				22
SåkorninVest II		2	5	1	3	1	1			13
Totalt	4	27	39	18	25	7	6	2	1	129

The funds were initiated in 2006 and the majority of investments (85 of 125) where completed within 2009.

Total investments by the funds with rural focus totaled 505.9 mNOK while the countrywide funds invested 799.4 mNOK.

Third wave[viii]

The Ministry of Trade, Industry and Fisheries announced the creation of six new "seed funds" ("såkornfond) May 15th 2012[ix]. The Norwegian state will provide 1.5 bnNOK in loan financing, while 1.5 bnNOK will come from private investors. 15% of the state loans are given as "risk mitigation", i.e. that 15 % of the 1.5 bn (or 7.5%) of the total capital has equity characteristics and will be written down in case of low exit values from the portfolio companies.

The mission of public seed funds

The overall mission of the seed funds as outlined in June 2013[x] (translated from Norwegian): "The long-term goal of the country wide seed fund scheme is to support the establishment of innovative, internationally competitive growth companies in an early stage throughout the country, and by doing so, create growth and

knowledge based jobs. This (goal) shall be accomplished by increasing the supply of qualified capital and competence, and build and develop good ecosystem of fund managers".

The mission of the seed funds differs between the ones with rural focus and the ones focusing on targets throughout the country[xi]. "The rural funds shall provide knowledge intensive companies that have significant growth potential and are that are located in areas with a weak business ecosystem, with patient equity, capabilities and network, in order to release the companies' growth and profitability potential…"

The funds that did not have geographical restrictions, i.e. that could invest in the entire country had a less constrained mission: "The country wide seed fund initiative shall support innovative, competitive growth business by increasing the supply competent capital and competence. The (investment) target group is innovative projects, including projects from universities and colleges throughout the country".

Structure of public seed funds
The 9 seed funds initiated in "wave 2" from 2006 to 2008 have been set up and monitored by "Innovation Norway", a public agency which mandate is to promote entrepreneurship and innovation. The money channeled from the state to the seed funds are given as 100 % loans, however, if fund returns are negative, a share of the debt is written off in order to offset some of the equity risk for private investors. This "risk mitigation" totals 7.5% of the total fund value for the countrywide funds and 12.5 % for the rural funds[xii].

Limited Partners (LPs) own the seed funds, while fund managers operate them. The fund managers often have ownership in the funds and are then called "General Partners, GPs"[xiii]. GP's ownership of funds helps align incentives with fund equity and debt holders as it incentives to pick investments giving high risk adjusted returns. The fund managers have frequent interactions with the target companies, i.e. by often taking a board position.

Public Early Stage Capital Characteristics

Innovation Driven Enterprises

The mission of the seed funds is to "…support innovative, competitive growth business by increasing the supply competent capital and competence"[xiv]. Murray and Aulet (2013)[xv] describe innovation-driven entrepreneurship as "… the creation of "innovation-driven enterprises" (IDEs) that pursue global opportunities based on brining customers new innovations that have a clear competitive advantage and high growth potential". Murray and Aulet points out that the innovation does not have to be technological, but can be a new business model, new way of delivering services or products, or entering new markets. The professors outline five characteristics of IDEs[xvi]:

1. Focus on global markets
2. The company is based on some sort of innovation (tech, process, business model) and potential competitive advantage
3. "Tradable jobs" – jobs that do not have to be performed locally
4. More diverse ownership base including wide array of external capital providers
5. The company starts by losing money, but if successful will have exponential growth. Requires investment. When you put money into the company, the revenue/cash flow/jobs do not respond quickly

In order to develop a perspective on whether the seed funds invested in companies that fit the IDE definition, a quantitative-qualitative analysis is shown below. The author has studied the business activities of all current and historic portfolio companies and given a rating ranging from 1 to 3 on the dimensions 1-3 outlined by Murray and Aulet. A score of 1 means that the firm does not exhibit the characteristic of an IDE on the given dimension, while 3 means that it does. A score of 2 can be interpreted as a neutral score.

Figure 2: Fit with characteristics of IDE

	Focus on global markets	Based on innovation	Tradable jobs
	117	117	117
3) Good description of firm	37%	37%	39%
2) Medium good description of firm	32%	32%	28%
1) Not a good description of firm	32%	31%	32%
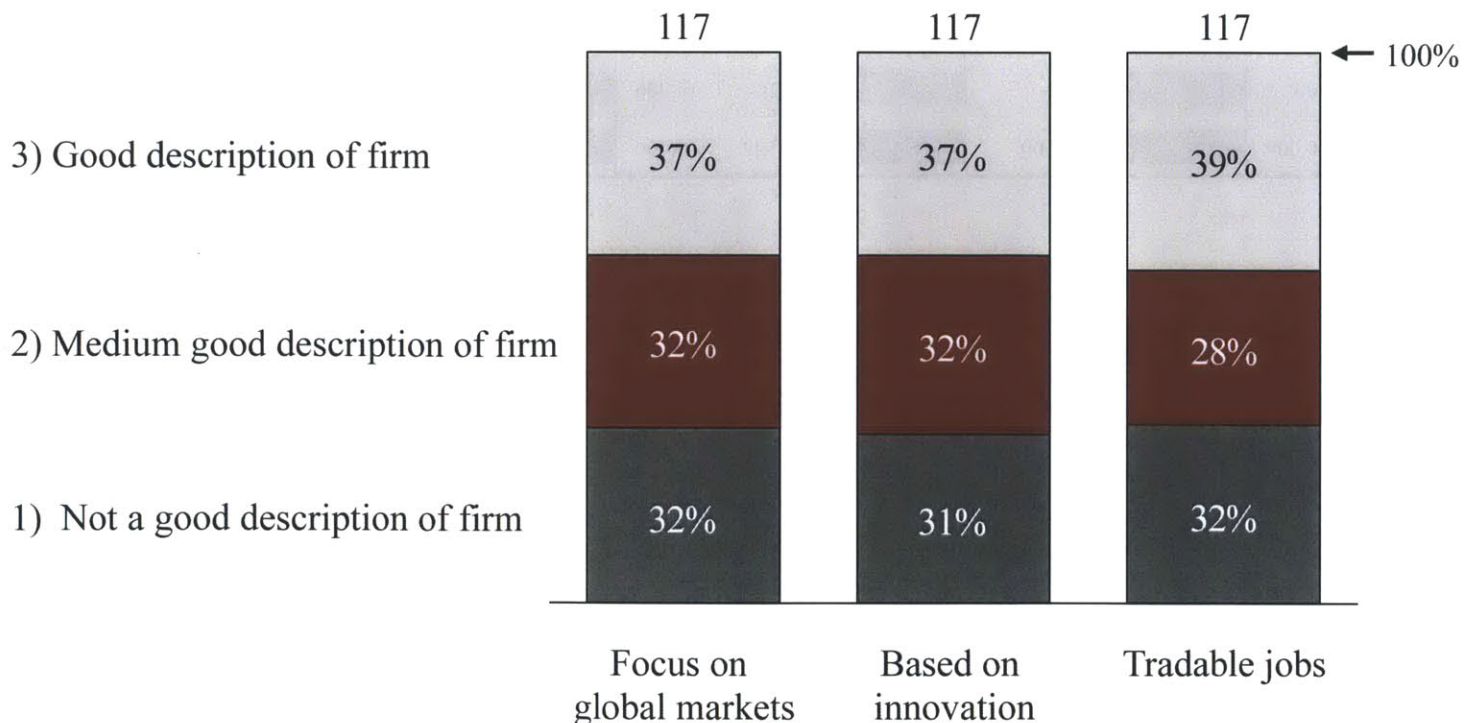
Accounting data in the year of investment

The table below shows accounting data for the companies receiving seed fund investments in years 2006-2012. The sum of the grey and red area of the bar charts corresponds to the aggregate share of firms having sales/assets/… that are less than the number of the category label (i.e. the number to the left of the bar chart). The grey area by itself shows the incremental number of firms added when increasing from the category label above. The accounting data seem in line with what one would expect from early stage growth companies. It shows: low revenues, negative profit margins, high shares of intangible assets and high share of sales revenue going to wages.

Figure 3: Accounting Data of Public Companies at T0 (1/2)

Legend: ■ Accumulated □ Interval addition

Category	Sales revenue, Percent less than	Assets, Percent less than	Wage costs category	Wage costs, Percent less than	Operating Income category	Operating Income, Percent less than
-	3	0	-	1	-10,000	4
100	3 14 17	0 4 4	100	1 4 5	-5,000	17 4 21
500	17 16 33	16 4 20	500	18 5 23	-2,500	21 18 39
1,000	33 16 49	20 19 39	1,000	23 12 35	-1,000	39 19 58
2,500	49 11 59	39 17 55	1,500	35 11 46	-500	58 7 65
5,000	59 14 74	55 11 67	2,000	46 6 53	-	65 11 76
10,000	74 7 80	67 10 77	2,500	53 11 64	500	76 10 86
25,000	80 5 86	77 7 84	5,000	64 18 82	1,000	86 3 89
50,000	86 9 95	84 7 92	10,000	82 10 92	1,500	89 3 92
1,000,000	95 5 100	92 8 100	>10,000	92 9 100	>1,500	92 7 99

Figure 4: Accounting Data of Public Companies at T0 (2/2)

Legend: ■ Accumulated □ Interval addition

Percent less than	Share intangibles (Acc / Int / Total)	Debt Ratio (Acc / Int / Total)
0%	6	1
10%	6 / 29 / 35	1 / 20 / 21
20%	35 / 11 / 46	21 / 11 / 32
30%	46 / 6 / 52	32 / 15 / 48
40%	52 / 10 / 62	48 / 6 / 54
50%	62 / 8 / 70	54 / 8 / 62
60%	70 / 17 / 87	62 / 13 / 75
70%	87 / 5 / 92	75 / 8 / 83
80%	92 / 6 / 98	83 / 6 / 89
90%	98 / 2 / 100	89 / 6 / 95
100%	100 / 0 / 100	95 / 5 / 100

Wages/Revenue, Percent less than	Acc / Int / Total	Operating Margin, Percent less than	Acc / Int / Total
10%	6	-1000%	14
20%	6 / 4 / 10	-250%	14 / 21 / 35
30%	10 / 6 / 16	-100%	35 / 12 / 47
40%	16 / 7 / 24	-50%	47 / 12 / 59
50%	24 / 10 / 34	-25%	59 / 7 / 67
60%	34 / 3 / 37	0%	67 / 6 / 73
70%	37 / 7 / 44	5%	73 / 5 / 78
80%	44 / 4 / 49	10%	78 / 7 / 85
90%	49 / 7 / 56	20%	85 / 6 / 91
100%	56 / 3 / 59	50%	91 / 6 / 98
>100%	59 / 41 / 100	>50%	98 / 2 / 100

(Amounts in 1000 NOK. Note: number of observations is not equal to number of investments in given year, as accounting data could not be found for all firms)

Sales revenues
86.7 % of all companies had sales revenue less than 25 mNOK, 49.3 % less than 1 mNOK and 33.3 % less than 0.5 mNOK in the year of investment. With a GDP per capita of NOK 591.242 per capita[xvii] and monthly wages of 41.000[xviii] it is clear that a large part of the companies have revenues that are too low to support employment.

Wages
23.2 % of the companies had wage costs that were lower than the average annual Norwegian wage. 52.4 % of companies had a wage cost of less than 2mNOK. For 66.2 % of the companies wages exceeded half of the sales revenues, while for 41.2 % of the companies the wages exceed 100% of sales revenues.

Operating income
76.6 % of companies had negative operating income, only 4.3 % less than -10 mNOK and a majority of companies between -5 and 0 mNOK. The operating margin was negative for 72.8 % of companies (different from percent with negative operating income because of lacking data points).

Intangibles assets
For 30.2% of the companies intangible assets made up more than 50 % of their total assets, while 54.0% of companies had a share higher than 30 %.

Debt ratio
61.9 % of the companies had a debt ratio of less than 50 % and 75 % less than 60 %.

Age

37 % of companies are less than 1 year old and 55 % less than 3 years old at the time of the investment.

Table 2: Average Investment Value by Fund type, fund and year

Radetiketter	2006	2007	2008	2009	2010	2011	2012	2013	(tom)	Totalt
Distrikt	7,489,702	14,488,990	8,358,974	10,154,227	3,577,423	5,871,145	6,273,555	1,500,000		8,030,753
FjordInvest SørVest			6,201,000	14,842,500	5,635,500	4,870,000				7,699,889
KapNord Fond	7,489,702	13,654,138	6,985,014	9,303,804	1,928,866	1,000,000				7,845,955
Midvest			13,725,320	7,743,318	4,065,929	127,444,578	8,178,884	1,500,000		7,021,408
Norinnova Invest		15,532,556	10,604,511	9,152,500	3,296,295		3,415,563			9,115,478
Landsdekkende	36,700,064	12,500,883	11,448,960	17,800,047	10,104,554	6,394,294	1,100,000	4,000,000	3,000,000	12,112,623
Alliance Venture Polaris		13,067,355	19,794,815	25,012,387	4,938,053					17,669,909
ProVenture Seed	36,700,064	15,068,752	15,836,793	13,209,678	11,001,080	4,635,365		4,000,000	3,000,000	13,814,308
Sarsia Seed		7,629,261	7,879,857	11,221,843	10,452,409	5,247,518				8,545,374
SåkorninVest II		19,279,900	8,641,746	9,300,000	10,533,327	9,300,000	1,100,000			10,236,039
Totalt	14,792,292	13,163,586	9,943,582	13,977,137	6,710,446	6,095,352	5,411,296	2,750,000	3,000,000	10,119,151

Table 3: Investment Value Per fund and Industry of Target

Radetiketter	Alliance Venture Polaris	FjordInvest SørVest	KapNord Fond	Midvest	Norinnova Invest	ProVenture Seed	Sarsia Seed	SåkorninVest II	Totalt
Construction		5,664,000							5,664,000
Consumer							773,679		773,679
Energy	12,062,598		39,848,163		5,481,652	33,025,314	16,583,359	98,948,529	205,949,615
Finance			252,500		220,000				472,500
Health				12,744,578	76,620,420		120,051,546	15,020,000	224,436,544
ICT	212,708,170	7,740,000	22,532,186	16,545,306	30,730,928	166,625,339	14,576,957	1,100,000	472,558,886
Marine			80,351,825	6,370,658	27,429,759		8,537,358		122,689,600
Maritime			42,820,255	15,555,016	16,880,653	25,005,033	9,581,529		109,842,486
Mechanical Industry		27,833,000		7,941,335	6,715,183				42,489,518
Environmental Technology	4,938,053	19,562,000		25,100,007		14,001,890	17,893,807	17,999,980	99,495,737
Mining							9,999,975		9,999,975
Industrial technology		5,500,000	2,498,000						7,998,000
Transport		3,000,000							3,000,000
Totalt	229,708,821	6,929,900	188,302,929	84,256,900	164,078,595	248,657,551	187,998,235	133,068,509	1,305,370,540

54% of capital injections from public seed funds were between 5 and 15 mNOK. The injection might have been done over time or as one transaction. Furthermore, the composition of the injection could be part loan, part equity[xix]. Out of the 129 companies 8 received from two public seed funds. The average injected capital was 9,0 mNOK, while the median was 5,9 mNOK.

Industry classification of investments

Figure 5: Ministry of Trade and Fisheries' classification of investments
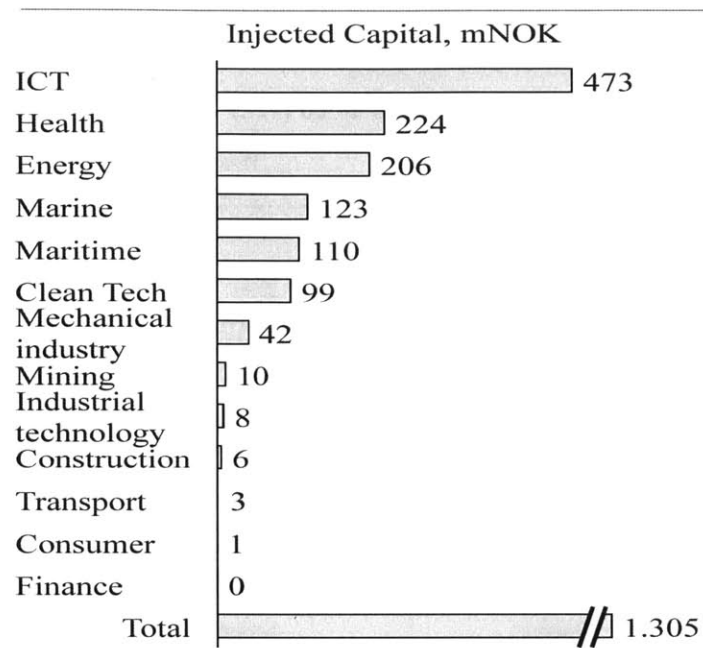
According to classification data from the Ministry of Trade, Industries and Fisheries the investments in ICT (473 mNOK) are double that of the two next categories (health with 224 mNOK and energy with 206 mNOK).

Private Early Stage Capital Characteristics

The accounting data of many of the private companies are also inline with what you would expect from early stage ventures, however, the sample of companies on average seem to be slightly more mature.

Figure 6: Accounting Data of Private Companies at T0 (1/2)

Legend: ■ Accumulated □ Interval addition

	Sales revenue, Percent less than				Assets, Percent less than				Wage costs, Percent less than				Operating Income, Percent less than		
Threshold	Acc.	Int.	Total	Threshold	Acc.	Int.	Total	Threshold	Acc.	Int.	Total	Threshold	Acc.	Int.	Total
-		11		-0		0		-		7		-10,000		17	
100	11	9	20	1,000	0	4	4	100	7	2	9	-5,000	17	11	28
500	20	12	32	2,500	4	7	11	500	9	11	20	-2,500	28	10	38
1,000	32	3	35	5,000	11	6	17	1,000	20	9	28	-1,000	38	18	56
2,500	35	6	41	10,000	17	8	25	1,500	28	7	35	-500	56	9	65
5,000	41	4	45	15,000	25	8	32	2,000	35	6	41	-	65	16	81
10,000	45	15	60	20,000	32	6	38	2,500	41	2	42	500	81	1	82
25,000	60	16	76	40,000	38	10	48	5,000	42	14	56	1,000	82	2	84
50,000	76	4	80	50,000	48	2	50	10,000	56	13	69	1,500	84	2	86
>50,000	80	20	100	>50,000	50	50	100	>10,000	69	31	100	>1,500	86	14	100

Figure 7: Accounting Data of Private Companies at T0 (2/2)

Legend: ■ Accumulated □ Interval addition

	Share intangibles, Percent less than				Debt Ratio, Percent less than				Wages/Revenue, Percent less than				Operating Margin, Percent less than		
Threshold	Acc.	Int.	Total	Threshold	Acc.	Int.	Total	Threshold	Acc.	Int.	Total	Threshold	Acc.	Int.	Total
0%		8		0		0		10%		5		-1000%		16	
10%	8	54	62	10%	0	15	15	20%	5	9	14	-250%	16	16	32
20%	62	13	75	20%	15	11	26	30%	14	9	23	-100%	32	9	41
30%	75	6	80	30%	26	18	44	40%	23	7	30	-50%	41	9	50
40%	80	8	88	40%	44	7	51	50%	30	10	40	-25%	50	12	62
50%	88	6	94	50%	51	11	63	60%	40	15	55	0%	62	13	75
60%	94	5	99	60%	63	9	72	70%	55	3	58	5%	75	3	78
70%	99	1	100	70%	72	6	78	80%	58	3	61	10%	78	8	86
80%	100	0	100	80%	78	11	89	90%	61	6	66	20%	86	9	95
90%	100	0	100	90%	89	8	98	100%	66	2	68	50%	95	3	98
100%	100	0	100	100%	98	2	100	>100%	68	32	100	>50%	98	2	100

(Amounts in 1000 NOK. Note: number of observations is not equal to number of investments in given year as accounting data could not be found for all firms)

Sales revenues

76.4 % of companies had sales revenues less than 25mNOK, 34.5 % less than 1 mNOK and 31.8% less than 0.5 mNOK in the year of investment. 20 % of the companies had sales revenues greater than 50 mNOK reflecting that the data contains companies in other stages than seed.

Wages

40.7 % of companies had a wage cost of less than 2mNOK. For 59.6% of the companies wages exceeded half of the sales revenues, while for 32.1 % of the companies the wages exceeded 100% of sales revenues.

Operating Income

81.0 % of companies had negative operating income, 17.0 % less than -10 mNOK and a majority of companies between -5 and 0 mNOK. The operating margin was negative for 75.0 % of companies (different from percent with negative operating income because of lacking datapoints).

Intangibles assets

For 5.9 % of the companies intangible assets made up more than 50 % of their total assets, while 19.6% of companies had a share higher than 30 %.

Debt ratio

62.7 % of the companies had a debt ratio of less than 50 % and 71.8 % less than 60 %.

Age

40.5 % of companies are less than 1 year old and 53.6 % less than 3 years old at the time of the investment. 22.2 % of companies were older than 10 years.

Comparison of public and private PE targets

Age
Figure 8: Investments by age

	Age of Private Portfolio Comps. Investments by industry				Age of Public Portfolio Comps. Investments by industry				■ Accumulated percent of investments
Average	8,2				8,3				☐ "Accumulated number of investments"
Median	7,0				7,0				
1st quartile	3,0				4,0				
Stdev	6,0				6,4				
0	14	5			9	6			
1	29	17			6	10			
2	20	25			11	18			
3	14	30			10	24			
4	8	33			19	37			
5	12	38			4	40			
6	17	44			13	49			
7	13	49			15	59			
8	10	53			4	62			
9	15	59			5	65			
10	16	65			6	69			
11-15	41	81			17	81			
16-20	44	98			21	95			
>20	4	100			7	100			

Private and public targets show a similar age distribution with average age being 8.2 for private PE targets and 8.3 for public ones, the median age is also close to identical with 7.0 years. However, some differences do exist. A higher portion of private PE is targeted towards companies less than 3 years (30% of investments vs. 24% for public PE). Public PE on the other hand has a relative preference for companies aged between 3 and 7 years.

While 30% of Private PE targets are less than 3 years, 24 % of Public targets are. Public PE though seem to have a relatively strong interest in companies aged between 3 and 7 years.

Industry

Figure 9: Investments by industry

	Private PE Investments by industry	Public PE Investments by industry
■ Percent of investments		
▢ Number of investments		
Professional, scientific and technical activities	70 / 24	32 / 21
Manufacturing	67 / 23	45 / 30
Information and communication	62 / 21	36 / 24
Wholesale and retail trade; repair of motor vehicles	30 / 10	13 / 9
Administrative and support service activities	25 / 9	1 / 1
Mining and quarrying	12 / 4	6 / 4
Electricity, gas, steam and air conditioning supply	5 / 2	6 / 4
Financial and insurance activities	5 / 2	5 / 3
Other	16 / 5	7 / 5

The industrial distribution of private and public investments shows strong similarities. Public PE are more present in manufacturing, ICT, Financial and insurance activities and Electricity, gas, steam and air conditioning supply, while private PE are more present in Professional, scientific and technical activities, Wholesale and retail trade; repair of motor vehicles and Administrative and support service activities. However, differences are small.

Data from Statistics Norway showing the share of 4 to 5 year old companies with average growth higher than 20% the last three years, and number of employees greater than 10 at t-3, show that both public and private PE investments are targeted toward industries that are prosperous relative to the average industry. While 25.5 % of all firms within ICT and 22.4 % of firms within manufacturing and mineral extraction fit the above mentioned criteria, we also know that 44 % of private and 54% of public PE investments are done within these sectors. Overall, there seem to be a tendency that the PE is supporting fast growing industries.

Figure 10: Share of 4-5 year old companies with average growth higher than 20% and number of employees higher than 10

Share of 4-5 year old companies with average growth higher than 20% and number of employees higher than 10

☐ Measured by revenue growth   ■ Measured by labor growth   ■ Share of total companies in economy

Industry	Revenue growth	Labor growth	Share of total companies
Information and communication (ICT)	25,5	9,8	4,4
Transport and storage	25,0	14,3	8,2
Manufacturing and mineral extraction	22,4	11,8	7,9
Construction	20,9	12,6	15,2
Culture and entertainment	20,8	16,7	2,5
Business Services	20,6	16,7	5,0
Professional, scientific and technical activities	20,3	12,2	12,3
Electricity, water and renovation	20,0	20,0	0,8
All	18,9	11,1	N/A
Trade and operation of property	15,0	0,0	6,3
Retail and repair of cars	12,6	8,4	25,6
Accomodation and food service	11,4	4,8	5,4
Other services	11,1	0,0	6,3

*Definition: High growth company definition: Companies with revenue and employee growth averaging more than 20 % annually the last three years. Companies must have more than 10 employees at t=0.
Source: Statistics Norway

Co-investments by private and public capital

Figure 11: Extent of co- and multiple round investments years 2006-2013

Category	Value
Only one round with one private investor	195
Several rounds with only private investors	60
Only one round with a public investor	60
Several rounds with only public investors	34
One or several rounds with both private and public investors	21
All companies	370
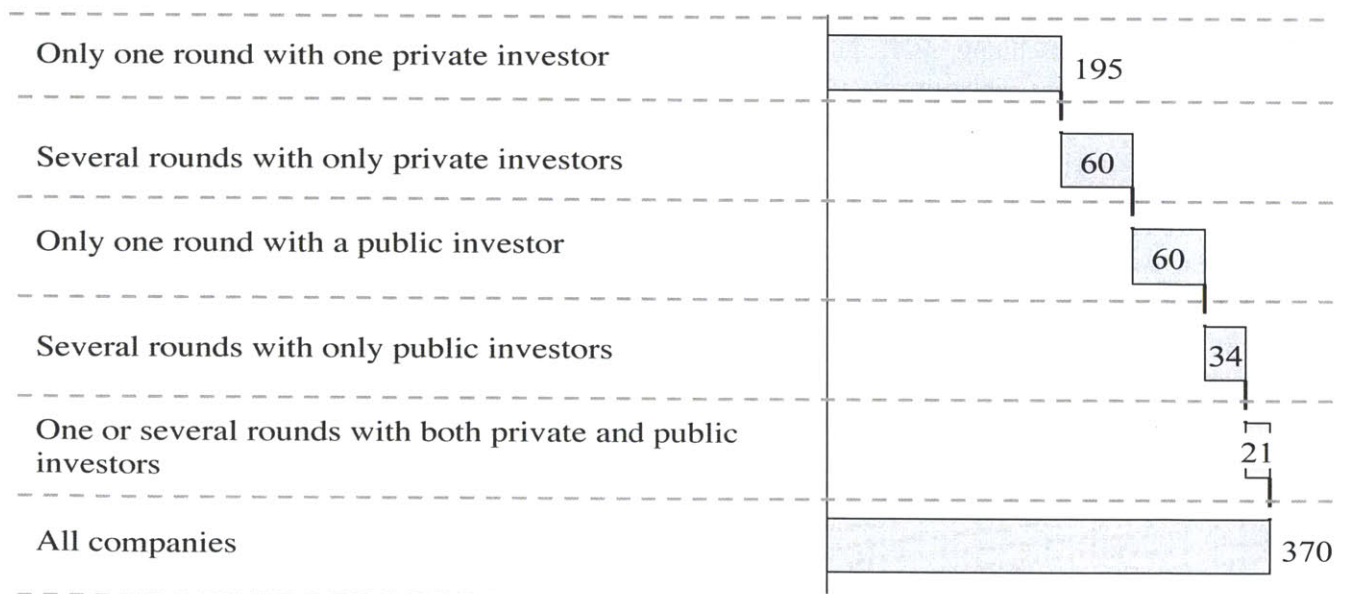
The public seed funds themselves are comprised of both public and private capital, however, the public seed funds and private funds frequently invest in the same target companies. Out of the 370 companies in the data: 195 companies had one investment round with only private investors, 60 had several rounds with only private investors, 60 had only one round with a public investor, 34 had several rounds with only public investors and 21 had one or several rounds with both private and public investors.

Performance of private companies following venture investment

The following graphs will describe the aggregate development in sales revenues, operating income, assets, long-term debt and wage after investment.

Overall development in sales revenues

Figure 12: Sales Revenue Development of private companies

| # companies* | 62 | 113 | 164 | 215 | 215+29 | 215+X |

Invest. year — Sales revenues and their annualized growth, *million NOK and %*

Sales revenue generated post investment

Invest. year	2007	2008	2009	2010	2011	2012	growth
2007	846	863	812	876	1.357	1.536	+13%
2008	1.664	2.711	3.276	3.968	4.542	5.265	+18%
2009	1.278	1.522	1.386	1.446	1.728	1.891	+11%
2010	1.608	2.098	2.655	3.040	3.858	4.739	+25%

Sales revenue generated post investment:
13.430
5.448
846 — 07
2.711 — 08
1.386 — 09
3.040 — 10
2012

2007 2008 2009 2010 2011 2012

Overall development in operating income

Figure 13: Operating income development of private companies

	62	113	164	215	215+29	215+X	# companies*	
Invest. year	**Operating Income and Op. Inc. annualized growth, *million NOK and %***							**Operating income delta post investment**
2007	-87	-458	-446	-464 (-45%)	-547	-553	248	
2008	79	-450	-571	141	244	-210 (+17%)	82 / 10	
							-87 / 07	
2009	-66	-234	-308	-184 (NA)	-173	177	-450 / 08	
							-308 / 09	
2010	90	91	110	82	42	71 (-7%)	-514	
							2012	
	2007	2008	2009	2010	2011	2012		
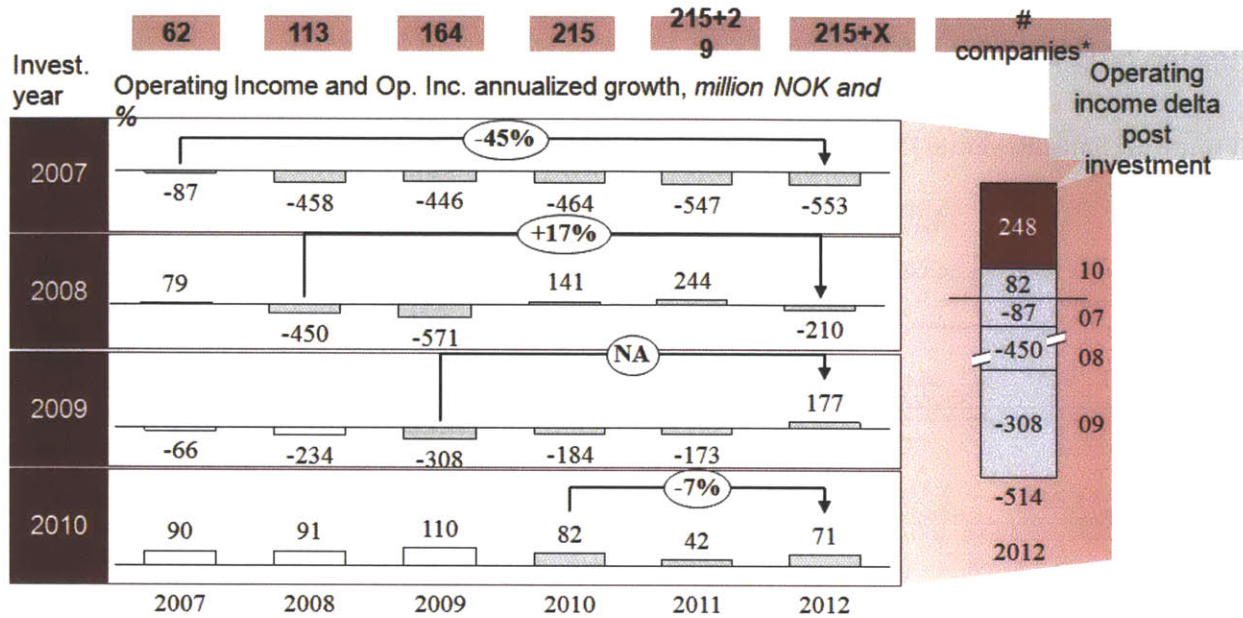
Overall development in assets

Figure 14: Asset development of private companies

	62	113	164	215	215+29	215+X	# companies*	
Invest. year	**Asset and asset annualized growth, *million NOK and %***							**Asset delta post investment**
2007	6.126	6.008	6.425	7.928 (+6%)	8.491	8.246	34.129	
2008	5.661	8.534	9.707	11.889 (+10%)	12.385	12.407	8.671	
2009	2.207	4.762	4.837	4.542 (0%)	4.322	4.902	6.126 / 07	
							8.534 / 08	
							4.837 / 09	
2010	2.620	3.222	3.435	5.961 (+20%)	8.028	8.574	5.961 / 10	
							2012	
	2007	2008	2009	2010	2011	2012		

26
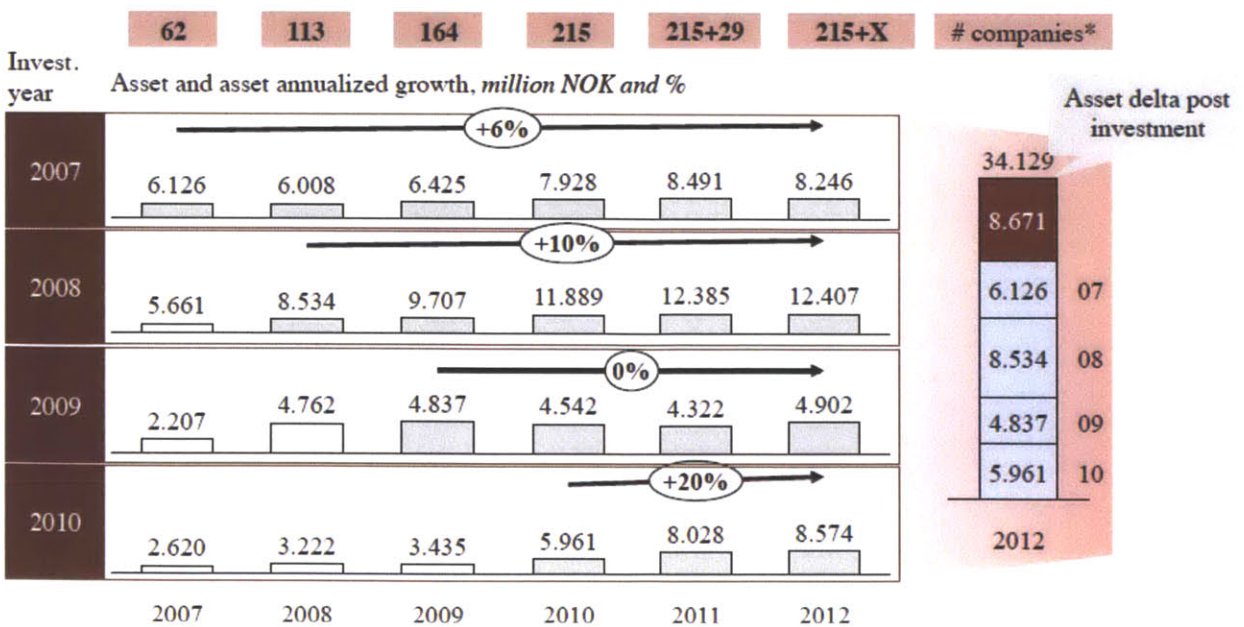
Overall development in long term debt

Figure 15: Long-term debt developments of private companies
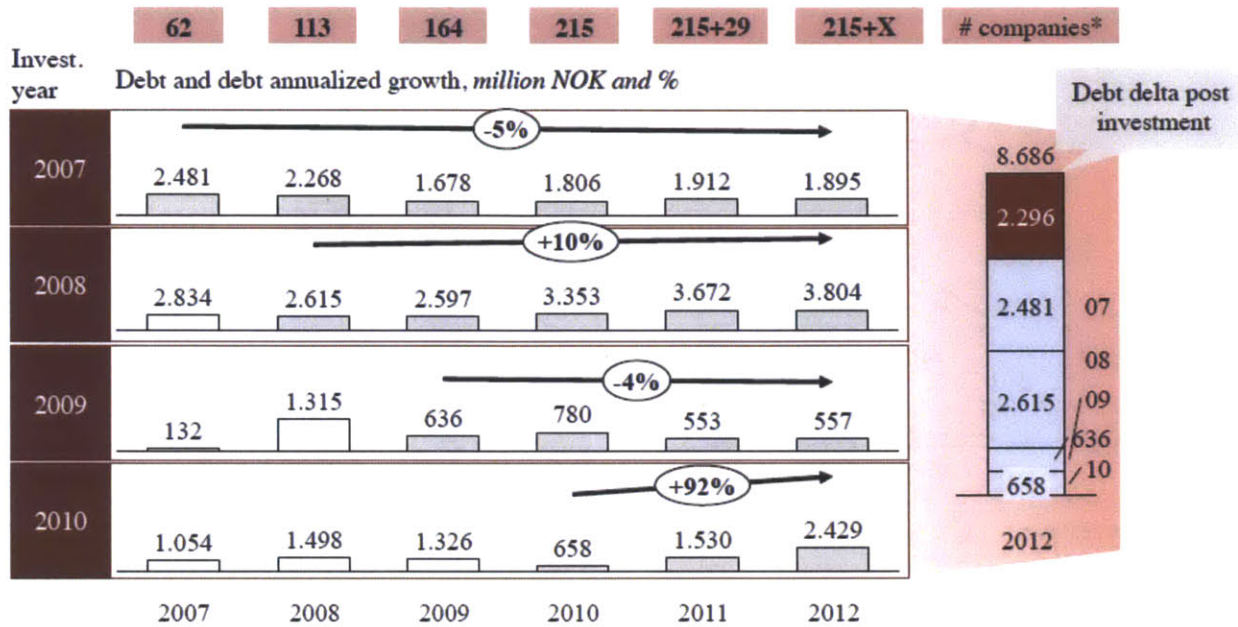
Overall development in wage costs

Figure 16: Wage cost development of private companies
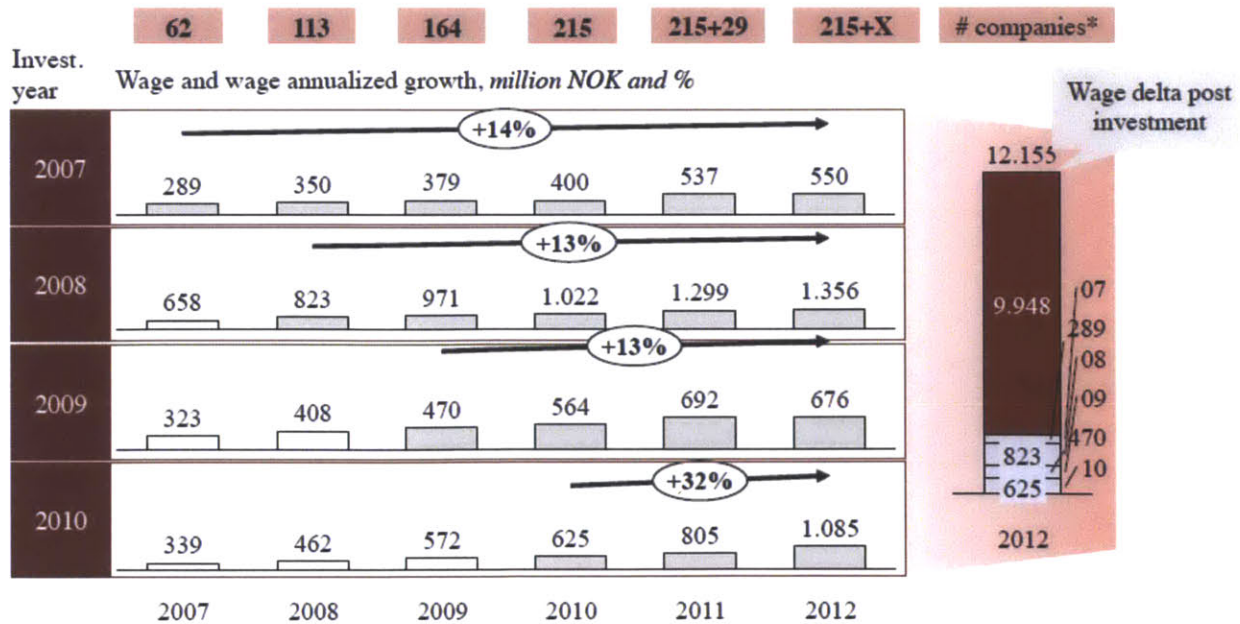
Figure 17: Wage and employment of private companies

Wage cost year of investment,
million NOK

+75%

6.077

2.097

3.467

550

1.055

1.356

289

823

676

470

1.085

625

204

314

| 06 |
| 07 |
| 08 |
| 09 |
| 10 |
| 11 |

Year of
investment

2012

Employment in 2012 by investment year,
Number of employees

11
2.449

06
2.715

10
1.511

09
2.479

07
3.677

08
1.335
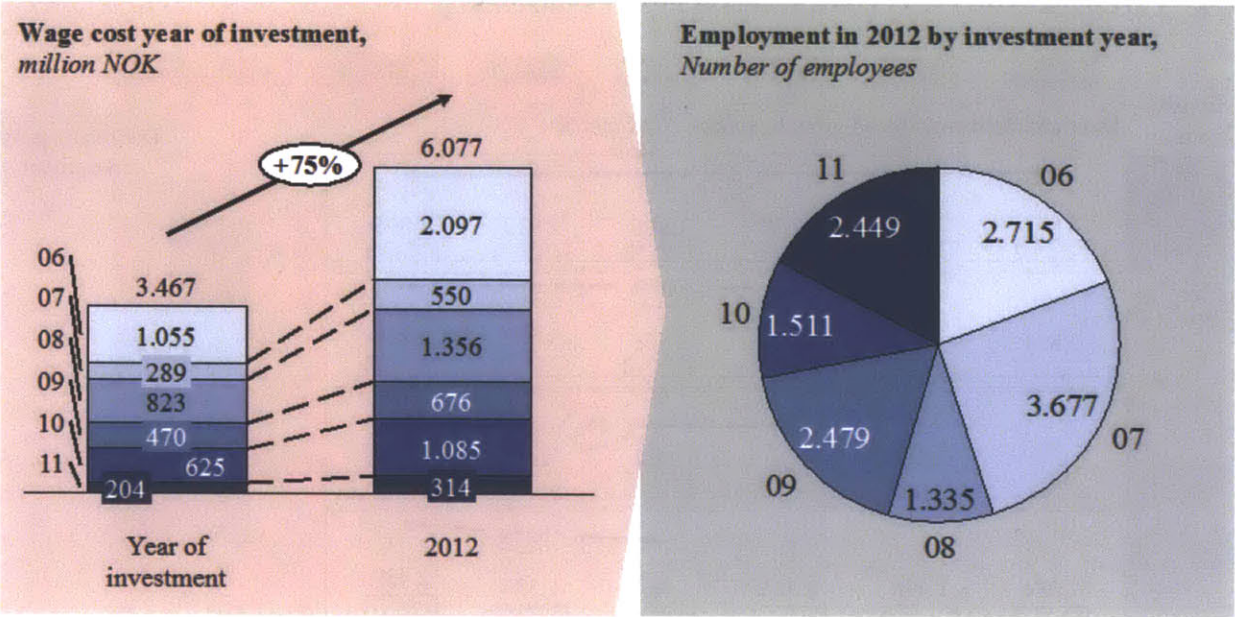
Performance of public companies following venture investment

The ultimate theoretical measure of success for early stage capital is the return, i.e. sales price over the acquisition price minus one adjusted for holding period, risk and alternative costs. The sales prices should theoretically reflect all future cash flows of the company, again adjusted for holding period, risk and alternative costs. In turn, the long-term cash flows should reflect the value creation of the company, i.e. the value created in excess of the costs of the company's inputs.

Although return and sales price are appealing metrics, it is very hard to obtain such data. And even in the event that such data was obtained, fluctuations in markets conditions, information asymmetry and (other) market imperfections would create discrepancy between the actual future cash flows and those implicitly assumed in the sales price.

In this imperfect world we use sales revenue (not total revenues) as a metric of success for out in depth analysis, while rate of bankruptcy, operating income, total assets, total debt, wage and the number of employees will be analyzed in a less rigorous way.

Bankruptcy

From the tax database data we observe that 18 of the 115 (14.8%) public investments made 2006-2012 are not present or denoted bankrupt in the 2012 data. The corresponding number for private PE is 56 of 276 (20.3%). These companies have either moved their tax residency to other countries or ceased to exists and thus been deleted from the tax database.

Figure 18: Number and Rate of Bankruptcy

Rate of bankruptcy for public companies
Number of companies

115 ---=1=--- 13 ---=4=--- 97

14.8% of companies invested in 2006-2012 are not present in 2012 data

Total   Bankrupt   Not   No   Accounting
        2012   present info data 2012
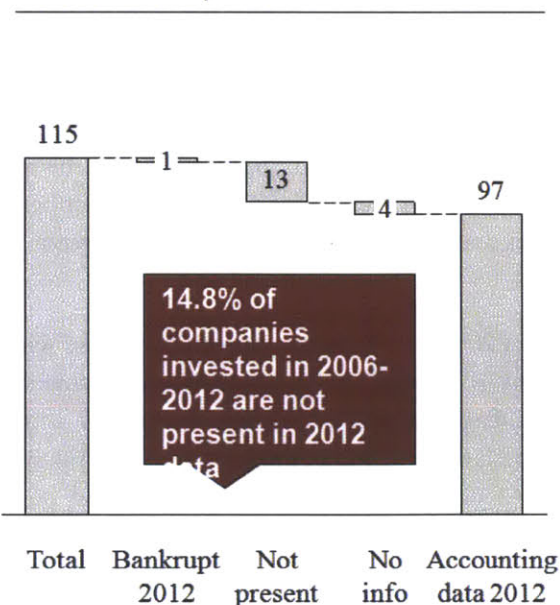
Rate of bankruptcy for private companies
Number of companies

276 ---0--- 56   220

20.3% of companies invested in 2006-2012 are not present in 2012 data

Total   Bankrupt   Not   No   Accounting
        2012   present info data 2012
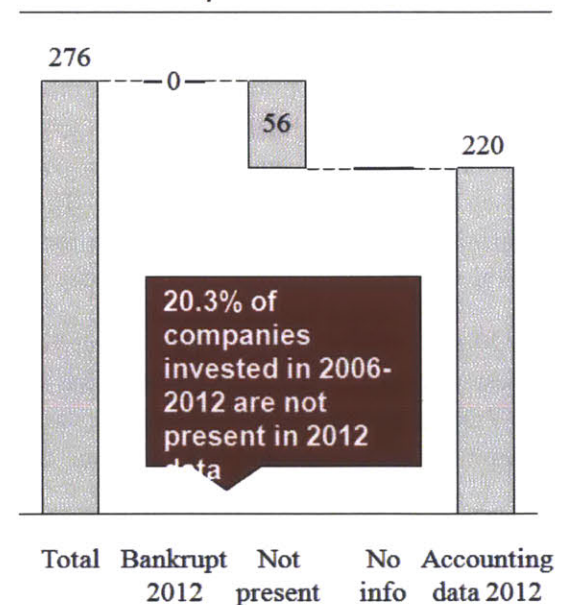
Overall development in sales revenues

Figure 19: Sales Revenue Developments of Public Companies

| 30 | 64 | 81 | 102 | 102+9 | 102+12 | # companies* |

Invest. year

Sales revenue and sales revenues annualized growth, *million NOK and %*

Sales revenue generated post investment

Invest. year							Sales revenue generated post investment
2007	34	41	85	142	219	255	+50%
2008	165	206	214	225	283	249	+5%
2009	124	185	199	172	166	179	-3%
2010	41	62	85	44	106	118	+63%

2007 2008 2009 2010 2011 2012

Right-hand bar chart: 801, 317, 34 (07), 206 (08), 199 (09), 44 (10), 2012

The above figure shows the aggregate sales of public seed fund portfolio companies by year of acquisition and operation. The grey charts indicate the aggregate revenue post-investment while the white charts indicate the same pre-investment. The red boxes on top show the aggregate number of companies in the portfolio in a given year. The "102+9" means that only the 102 companies invested in from 2007 to 2010 are included in the data, although the public seed funds made 9 additional investments in 2011 and 3 in 2012. The blue area of bar chart to the right shows the aggregate sales revenue at the time of investment and the red area show the additional sales revenue created post-ownership. The arrow with the round "bubble" shows the annual geometrical growth of sales revenues. The 102 companies included in aggregate revenue numbers are companies still present in the tax register for 2012. Companies that for some any reason are not present in the tax register will not be part of the aggregate.

The 30 and (102-81=) 21 companies receiving investments in 2007 and 2010 respectively are those with the highest aggregate growth, creating (255-34=) 221 and 74 mNOK in additional revenue post-investment. The respective annual geometric growth rates are 50% and 63%. Together the investments from 2007 and 2010 account for 93% of the additional revenue created over the period. The 2007 companies achieved the highest growth rates during the years 2009-2010, where revenues doubled in 2009 and nearly doubled in 2010. Conversely, the revenue created by companies receiving investments in 2008 was a modest 43 mNOK on a base of 206 mNOK, equivalent to a 5 % annual growth rate. 2008 saw an addition of 34 companies to the public portfolio, just 4 more than in 2007. At the same time, the aggregate sales revenue of the companies acquired in 2008 was higher making the average sales revenue per company at time of investment 6.1 mNOK versus 0.9 mNOK in 2007. The increased average revenue of the 2008 investments might indicate that the

investments undertaken was more mature than those in 2007, which would also be inline with a more modest growth in sales revenues. The annual geometric sales revenue growth for companies receiving investments in 2009 was in 2012 negative by -3%.

The public seed investments have a long-term perspective and the state seeks to be "a patient investor". Therefore, even if one should expect successful seed fund investments to exhibit a fast growth rate in sales, a high growth rate might not manifest itself for several years post investment. The five year period from 2007 to 2012 may be long enough to say that the increase in sales revenue of 2007 investments have on average been satisfactory and inline with what can be expected from highly risky but potentially highly successfully early stage ventures. Claiming that the annual geometric growth rates exhibited by the 2010 investments is equally satisfactory is associated with more uncertainty, as the data points are few, the companies have had less time to develop and the sales revenue have higher variation, it e.g. went down by almost 50 % from 2009 to 2010 then to more than double in 2011.

The aggregate sales development will be analyzed in more depth below, however, observations so far show that while there are variation in success rates across investment years, in 2012 317 mNOK of net sales revenue was created in excess of sales revenues in the year of investment.

Overall development in operating income

Figure 20: Operating income development of public companies

	30	64	81	102	102+9	102+12	# companies*

Invest. year — Operating Income and Op. Inc. annualized growth, *million NOK and %*

Operating income delta post investment

Invest. year	2007	2008	2009	2010	2011	2012
2007	-46	-86	-89	-89	-102	-78
				+11%		
2008	-37	-40	-59	-87	-62	-57
				+9%		
2009	-17	-127	-239	-346	-505	-586
				+35%		
2010	-17	-21	-15	-58	-46	-63

+4%

Operating income delta post investment:
-401
-46 · 07
-40 · 08
-239 · 09
-58 · 10
-784
2012
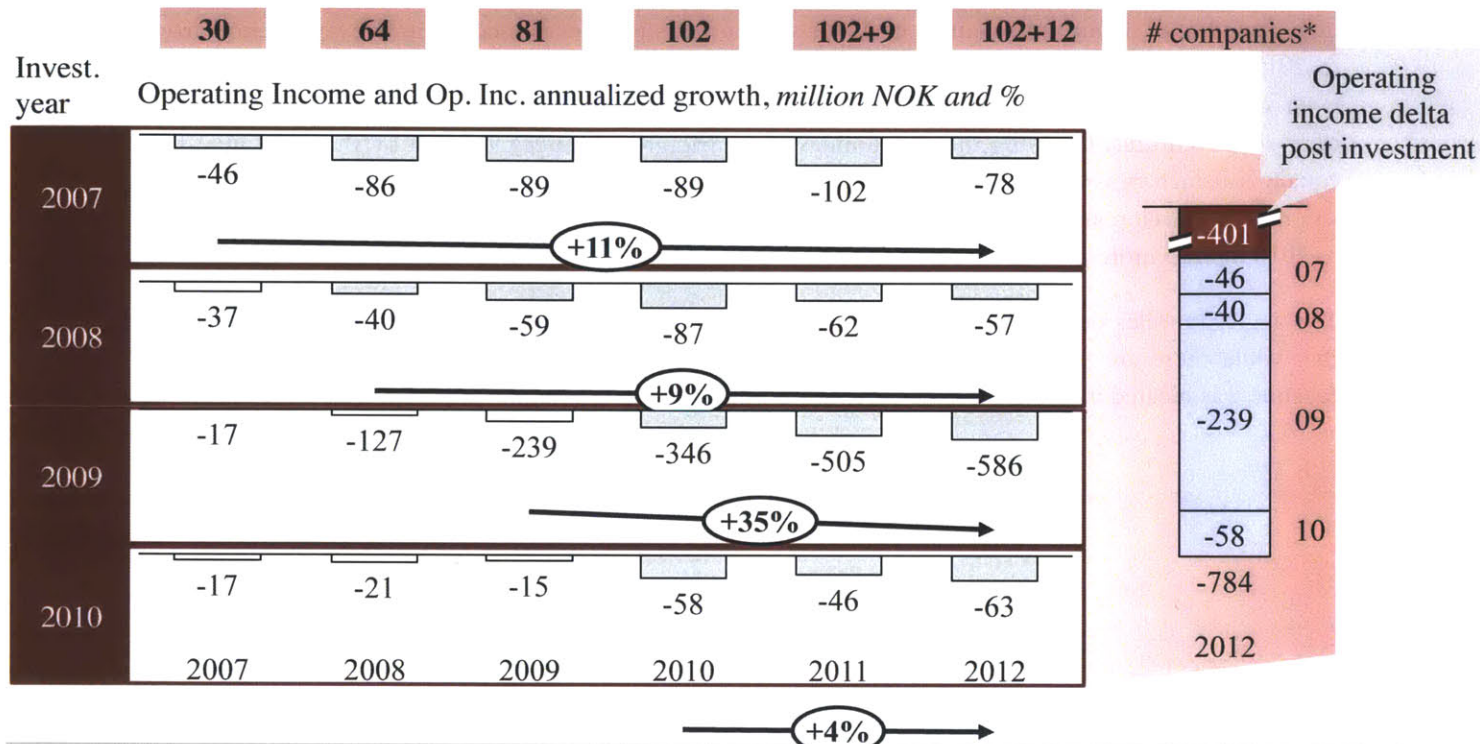
The above exhibit shows the operating income of portfolio companies in the same way that sales revenues where shown above.

Apart from the companies receiving investments in 2008, the aggregate net income of portfolio companies deteriorated throughout from investment and throughout 2012. While the aggregate net income at time of investment was -383 mNOK, the corresponding number in 2012 was -784 mNOK. Knowing from the analysis above that the aggregate sales revenues were 801 in 2012, we see that portfolio companies must have costs of 1585 mNOK (801 + 784) that are 198% of the revenues.

The portfolio companies from 2007 experienced decreasing operating income from investment in 2007 and throughout 2011. In 2012 the net operating income increased by 24 mNOK from -102 mNOK to -78 mNOK. The increase in net operating income (decrease in the negative net operating income) might mark that the 2007 portfolio companies are approaching a more mature stage with more self-sustaining economics. On the other hand, as the sales revenues increases 36 mNOK while the net income increased 24 mNOK, we see that companies still have increasing costs (equal to 36-24 = 12 mNOK).

The 2008 portfolio companies has decreased their operating income by an annual geometric average of 9%. While the increase in sales from 2010 to 2011 was 58 mNOK, the corresponding increase in net income was

25 mNOK, indicating that these firms still have increasing costs (33 mNOK) but a higher portion of previous years' cost increase could be supported by higher sales revenues.

The 2009 portfolio companies have a net operating income that declined sharply from 2009 to 2012, achieving an annual geometrical growth rate of -35%. At the same time sales revenues for these companies experienced an annual decline of 3%. While growth in revenues is not too different (8%) from the 2008 to 2009 portfolio companies, the growth in costs is. The 2008 portfolio companies experienced only a slight increase in costs, the 2009 portfolio companies more than doubled.

From the year of investment, 2010, to 2012, the 2010 portfolio companies decreased net income by an annual geometrical average of 4 %. At the same time, revenues went up 63 % annually almost fully offsetting the increased costs. However, during the year following investment, the revenues of the portfolio companies were cut almost in half (by 41 mNOK), thus decreasing operating income by 43 mNOK, equivalent to a cost increase of only 2 mNOK in 2010. The following cost increases in 2011 and 2012 indicate that portfolio companies potentially had the liquidity to invest in the development of their business.

2012 the portfolio companies had costs equating to almost double of their income. This is to be expected from early stage ventures. The fact that companies manage to secure cash for further operations with highly negative net operating income demonstrates that providers of cash believe in the business idea. The -784 mNOK in net operating income in 2012 requires approximately 8 mNOK in cash flows until perpetuity for every percent we apply in discount rate[1], i.e. in order to justify a one year net operating income of -784 mNOK. For a discount rate ranging from 10-50%, the annual required cash flows would have to be 80 to 400 mNOK[2] from now until perpetuity. A profit maximizing investor in the portfolio companies must therefore be able to see a real chance for significant future potential of the portfolio companies for it to be rational to conduct an investment.

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[1] Assuming no taxes and that operating cash flows are approximately negative 800 mNOK
[2] Starting next year. Postponing cash flows an incremental year requires additional $1/(1+50\%)= 33\%$ of the above calculated cash flows.

Overall development in assets

Figure 21: Asset development of public companies

| | 30 | 64 | 81 | 102 | 102+9 | 102+12 | # companies* |

Invest. year

Asset and asset annualized growth, *million NOK and %*

Asset delta post investment

Invest. year	2007	2008	2009	2010	2011	2012
2007	295	408	445	491	477	444
2008	310	417	463	546	538	657
2009	134	527	678	1.074	1.565	1.338
2010	59	55	73	139	186	204

+8%
+12%
+25%
+21%

Asset delta post investment: 2.642 — 1.113 — 295 (07) — 417 (08) — 678 (09) — 139 (10) — 2012
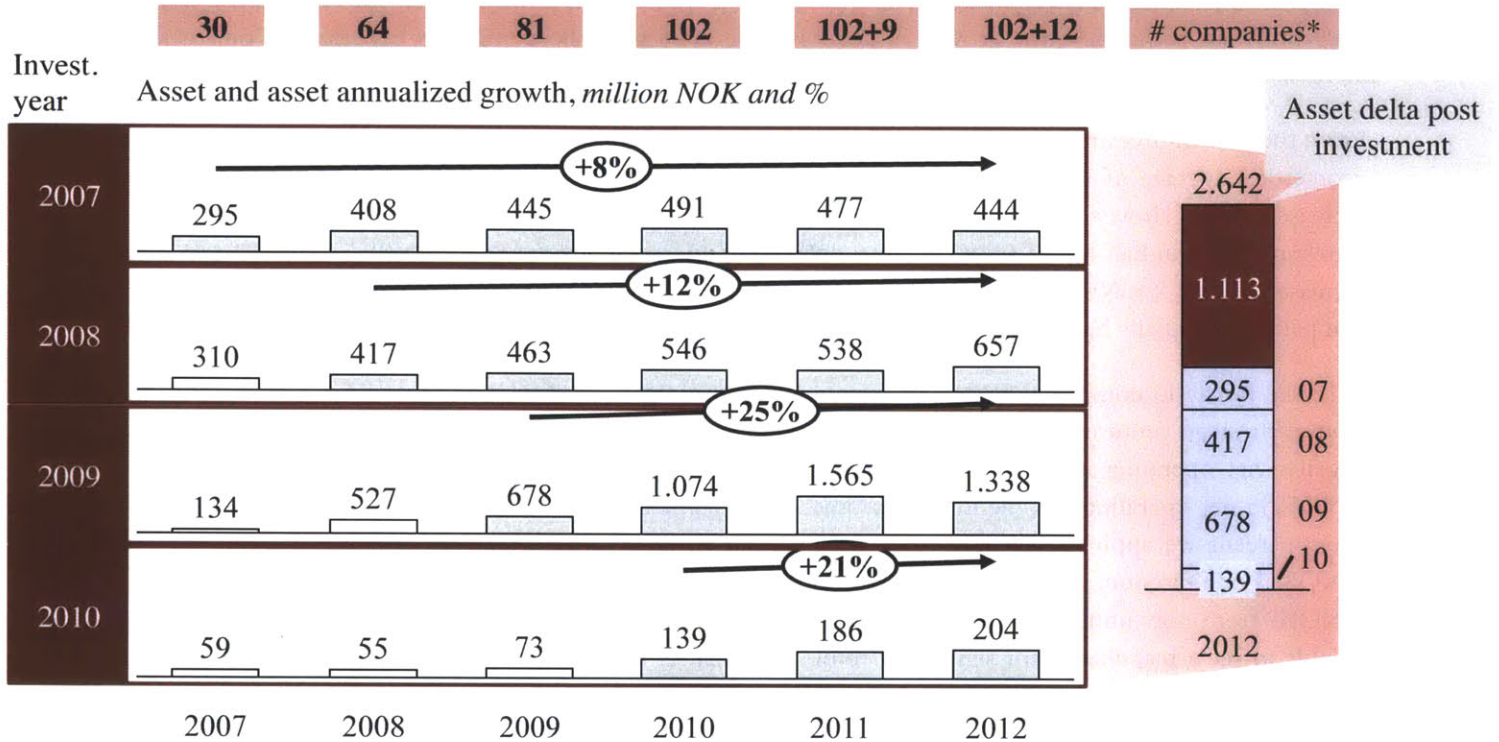
The discussion above illustrated how a rational profit maximizing investor must have strong beliefs in the future potential of the early stage venture. The investment in assets might indicate willingness to invest and thus say something about the belief in the future of the venture. From the figure above, we see that assets have grown at an annual geometric average of between 8 % (for the 2007 companies) and 25 % (for the 2009 companies). The additional assets acquired post investment aggregate to 1,113 mNOK, which represents a 73% total increase in assets since investment. One must keep in mind that as this statistic does not make a distinction between long-term and short-term assets, what we observe could be everything from long-term investments into capital equipment or patents with a long lifetime to the build up of bank deposits to cover future expenditure. However, even though cash might be used for operating expenses that increase the potential for generation of future cash flows, this does not necessarily mean that the company builds an asset that is visible on the balance sheet, but rather expenses the investment (e.g. research) immediately. As a portion of investments might be expensed directly also short term monetary assets might be interpreted as something that will transform into future business potential – otherwise it would be rational for the owners not to spend the money.

The asset build-up together with debt build up indicates the belief of external (equity and debt) investors in the company. This holds true as the asset build up must be equal to the build up of debt and equity. This aspect will be treated below. First, an analysis of the build up of assets themselves:

The 2007 portfolio companies experienced the strongest absolute and relative growth in assets (113 mNOK increase on 295 mNOK) the year of the seed fund investment. This might indicate that the seed funds indeed was a source of capital for entrepreneurs to develop their businesses and thus alleviated the liquidity constraints some companies might have been facing.

The 2008 companies did not experience the same relative or absolute increase in the year of investment, but rather had their largest relative increase in assets the year prior to investments, maybe increasing the need for the seed fund investments that followed.

The 2009 companies have had the highest absolute and relative growth, with 396 mNOK being added to the asset base the year after the seed fund investment. The increase from 2010 to 2011 was even greater with 491 mNOK. With low revenue growth (-3%), rapidly decreasing operating income (-35%) and a high build up of assets (+25%) the 2009 portfolio companies seem to be investing heavy in the future while not being ready to monetize the investments just yet. The (1565-1338=) 227 mNOK reduction in assets from 2011 to 2012 might indicate either a halt in investments or high depreciation of assets, potentially as the consequence of write downs.

Overall development in long term debt

Figure 22: Long term debt development of public companies
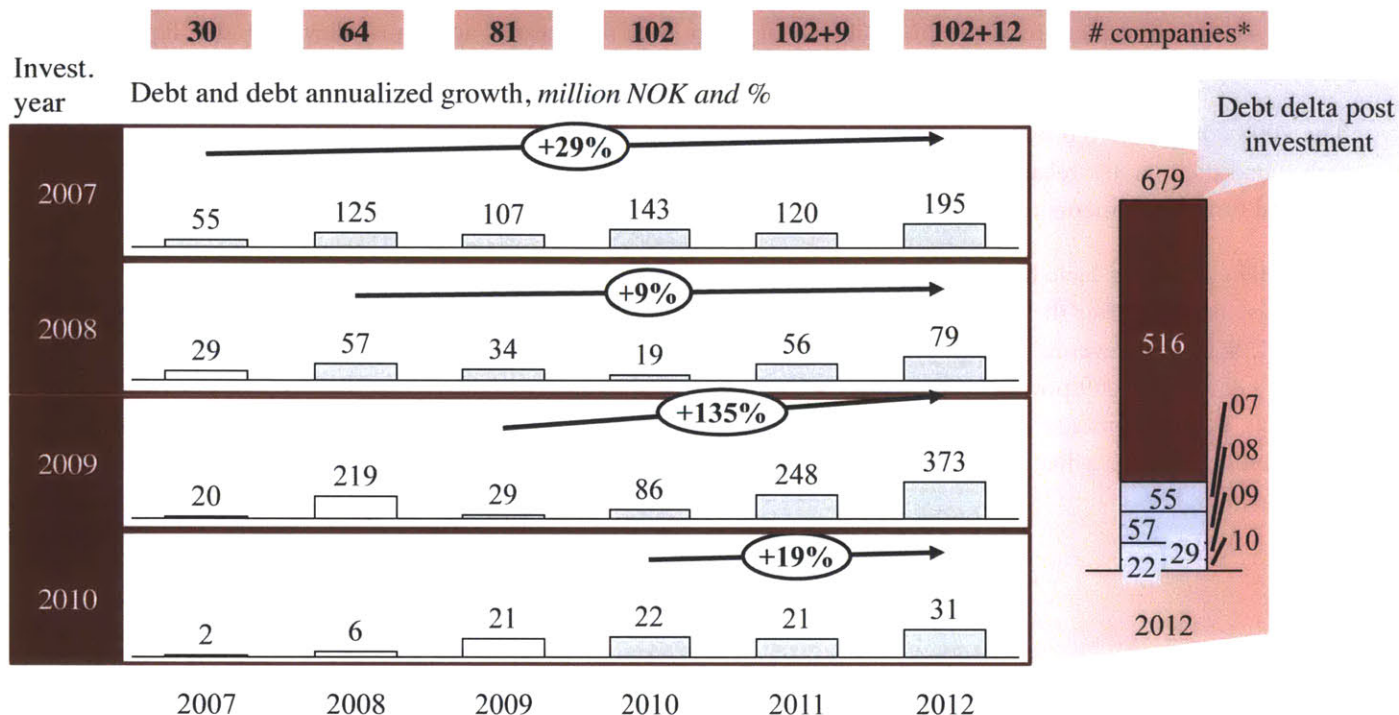
Long-term debt is, according to Norwegian tax law[xx], debt that has duration of more than one year. Furthermore, long-term debt as an asset class is (should) be less risky than equity investments. Raising new long-term debt can therefore serve as an indication of external stakeholders' (i.e. banks) belief in the ability of the company to repay principal and interest in the future, and thus on the solidity and potential of the company. Of the 2.642 mNOK in book assets in 2012, 679 mNOK was long-term debt whereas 76% (516 mNOK) was accumulated post seed fund investments. The increased amount of long-term debt will reflect the lenders belief in the future ability to pay back principal and interest, but also that the equity investments might reduce the risk of the long-term debt because of the "pecking order", i.e. that in case of financial difficulties, the lenders will have priority over equity owners in collecting their claims on the firm's assets. An increase in equity – or risk offsetting loans - will thus reduce the risk of lenders, increase the willingness to lend money (at a given interest) and thus increase the amount of debt in the portfolio companies.

The 2007 portfolio companies increased debt levels by an geometrical average of 29 % annually from 2007 to 2012, whereas debt levels went up ((125/55)-1) 127 % the year of the seed fund investments, indicating that the funds allowed a growth in debt levels.

The 2008 portfolio companies increased debt levels by a geometrical average of 9% from 2008 to 2012. While debt levels almost doubled in the year of investment, it slumped down to pre-investment levels from 2009 to 2010, and bounced back up in 2011 and 2012. The moderate growth in debt levels aligns well with moderate growth in assets, operating income and sales revenues and indicates that the companies' growth might have leveled out.

The 2009 portfolio companies significantly increased debt levels from 2009 to 2012, financing 344 of 660 mNOK in build up of assets using debt. The debt build up combined with declining operating income but stagnant assets might indicate that these companies still are in the development phase of their business.

The 2010 portfolio companies experienced a modest debt build up form 2010 to 2012 of 9 mNOK, while assets increased by 65 mNOK, indicating equity financing.

Overall development in wage costs

Figure 23: Wage cost development of public companies
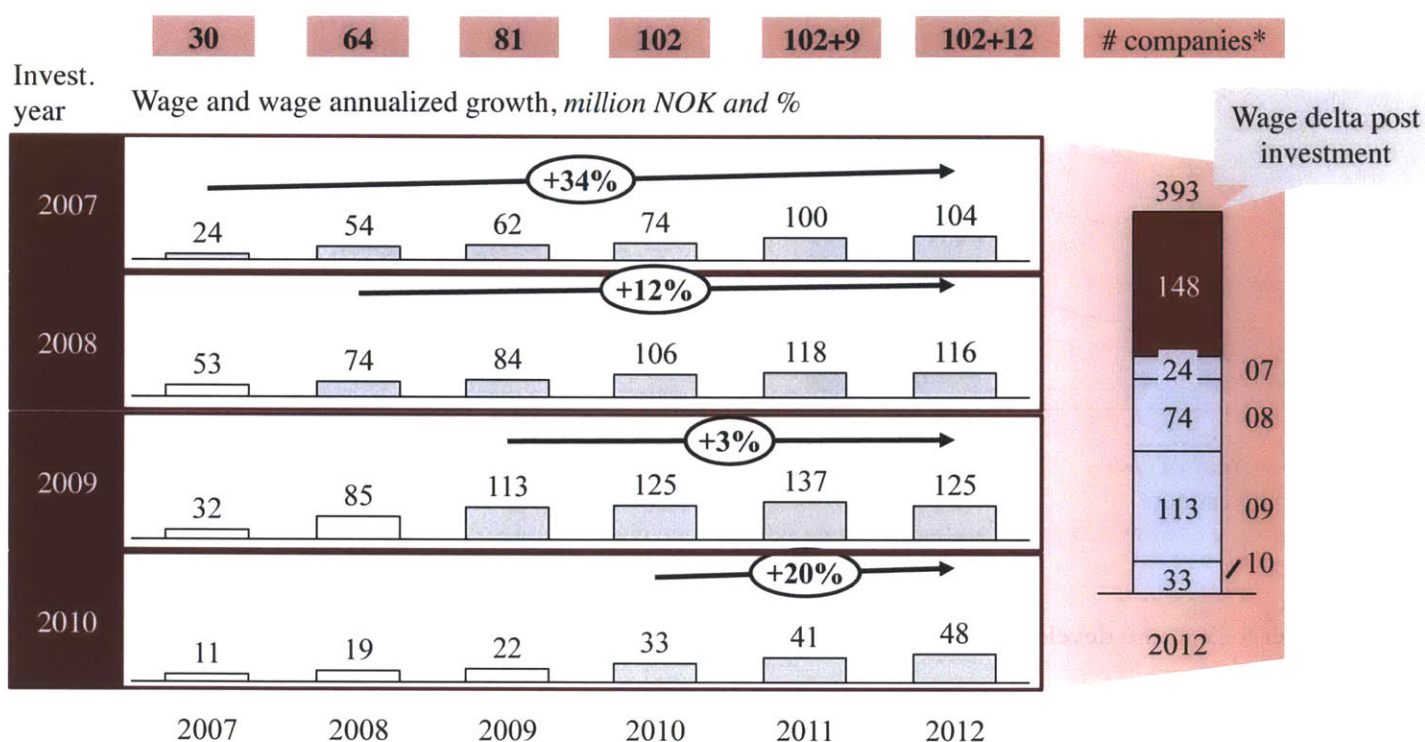
Wages for 2007-2010 portfolio companies aggregated to 393 mNOK in 2012, aggregating to 49% of revenues or about 25 % of expenses. The portfolio companies acquired 2007-2010 had 2454 employees end of 2012, while all portfolio companies acquired in the period 2006 – 2013 had 3423 employees and 529 mNOK in wage costs. With average Norwegian wage costs of 0.5 mNOK, the portfolio companies either have wage costs that are significantly lower than the national average or they have many employees who work part time. It would be reasonable to expect that a driver of the low average wages is that entrepreneurs and other stakeholders perform a great deal of unpaid work.

The 2007 and 2010 portfolio companies have the largest annual relative increases in wage costs post investment. These portfolio companies also experienced the largest increase in sales revenues over the period.

Common for all portfolio companies is that wage costs increased (relatively) more the year of investment than the geometrical average of all years post investment taken together. However, of the total wage cost of 393 mNOK in 2012, 38% of the wage cost was "added" after investment. The increase in wage costs post investment might indicate that the investment allows for hiring or higher compensation to current employees.

An average compensation per worker that seems – as mentioned above – to be modest compared to the national average.

Figure 24: Wage and employment of public companies

Wage cost year of investment, *million NOK*

Employment in 2012 by investment year, *Number of employees*
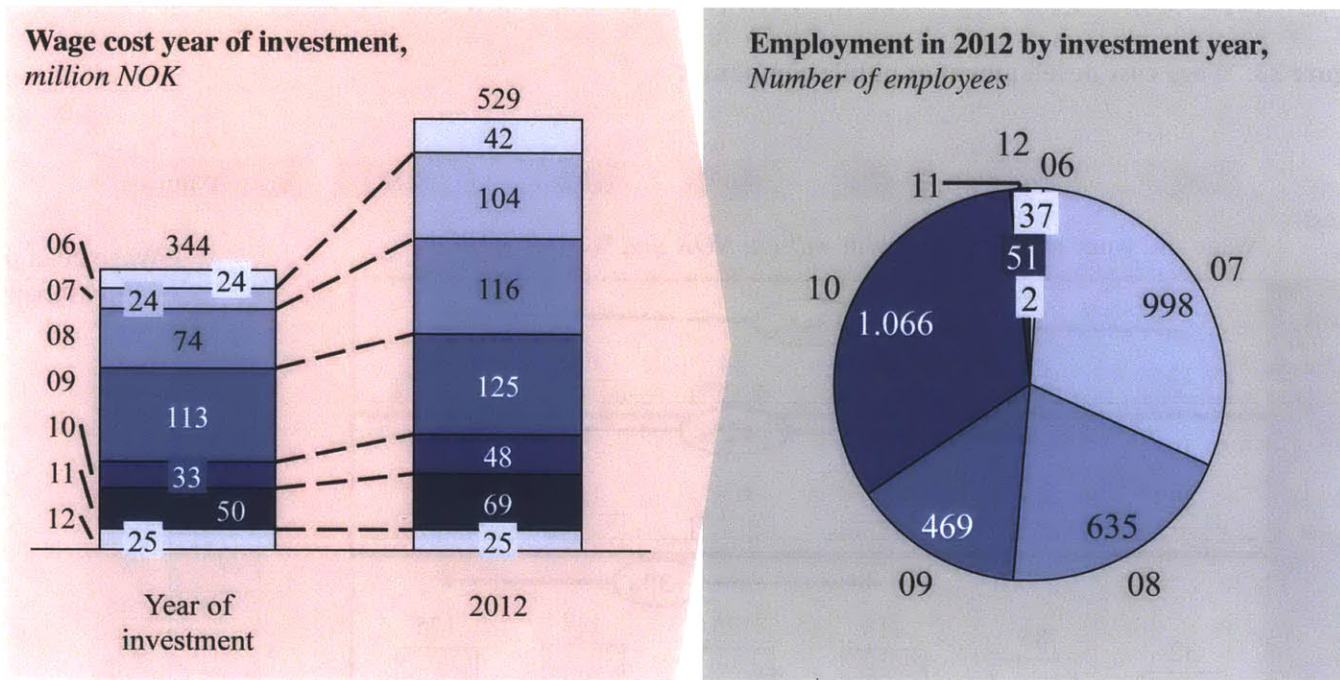
Closer look at the development of sales revenues

There are several reasons for analyzing sales revenues in depth. Firstly, sales revenues are easily available through the Norwegian tax database, Brønnøysundregisteret. Sales revenues are chosen instead of total revenues, as the metric of most interest to us is how well the core product or service is received by the market, not potential financial income etc. Secondly, sales revenues, and the growth in sales revenues, give a good indication of how much customer value is created: if consumers have bought products for 100, the minimum value placed on what is bought should be 100. Furthermore, the growth in sales revenues indicate how fast companies are capable of penetrating markets and stealing market shares, which in turn must mean that consumers perceive a company's products and services to be attractive. Of course, a company cannot be deemed successful if it is creating consumer value but not any return on its capital. Several measures of such return exists, however, most of them are not good proxies for the success of an early stage company. These companies often loose money and have negative value creation by most metrics during their first years of operation. Indeed, looking closer at the net income – a measure of return – we see that most of the companies in this paper's data have negative net income. It is the long-term cash flows of the company that is the ultimate measure of value creation. Negative net income in the first years does therefore not necessarily indicate low potential for economic success. On the contrary, if companies are loosing money, but increasing sales revenues and attracting capital, it might indicate that investors believe in the company's future (cash flows).

Under the headline "mission of public seed funds" we see that the public seed funds have set different goals then what is common for private funds. Returns are not mentioned in the mission, but importance is rather given to the establishment of innovative, international competitive companies with the potential for growth.

Given the accessibility of sales revenues, their indication of market success and alignment with the ambition for growth in the mission statement for seeds funds, sales revenues will be used as the main metric for the following analysis and for the regressions in the next chapter.

Scatterplots of change in sales revenue for private and public portfolio companies

Figure 25: 5 year changes in sales revenue

Absolute Change

Five year sales increase,
Sales T5 over sales T0 and absolute sales change in 1000 NOK (logarithmic x and y-axis)

● Private ▲ Public ◆ Aggregates

Sales decrease →

Sales multiple
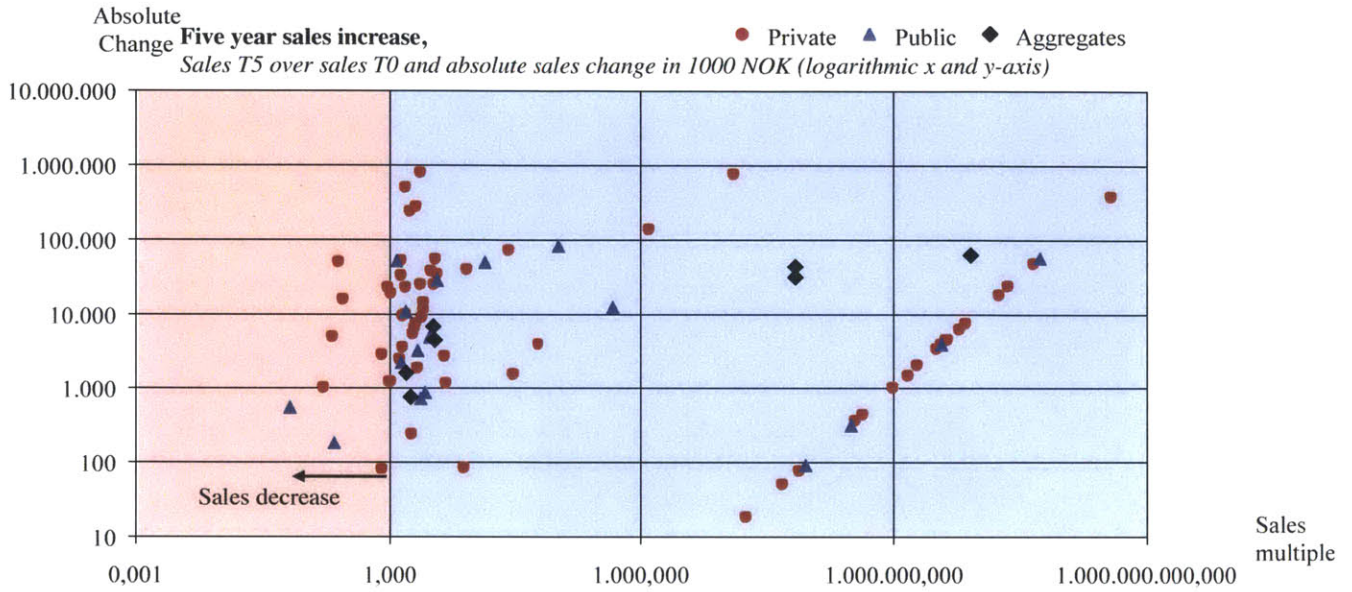
Figure 26: 1 year changes in sales revenue

Absolute Change

One year sales increase,
Sales T1 over sales T0 and absolute sales change in 1000 NOK (logarithmic x and y-axis)

● Private ▲ Public

Sales decrease →

Sales multiple
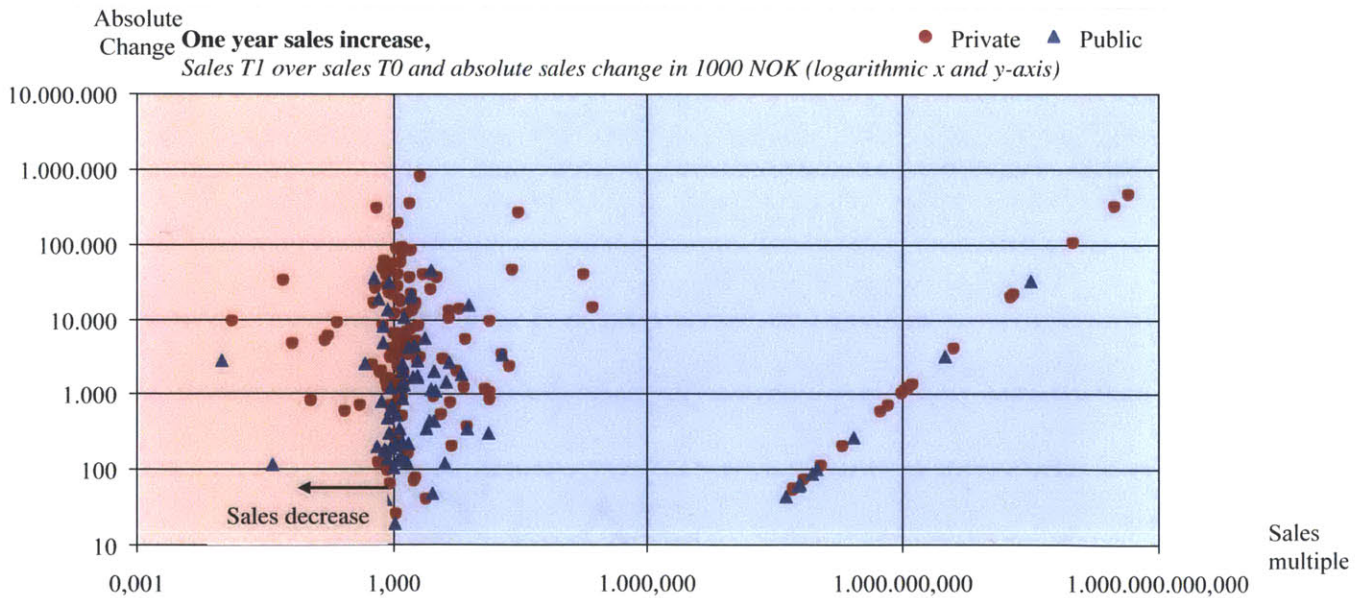
The above scatterplots show the 1 and 5-year change in sales revenues for private and public companies between 2006 and 2012. The red round dots depict companies with purely private investors, while the blue triangles depicts companies with one or more public seed fund is an investor. The x-axis of the plots shows the sales multiple, i.e. the ratio between sales in year 1-5 to sales in year 0. The Y-axis shows the absolute change in sales in 1000 NOK. Both the X- and Y-axis are shown on a logarithmic scale although labels are displayed as natural numbers. If a data point is located to the left of 1,000 (i.e. in the red area) the company experienced a sales decrease and the Y-value should be interpreted as negative, i.e. that the absolute change in sales was negative by the amount depicted on the Y-axis.

The number of data points is highest for the 1-year change and gradually becomes smaller. The reason is that a as the time period gets longer (e.g. change over 5 years), the restriction on when the company received its investment becomes stricter. A 5-yeartime period e.g. requires that a company must have received investment in 2006 or 2007 to be included in the sample.

If the initial sales revenue at investment (t0) was close to 0, the ratio between the sales revenue at t1-t5 and to t0 will be infinitely high. As this happen the observations will be far to the right on the x-axis. The "straight line" of dots with high sales multiples are the effect of low initial sales and logarithmic properties that make the logarithm of the absolute change in sales be proportional to the logarithm of the sales multiple.

A high relative and absolute growth in sales revenues would place an observation high up to the right. Observations that are high up but close to 1,000 on the x-axis are companies that experiences a high absolute increase but where the sales increase relative to the sales at t0 was not high.

As the time period increases, the data is more spread out in the scatterplot. At t5 we see that most companies have a change in sales revenues of 10 mNOK to 100 mNOK, in comparison to t1 where many companies have changes between 0.1 and 1 mNOK. Visually the companies also seem to move to the right in the scatter as we approach t5. The plot seems to suggest that those companies that are still operating 5 years after investment do grow their sales with more than 1 mNOK and that their multiple is high.

(The data points forming a straight line had very low initial sales and thus on logarithmic scales the relative increase become almost proportional to the absolute increase)

Comparison of private and public companies

Growth rate of sales, wages, operating income, debt and assets

Figure 27: Annual geometric growth rate from year of investment to 2012

Year of investment | Annualized geometric growth rate by year of investment, *percent* — Private / Public

Year of investment	Sales (Private / Public)	Op.Inc (Private / Public)	Wage Costs (Private / Public)	Assets (Private / Public)	Debt (Private / Public)
2007	13 / 50	-45 / -11	14 / 34	6 / 8	-5 / 29
2008	18 / 5	17 / -9	13 / 12	10 / 12	10 / 9
2009	11 / -3	183 / -35	13 / 3	0 / 25	-4 / 135
2010	25 / 63	7 / 4	32 / 20	20 / 21	92 / 19
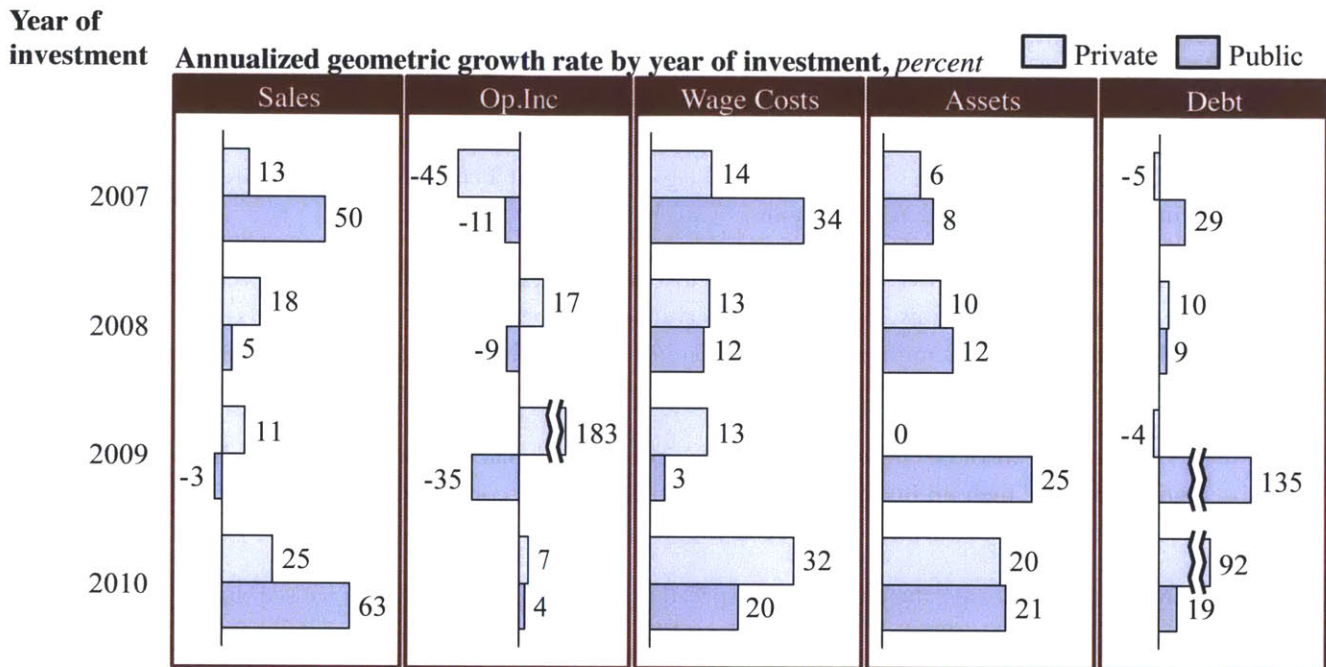
The charts above show the annual geometric growth rate of sales, operating income, wage costs, assets and debt for private and public firms.

Public firms who received investments in 2007 and 2010 had higher annual growth than privates that received investments the same years, while the result was opposite for investments made in 2008 and 2009. The variance of sales changes is higher for the public than the private firms, potentially because the sample of private investments is done at a later stage.

There does not seem to be any systematic differences between the aggregate development of the operating incomes of private and public companies.

Wage costs increase more in private companies than private three out of four years, potentially because the sample of private investments is done at a later stage.

Public companies consistently had a higher growth in assets than public ones, while debt growth was higher two out of four years.

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Absolute change in sales revenue

Figure 28: Summary of changes in sales revenues from t0 to t5

Share of companies with change in sales greater than 0, 5 and 25 mNOK,
percent of companies
☐ Private ☐ Public

	T1	T2	T3	T4	T5

>0 mNOK
- T1: 50 / 53
- T2: 56 / 60
- T3: 52 / 54
- T4: 49 / 51
- T5: 57 / 65

>5 mNOK
- T1: 21 / 7
- T2: 31 / 13
- T3: 34 / 20
- T4: 32 / 21
- T5: 32 / 30

>25 mNOK
- T1: 9 / 2
- T2: 14 / 5
- T3: 15 / 6
- T4: 17 / 8
- T5: 15 / 22
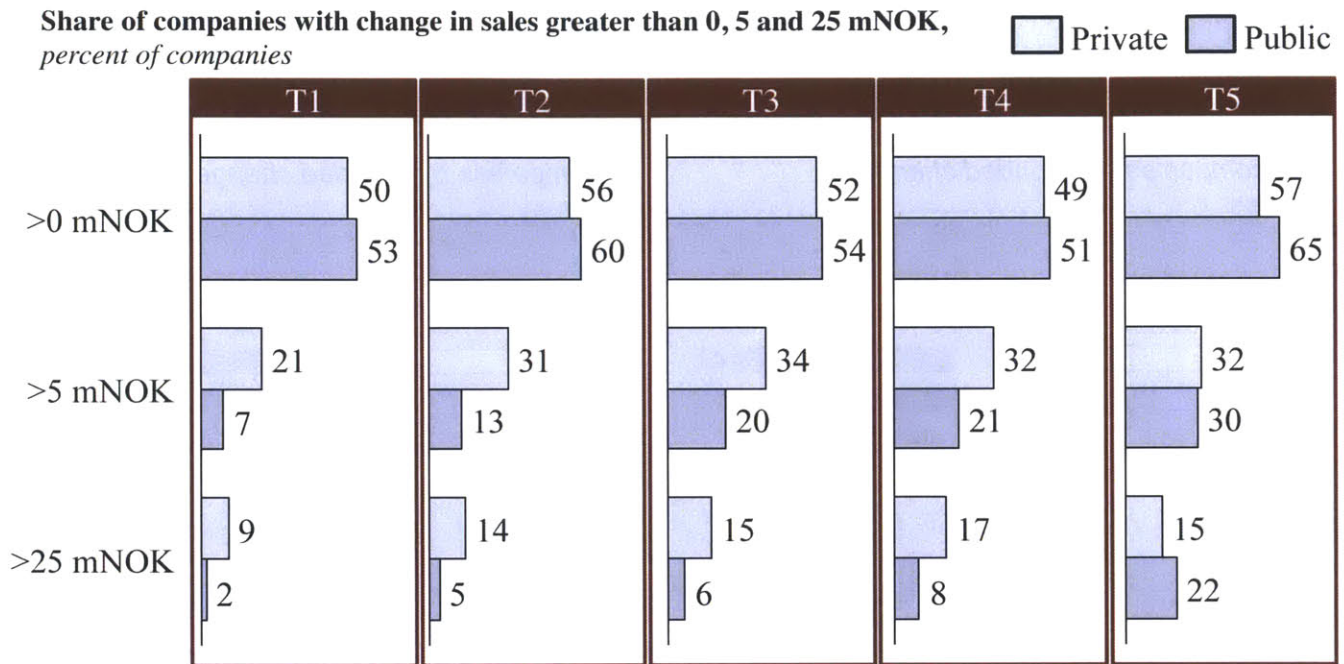
The above charts show a histogram of sales revenues changes from t0 to t5, t4, t3, t2 and t1 for both private and public companies. The white bars show the number of companies with sales revenues less than or equal to the given axis number but higher than the axis number depicted above it. The red bars use percent of all companies in the sample as the size of the bar. The absolute numbers and percentages for companies that received public seed fund investments are shown to the left while companies receiving private capital are shown to the right.

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Histograms

The histograms provide a detailed overview and comparison of the number and percentage of private and public firms that had sales changes less than a given amount from the year of investment to year Z (where Z is 1,2,3,4,5).

Figure 29: Histogram of Change in Sales T0-T1

Change in sales over period for public companies, *number & percent* of companies by rounded change in sales		Change in sales over period for private companies, *number & percent* of companies by rounded change in sales		Legend: ■ % of comp □ # of comp
-100	0 / 0	1 / 0		
-50	0 / 0	2 / 1		
-10	4 / 4	11 / 5		
0	42 / 43	96 / 44		
1	26 / 27	33 / 15		
5	18 / 19	31 / 14		
10	1 / 1	8 / 4		
15	1 / 1	7 / 3		
20	2 / 2	7 / 3		
25	1 / 1	3 / 1		
50	2 / 2	8 / 4		
100	0 / 0	5 / 2		
500	0 / 0	7 / 3		
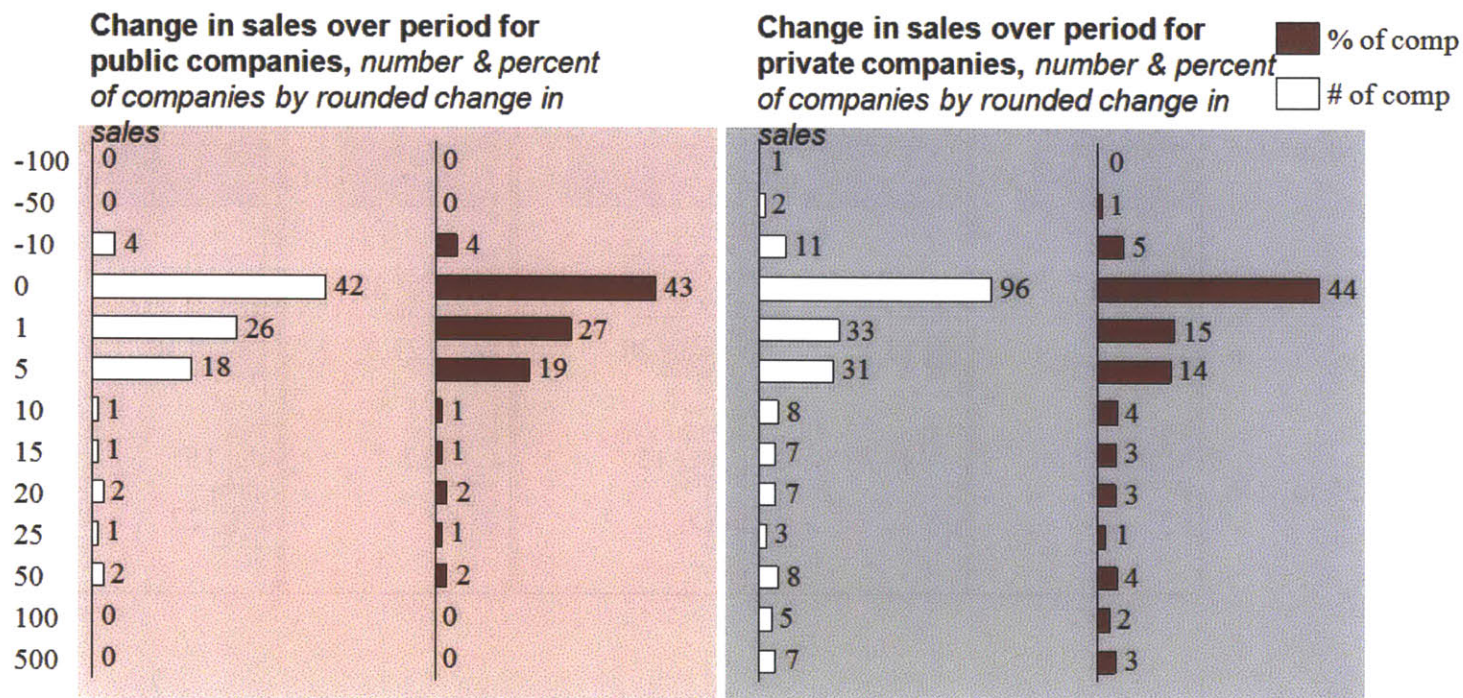
In T1 53% of public companies have increased their sales revenue, 7% by more than 5 mNOK and 2% by more than 25 mNOK. The corresponding numbers for privates are 50%, 20% and 9 %.

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Figure 30: History of Change in Sales T0-T2

Change in sales over period for public companies, number & percent of companies by rounded change in sales

Change in sales over period for private companies, number & percent of companies by rounded change in sales

% of comp

# of comp
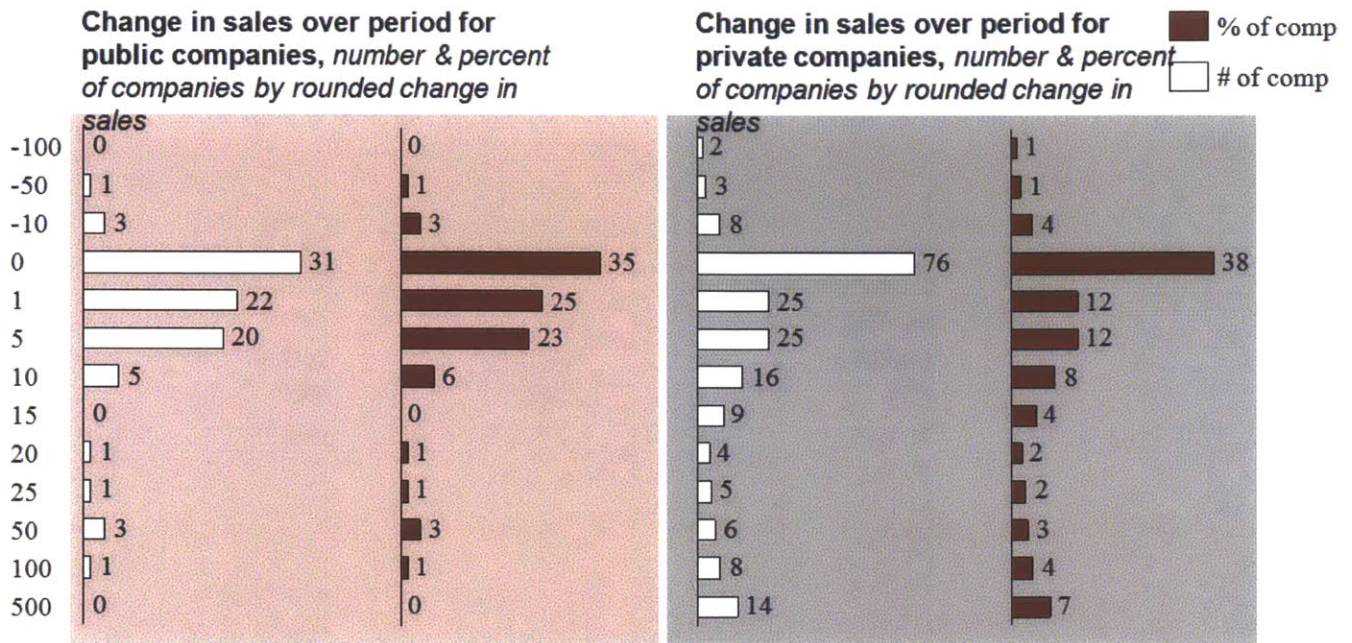
In T2 61% of public companies have increased their sales revenue, 35% by more than 5 mNOK and 4% by more than 25 mNOK. The corresponding numbers for privates are 56%, 32% and 14 %.

Figure 31: History of Change in Sales T0-T3

Change in sales over period for public companies, *number & percent of companies by rounded change in sales*

Change in sales over period for private companies, *number & percent of companies by rounded change in sales*

■ % of comp
☐ # of comp

Rounded change	Public #	Public %	Private #	Private %
-100	0	0	1	1
-50	1	1	2	1
-10	3	4	9	5
0	28	41	72	41
1	12	17	15	9
5	11	16	16	9
10	4	6	12	7
15	3	4	15	9
20	2	3	5	3
25	1	1	1	1
50	3	4	8	5
100	1	1	7	4
500	0	0	11	6

In T3 54% of public companies have increased their sales revenue, 19% by more than 5 mNOK and 5% by more than 25 mNOK. The corresponding numbers for privates are 52%, 35% and 15%.

Figure 32 : History of Change in Sales T0-T4

Change in sales over period for **public companies**, *number & percent of companies by rounded change in sales*

Change in sales over period for **private companies**, *number & percent of companies by rounded change in sales*

Legend: ■ % of comp   □ # of comp

Public companies:

rounded change	# of comp	% of comp
-100	0	0
-50	0	0
-10	1	2
0	25	47
1	8	15
5	8	15
10	4	8
15	3	6
20	0	0
25	0	0
50	2	4
100	2	4
500	0	0

Private companies:

rounded change	# of comp	% of comp
-100	0	0
-50	3	2
-10	4	3
0	63	46
1	11	8
5	12	9
10	10	7
15	3	2
20	6	4
25	2	1
50	9	7
100	4	3
500	10	7

In T4 51% of public companies have increased their sales revenue, 22% by more than 5 mNOK and 8% by more than 25 mNOK. The corresponding numbers for privates are 49%, 30% and 17%.

Figure 34 : History of Change in Sales T0-T5

Change in sales over period for public companies, *number & percent* *of companies by rounded change in sales*

Change in sales over period for private companies, *number & percent* *of companies by rounded change in sales*

Legend: ■ % of comp □ # of comp.

Change	Public #	Public %	Private #	Private %
-100	0	0	0	0
-50	0	0	0	0
-10	0	0	4	4
0	8	35	38	39
1	4	17	9	9
5	4	17	15	15
10	0	0	8	8
15	2	9	2	2
20	0	0	2	2
25	0	0	4	4
50	2	9	5	5
100	3	13	3	3
500	0	0	7	7

In T5 65% of public companies have increased their sales revenue, 31% by more than 5 mNOK and 22% by more than 25 mNOK. The corresponding numbers for privates are 57%, 31% and 15%.

We observe that public companies more often than private companies increase their sales revenue. However, we also observe that the private companies generally have higher positive changes to their sales revenues than the public companies.

The observation that private companies tend to have higher absolute changes to sales revenue does not necessarily mean that these companies manage to increase revenues more, but rather that they started of with higher revenues. These differences in revenue at t0 are controlled for in later regressions.

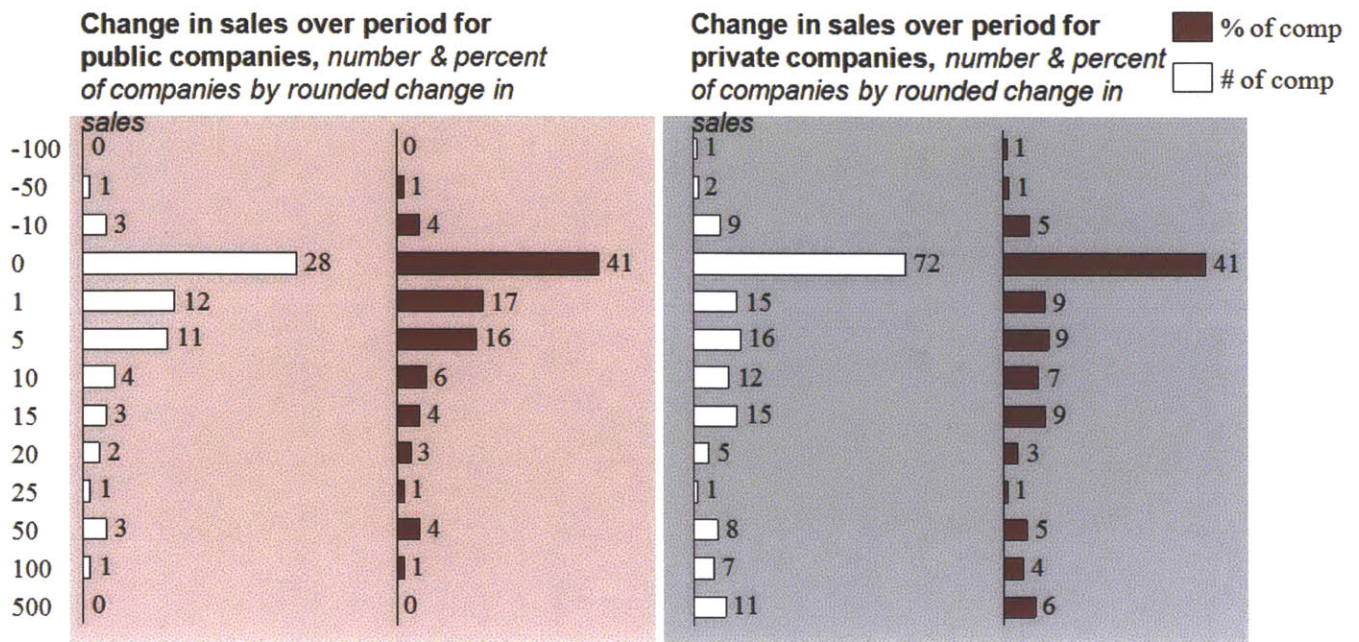On an overall level what we see from the data is that on the longer term (4-5 years after investments) more than half of the public investments that are not bankrupt manage to improve their sales revenues and some of these even manage to grow revenues by more than 25mNOK (8% for T4 and 23% for T5), reflecting that these investments indeed are competitive growth companies.

It is also possible to include sales at t0 as a dimension to the above analysis by generating two-dimensional tables. These tables can be found in appendix and show combinations of changes in sales revenue and sales at t0.

Sales revenue development by seed fund

Figure 34: Sales revenue development by public seed fund

Number of companies included in data — ☐ Sales at investment — ☐ Sales at T1/T3/T5

	Alliance Pol.	FjordInvest	KapNord	Midvest	NorInnova	Proventure	Sarsia	Såkorninvest
T0→T1 (companies)	6	2	8	5	6	8	8	3
change	-55%	-40%	-43%	+38%	-38%	+493%	-43%	+39%
sales at investment	11,8	2,9	48	64	12,5	4,3	6,7	4,0
sales at T1	5,3	1,7	28	88	7,7	25,4	3,8	5,6
T0→T3 (companies)	6	1	6	0	7	5	5	3
change	+350%	+554%	-64%	NA	+48%	+4.709%	-57%	+2.370%
sales at investment	11,8	1,0	294	0	15,5	1,2	5,7	0,1
sales at T3	53,0	6,9	105	0	23,0	56,4	2,4	1,3
T0→T5 (companies)	3	0	3	0	2	3	1	1
change	+706%	NA	-53%	NA	-46%	+11.876%	+66%	NA
sales at investment	6,7	0,0	227		24,2	0,8	0,5	0,0
sales at T5	54,2	0,0	107		13,0	94,7	0,9	0,0

The charts above show the aggregate sales in mNOK of portfolio companies per seed fund at the time of investment and 1, 2 and 5 years after investment. The arrow with the circle shows the aggregate change in sales of the portfolio companies.

The overall impression is that few data points per fund create large variation in the change in sales from fund to fund and time period to time period.

While Alliance Polaris' portfolio companies experienced a decline in sales over a period of 1 year after investment, the growth on a three and five-year basis is very strong. The aggregate Proventure portfolio has the highest absolute and relative growth rates of the funds, starting from very low initial sales in the year of investment both absolute and relative sales grow at a higher rate than any of the other seed funds' portfolios. The aggregate portfolio of KapNord on the other hand shows a consistent decline regardless of the time horizon. As the characteristics of the investments of each seed fund may vary (e.g. in age and industry of portfolio companies) conclusions drawn based on the numbers shown above will not be strong ones. The chapter with regressions

Regressions on sales revenues, operating income and wages

The univariate analysis conducted in the previous chapters provides a good descriptive understanding of how portfolio companies evolved. However, when measuring and comparing performance of portfolio companies, factors such as industry, age and revenues at the time of investment made direct comparisons less relevant. Regression analysis allows us to isolate the effect independent variables (such as industry, age and more) have on the dependent variable of choice (e.g. change in sales X years after investment).

Regression methodology and data

Multiple linear regressions are used to determine how the independent variables affect the dependent variable. The dependent variables used in the regressions are relative and absolute change in sales revenue, relative and absolute change in wage costs and absolute change in operating income. The regressions are done for 1,2,3,4,5 years after the year of investment. Each regression is done with two sets of variables: one where public seed funds are denoted with two dummy variables ("PublicRestricted" and "PublicNotRestricted") and one set of regressions with 8 dummy variables; one for each individual seed fund. Furthermore, the same regressions are done for three groups of data: firstly on all observations of companies, secondly for all companies who experienced an increase in sales, thirdly for companies that did not experience an increase in sales. The companies included in the regression are those who according to data from The Ministry of Trade and Fisheries and the Norwegian School of Economics received investments in the period 2006 to 2012.

All regressions are done using the natural logarithm. For those numbers that are negative, the natural logarithm is based off of the absolute value and a negative sign is added in front of the logarithm.

Independent variables:

Overview of all variables, some of which are not included in the regression but can be found in the dataset.

- Org_Nr: the official and unique organization number of each company as given by Norwegian tax authorities
- AgeInv: The age of the company at the time of investment
- InvestmentYear: The year of investment
- PublicRestricted: Dummy variable that is 1 if a given company received investments from a seed fund with a rural focus
- PublicNotRestricted: Dummy variable that is 1 if a given company received investment from a seed fund with a country wide focus
- IndSimp: Category variable that denotes which industry the company belongs to:
- LnSales0: the natural logarithm of the sales of a company in the year of investment
- SalesDirT5/4/3/2/1:
  - o Up: the sales revenue increased in the relevant time period
  - o Down: sales revenue did not increase (i.e. decreased or did not change) in the relevant time period
- LnOpInc0: is the natural logarithm of the absolute value of the operating income of a company at T0 (i.e. time of investment)
- LnWage0: Natural logarithm of wage costs at T0
- OSESX5/4/3/2/1: the 5/4/3/2/1 year return on the Oslo small cap index
- Ind1: Dummy variable that takes on the value 1 if a given company belongs to the industry "Information and communication"
- Ind2: Dummy variable that takes on the value 1 if a given company belongs to the industry "Manufacturing"
- Ind3: "Dummy variable that takes on the value 1 if a given company belongs to the industry "Other"

- Ind4: Dummy variable that takes on the value 1 if a given company belongs to the industry "Professional, scientific and technical activities"
- Ind5: Dummy variable that takes on the value 1 if a given company belongs to the industry "Transport and storage"
- Pub.1: Dummy variable that takes on the value 1 if a given company has received investments from Alliance Venture Polaris
- Pub.2: Dummy variable that takes on the value 1 if a given company has received investments from FjordInvest SørVest
- Pub.3: Dummy variable that takes on the value 1 if a given company has received investments from KapNord
- Pub.4: Dummy variable that takes on the value 1 if a given company has received investments from Midvest
- Pub.5: Dummy variable that takes on the value 1 if a given company has received investments from NorInnova Invest
- Pub.6: Dummy variable that takes on the value 1 if a given company has received investments from other investors than Pub1/2/3/4/5/7/8/9
- Pub.7: Dummy variable that takes on the value 1 if a given company has received investments from ProVenture Seed
- Pub.8: Dummy variable that takes on the value 1 if a given company has received investments from Sarsia Seed
- Pub.9: Dummy variable that takes on the value 1 if a given company has received investments from SåkorninVest II

Dependent variables:
The five dependent variables used in the regressions are:

$$LnDSalesZ$$

$$DLnSalesZ$$

$$LnDeltaOpIncZ$$

$$LnDWageZ$$

$$DLnWageZ$$

$$absLnDSalesZ$$

$$absLnDOpIncZ$$

Where Z can take values 1-5.

LnDSalesZ is the natural logarithm of the difference in sales revenue from T0 to TZ. DLnSalesZ is the natural logarithm of sales revenues Z years after investment less the natural logarithm of sales revenues at investment. LnDeltaOpIncZ is the natural logarithm of the absolute change in operating income. If the operating income decreased, the variable is negative. LnDWageZ is the natural logarithm of the absolute difference between sales revenues at TZ and T0. The variable is negative if wage costs are higher in T0 than

TZ. DLnWageZ is the natural logarithm of wage costs at TZ less the natural logarithm of wage costs at T0. "absLnSalesZ" is the absolute value of the change in sales. "absLnOpIncZ" is the absolute value of change in operating income. The two latter variables are always positive. All dependent variables and how they are regressed are described under " overview of regressions".

Regression software and method
The regression was conducted in Stata statistical software. Regression commands can be found in the appendix.

Overview of regressions
The regressions are differentiated by their dependent variables and which combinations of variables and observations that is included in the regressions. The purpose of including different variables and observations is to minimize issues with co-linearity (variables being correlated) and omitted variables. All regressions will be described in the following.

Regressions on relative sales change

Description of regressions
The regressions on relative sales change seeks to establish a fractional relationship between sales at T5/4/3/2/1 and T0. They have the basic formula:

$$DLnSalesZ = a * AgeInv + b * PublicRestricted + c * PublicNotRestricted + d * LnSales0 + e * OSESXZ + f * Ind1\ g * Ind2 + i * Ind4 + j * Ind5$$

ind3 ("Other") and pub6 ("Not Public) are left out of the regression to allow one free dummy

The above regression is done for Z values 1 to 5, i.e. for 1,2,3,4 and 5 years after investment. Furthermore, each regression is done on three groups of observations: for those companies that increased sales, those who did not increase sales and all companies together.

Dividing companies into groups of increasing and not increasing sales revenues allows to test whether there are observable differences in risk. If e.g. public companies have a higher increase in the dependent variable for those companies that increased their sales revenue and higher (absolute) decreases for those who decreased their revenues, this could indicate higher variance on the dependent variable and thus more risk. x

In the below regression equation the variables "PublicRestricted" and "PublicNotRestricted" are replaced with one dummy variable per seed fund in order to pick up the individual effect each seed fund have on the dependent variable. The regression is done on the three groups of observations: those companies that increased sales, those who did not increase sales and all companies together.

$$DLnSalesZ = a * AgeInv + d * LnSales0 + e * OSESXZ + f * Ind1\ g * Ind2 + i * Ind4 + j * Ind5 + k * Pub1 + l * Pub2 + m * Pub3 + n * Pub4 + o * Pub + q * Pub7 + r * Pub8 + s * Pub9$$

ind3 ("Other") and pub6 ("Not Public) are left out of the regression to allow one free dummy.

Relative sales change: interpretation of results

The coefficients estimated by the regression results will allow calculating an estimate of the difference between the logarithm at TZ and T0. The difference is equal to the ratio between sales at TZ and T0. Below is an example where the difference between the natural logarithm of sales at T5 and T0 is 3. This means that sales at T5 is 3-times the sales of T0:

$$Ln(SalesT5) - Ln(SalesT0) = 3,$$

$$e^{(Ln(SalesT5)-Ln(SalesT0))} = 3$$

$$e^{Ln((SalesT5)/(SalesT0))} = e^3$$

$$\frac{Sales\ T5}{Sales\ T0} = 20.086$$

i.e. sales in year 5 is 20.086 times as high as sales at T0.

Regressions on natural logarithm of sales change in NOK

Description of regressions

The regressions done for absolute sales change are the same as for relative sales change apart from a change in the dependent variable:

$$LnDSalesZ = Ln(SalesTZ - SalesT0), \quad where\ Z = 1,2,3,4,5$$

The regression takes the natural logarithm of the absolute difference between sales at TZ and T0. If the difference is negative (when not taking the absolute value) the expression (LnDSalesZ) is given a negative sign.

Natural logarithm of sales change in NOK: interpretation of results

The coefficients estimated by the regression results will allow calculating an estimate of the natural logarithm of the absolute difference in sales between TZ and T0 (with the logarithm being negative for a drop in sales). Below is an example where the logarithm of the difference between sales at T0 and T5 is 3. This means that sales at T5 are e^3 higher than at T0.

$$Ln(SalesT5 - SalesT0) = 3,$$

the change in sales between T0 and T5 would be approximated by:

$$SalesT5 - SalesT0 = e^{Ln(SalesT5-SalesT0)}$$

$$= e^3 = 20.08$$

Negative changes should be interpreted in the following way:

$$Ln(SalesT5 - SalesT0) = -3,$$

The change in sales can be approximated by raising a negative e to the power of the absolute value of 3:

$$-e^{Abs(SalesT5-SalesT0)} = -e^3 = -20.08$$

Regressions on natural logarithm of operating income change in NOK

Description of regressions

The regressions on NOK change in operating income seek to establish and absolute relationship between the NOK change in operating income from T0 to TZ. The regressions have the formula.

$LnDeltaOpIncZ$
$$= a * AgeInv + b * PublicResticted + c * PublicNotRestricted + d * LnSales0$$
$$+ e * OSESXZ + f * Ind1 \ g * Ind2 + i * Ind4 + j * Ind5 + k * LnOpInc0$$

ind3 ("Other") and pub6 ("Not Public") are left out of the regression to allow one free dummy

The above regression is done for Z values 1 to 5, i.e. for 1,2,3,4 and 5 years after investment. Furthermore, each regression is done on three groups of observations: for those companies that increased sales, those who did not increase sales and all companies together.

Dividing companies into groups of increasing and not increasing sales revenues allows to test whether there are observable differences in risk. If e.g. public companies have a higher increase in the dependent variable for those companies that increased their sales revenue and higher (absolute) decreases for those who decreased their revenues, this could indicate higher variance on the dependent variable and thus more risk.

In the below regression equation the variables "PublicRestricted" and "PublicNotRestricted" are replaced with one dummy variable per seed fund in order to pick up the individual effect each seed fund have on the dependent variable. The regression is done on the three groups of observations: those companies that increased sales, those who did not increase sales and all companies together.

$LnDeltaOpIncZ$
$$= a * AgeInv + d * LnOpInc0 + k * LnSales0 + e * OSESXZ + f * Ind1 + g$$
$$* Ind2 + i * Ind4 + j * Ind5 + k * Pub1 + l * Pub2 + m * Pub3 + n * Pub4 + o$$
$$* Pub + q * Pub7 + r * Pub8 + s * Pub9$$

Natural logarithm of operating income change in NOK: interpretation of results

We only use one set of dependent variables in the regression of operating income. These dependent variables allow us to approximate the absolute increase in operating income, e.g.:

$$Ln(Operating\ income\ T5 - Operating\ Income\ T0) = 3,$$

the change in operating income between T0 and T5 would be approximated by:

$$Operating\ income\ T5 - Operating\ Income\ T0$$

$$= e^{Ln(Operating\ income\ T5 - Operating\ Income\ T0)}$$

$$= e^3 = 20.08$$

Regressions on relative change in wage costs

Description of regressions

The regressions on relative wage change seek to establish a fractional relationship between wage at T5/4/3/2/1 and T0. They have the basic formula:

$$DLnWageZ =$$
$$a * AgeInv + b * PublicRestricted + c * PublicNotRestricted + d * LnSales0 + e * OSESXZ + f * Ind1 \; g * Ind2 + i * Ind4 + j * Ind5 + \text{k*LnWage0}$$

ind3 ("Other") and pub6 ("Not Public") are left out of the regression to allow one free dummy

where Z is the number of years since investment and can take the values 5,4,3,2,1

The above regression is done for Z values 1 to 5, i.e. for 1,2,3,4 and 5 years after investment. Furthermore, each regression is done on three groups of observations: for those companies that increased sales, those who did not increase sales and all companies together.

Dividing companies into groups of is done to be consistent with regressions on sales and operating income.

In the below regression equation the variables "PublicRestricted" and "PublicNotRestricted" are replaced with one dummy variable per seed fund in order to pick up the individual effect each seed fund have on the dependent variable. The regression is done on the three groups of observations: those companies that increased sales, those who did not increase sales and all companies together.

$$DLnWageZ = a * AgeInv + d * LnSales0 + d * LnWage0 + e * OSESXZ + f * Ind1 \; g * Ind2$$
$$+ i * Ind4 + j * Ind5 + k * Pub1 + l * Pub2 + m * Pub3 + n * Pub4 + o * Pub + q$$
$$* Pub7 + r * Pub8 + s * Pub9$$

Regressions on natural logarithm of wage cost change in NOK

Description of regressions
The regressions on NOK change in wage seek to establish a relationship between the NOK change in wage cost from T0 to TZ and the independent variables. The regressions have the formula:

$$\square nDWageZ = a * AgeInv + b * PublicResticted + c * PublicNotRestricted + d * LnSales0 \\ + e * OSESXZ + f * Ind1 \ g * Ind2 + i * Ind4 + j * Ind5 + k * LnWage0$$

ind3 ("Other") and pub6 ("Not Public") are left out of the regression to allow one free dummy

The above regression is done for Z values 1 to 5, i.e. for 1,2,3,4 and 5 years after investment. Furthermore, each regression is done on three groups of observations: for those companies that increased sales, those who did not increase sales and all companies together.

Dividing companies into groups of increasing and not increasing sales revenues makes the regressions consistent with the ones on sales and operating income.

In the below regression equation the variables "PublicRestricted" and "PublicNotRestricted" are replaced with one dummy variable per seed fund in order to pick up the individual effect each seed fund have on the dependent variable. The regression is done on the three groups of observations: those companies that increased sales, those who did not increase sales and all companies together.

$$LnDWageZ = a * AgeInv + d * LnWage0 + k * LnSales0 + e * OSESXZ + f * Ind1 \ g * Ind2 \\ + i * Ind4 + j * Ind5 + k * Pub1 + l * Pub2 + m * Pub3 + n * Pub4 + o * Pub + q \\ * Pub7 + r * Pub8 + s * Pub9$$

NOK and relative wage change: interpretation of results
The math underlying the regressions on wage change is identical to that for sales change.

Regressions on absolute change in operating income and sales (regressions on variance and risk)

Description of regressions
The regressions on absolute change in operating income and sales seek to uncover whether the magnitude of the changes in operating income and sales for public companies is lower than for privates. The regressions are identical to the regression on change in sales and operating except that all regression uses the absolute value of changes.

The regressions have the formulas:

$$absLnOpIncZ = a * AgeInv + b * PublicResticted + c * PublicNotRestricted + d * LnSales0 \\ + e * OS\square SXZ + f * Ind1 \ g * Ind2 + i * Ind4 + j * Ind5 + k * LnOpInc0$$

$$absLnDSalesZ \\ = a * AgeInv + b * PublicRestricted + c * PublicNotRestricted + d \\ * LnSales0 + e * OSESXZ + f * Ind1 \ g * In\square 2 + i * Ind4 + j * Ind5$$

The above regressions are done for Z values 1 to 5, i.e. for 1,2,3,4 and 5 years after investment and for one group of observations: all observations.

Interpretation of results

The interpretation of the results is the same as for "NOK change" in sales and operating income except that the direction of the change is not visible. The coefficients thus only inform us about the magnitude of the changes, not whether they were positive or negative.

Potential sources of error

The regression was linear, i.e. that the dependent variables (changes in sale or change in operating income) dependent linearly on the explanatory variables. If the linear relationship does not hold, coefficients could be affected. E.g. if the relationship between sales change and sales at investment is not linear, the regression will underestimate the effect of the LnSales0 variable for some intervals of LnSales0, and overestimate for others.

Regression Results

Summary tables

The summary tables below show the result of 150 regressions using 18 explanatory and 25 dependent variables. The vertical axis lists the independent variables while the horizontal axis lists the dependent ones. The three bottom rows in each table includes information about the number of observations (i.e. investments in companies), the number of clustered observations (correcting for several investments in the same companies) and the R^2 – the measure of how well the regression equation fits the data. The explanatory variables are explained under the headlines "Independent Variables", while the dependent ones are explained under "Description of regressions". The regressions are performed on three groups of data: firstly on all observations, secondly on those companies that increased their sales, thirdly on those companies that decreases their sales. For each group and dependent variable, the regression is conducted twice: once with public ownership being indicated by "PublicRestricted" or "PublicNotRestricted", and once using one variable per seed fund. The latter regressions are marked in darker grey. The three bottom rows refer to the regressions where public seed funds are bundled to two variables. Each cell in the tables represents the regressed effect of the independent variable on the dependent variable, i.e. the independent variable's coefficient. The coefficient will appear in the table given that it is significant at a 10 % significance level (or 5% for those coefficients marked with a *).

Relative change in sales

Regression conducted on all observations

Table 4 : Relative change in sales - regression conducted on all observations

*>=5% sign, 10% sign	Relative change in sales				
	T1	T2	T3	T4	T5
AgeInv			-0.20*		
PublicRestricted					
PublicNotRestricted					
LnOpInc0/LnWage0					
LnSales0	-0.28*	-0.36*	-0.44*	-0.38*	-0.52*
OSESXZ					
Ind1					
Ind2					
Ind4					
Ind5	-3.72*	-3.79*	-5.08*	-3.70*	-5.70*
Pub1		1.82*	1.8	2.79*	
Pub2		1.37*			
Pub3			-3.07		
Pub4			3.21*	5.83*	
Pub5					
Pub7		2.58			3.51
Pub8					
Pub9					
Number of observations	398	369	311	236	147
Clustered observations	262	240	202	159	100
R-squared	0.15	0.2	0.27	0.23	0.31

147 data points in T5 and 398 data points in T1 provided the basis for the regressions in relative change in sales. The age of the company at time of investment ("AgeInv") was found to have a significant negative effect on the relative sales increase. Higher sales in the year of investment also consistently for all periods had a negative impact on the relative sales increase. Industry 5 also consistently had a negative impact on relative sales increase. Whether the investment was made by a public seed fund did not have a significant impact in the regression when the public seed funds were grouped together in two variables (PublicRestricted) and (PublicNotRestricted). However, some significant results were observed as the two variables indicating public ownership were divided into eight variables – one for each fund. Generally when clustering variables together, effects of one variable might interfere with the effect of another. Overall the effect of the public seed funds was higher relative sales increase then the public benchmark. One exception was pub3 in T3.

The R^2 of the regression consistently declined from 0.31 in T5 to 0.15 in T1 as the number of observations went up.

Regression conducted on companies that increased sales

Table 5 : Relative change in sales - regression conducted on companies that increased sales

*>=5% sign, 10% sign	Relative change in sales				
	T1	T2	T3	T4	T5
AgeInv					
PublicRestricted	-0.83*	-1.49*	-1.51*	-1.57*	
PublicNotRestricted	-1.83*	-1.86*	-1.73*	-1.90*	
LnOpInc0/LnWage0					
LnSales0	-0.78*	-0.81*	-0.78*	-0.81*	-0.77*
OSESXZ					
Ind1		0.97	0.85*		
Ind2				1.05	
Ind4					
Ind5					
Pub1	-1.96*	-1.56*	-1.56*	-1.53*	-0.95*
Pub2	-1.46*	-1.45*	-1.26*		
Pub3	-1.13			-1.46	
Pub4					
Pub5	-1.31*	-2.22*	-2.22*	-1.98*	
Pub7	-1.64	-1.46		-2.19*	
Pub8	-2.15*	-2.57*	-2.47*		
Pub9	-1.74*	-2.55*	-2.26*	-2.65*	1.57*
Number of observations	201	212	174	125	91
Clustered observations	140	140	112	80	58
R-squared	0.87	0.89	0.91	0.91	0.91

The same regressions as above were conducted for companies that increased their sales. The explanatory power of the regression, the R^2, ranges from 0.91 (for T5) to 0.87 (for T1), a threefold of the explanatory power compared to the previous group of regressions. Furthermore, the number of significant P-values increases. PublicRestricted and PubNonRes both have significant negative coefficients from T1 and throughout T4, indicating that sales grew percentage wise less for companies that were publically owned. Sales at T0 are still a factor contributing in negative direction, while ind1 gives a positive effect in T2 and T3 and Ind2 in T4. Decomposing the public variable into the individual seed funds yield more significant coefficients than when all observations were regressed. Almost consistently, apart from T5 for Pub9, ownership by the seed funds reduces the increase in sales revenues.

Regression conducted on companies that decreased sales

Table 6: Relative change in sales - regression conducted on companies that decreased sales

*>=5% sign, 10% sign	Relative change in sales				
	T1	**T2**	**T3**	**T4**	**T5**
AgeInv			-0.16		
PublicRestricted					
PublicNotRestricted					
LnOpInc0/LnWage0					
LnSales0	-0.16*	-0.21*	-0.22*	-0.35*	-0.45*
OSESXZ					
Ind1					
Ind2					
Ind4					
Ind5			2.56		
Pub1		4.18*	4.32*		
Pub2	2.39*	3.65*	3.68*		
Pub3	1.45*				
Pub4	2.87*	4.25*	5.26*		
Pub5					7.83*
Pub7	2.10*	2.39			6.16*
Pub8	3.31*		-4.65*		
Pub9		-7.59*			
Number of observations	197	157	137	111	56
Clustered observations	137	104	96	80	42
R-squared	0.13	0.17	0.16	0.3	0.44

Again the same regression is conducted. This time on 79 to 197 observations (for T5 and T1 respectively) of companies that experienced a decrease in sales. The explanatory power, the R^2 goes down from 0.44 (in T5) to 0.13 (in T1). The age at the time of investment has a slight negative effect in T3, but there is no consistency between periods. Sales at investment consistently give a lower increase in relative sales. The dummy variables for aggregate public ownership, PublicRestricted and PublicNotRestricted, are not significant, however, when assigning a variable per seed fund, the coefficients become significant and – for the majority of coefficients – positive. The companies that had public ownership decreased their sales less than those companies that which were not publically owned.

Natural Logarithm of NOK change in sales

Regression conducted on all observations

Table 7: NOK change in sales - regression conducted on all observations

*>=5% sign, 10% sign	Natural Logarithm of NOK change in sales				
	T1	T2	T3	T4	T5
AgeInv					
PublicRestricted					
PublicNotRestricted				-6.60*	
LnOpInc0/LnWage0					
LnSales0	-0.59*	-0.59*	-0.61*	-0.48*	-0.29
OSESXZ					
Ind1	5.17*	5.41			
Ind2	4.69*				
Ind4					
Ind5					
Pub1				7.50*	7.28*
Pub2				-19.54*	
Pub3					
Pub4				14.42*	
Pub5					
Pub7				-9.71*	
Pub8	-6.56*	-6.59	-7.22	-9.72*	
Pub9		-7.97*			
Number of observations	303	292	256	179	115
Clustered observations	200	186	161	116	76
R-squared	0.11	0.12	0.11	0.12	0.1

115 data points in T5 and 303[3] data points in T1 provided the basis for the regressions on relative change in sales. The explanatory power measured by R^2 was 0.10-0.12 for T5-T1. Higher sales in the year of investment had a negative effect on absolute increase in sales consistently T5-T1. PublicNotRestricted had a negative effect in T4, however, the effect is not consistent T1-T5. Ind1 and a positive effect on absolute sales change in T1 and T2 while Ind2 had a positive effect in T1. When splitting the variables that indicate public ownership on the separate seed funds, the coefficient of pub8 describes a negative effect T1-T4. Furthermore, pub1, pub2, pub4 and pub7 also seem to have a negative effect in T4.

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[3]Reason for lower number of observations than for relative sales increase: a) Companies that went bankrupt are classified as having a negative 100% change in sales revenues, while no observations on the absolute changes can be obtained from the tax registry. b) Companies that had sales of zero in the year of investment and had zero in later years are included with 0 % change in sales in the regression on relative sales, but with no entry for the Natural Logarithm of NOK change in sales.

Regression conducted on companies that increased sales

Table 8: NOK change in sales - regression conducted on companies that increased sales

*>=5% sign, 10% sign	Natural Logarithm of NOK change in sales				
	T1	T2	T3	T4	T5
AgeInv					-0.09
PublicRestricted	-0.87	-1.46*	-1.60*	-1.85*	-1.69
PublicNotRestricted	-1.81*	-1.85*	-1.51*	-1.78*	
LnOpInc0/LnWage0					
LnSales0	0.11*	0.11*	0.16*	0.12*	0.16*
OSESXZ					
Ind1		0.94	0.85	0.97	
Ind2				1.17*	
Ind4					
Ind5					
Pub1	-1.46*	-1.26*		1.20*	
Pub2		-0.79*	-0.73*		
Pub3				-2.19*	
Pub4			0.95	1.1	
Pub5	-1.17*	-2.23*	-2.20*	-2.17*	
Pub7				-2.09*	
Pub8	-2.59*	-3.09*	-2.58*		
Pub9	-2.05*	-2.59*	-2.06*	-2.55*	1.14
Number of observations	201	212	174	125	91
Clustered observations	140	140	112	80	58
R-squared	0.21	0.26	0.38	0.37	0.33

The explanatory power of the regression increases to between 0.21 and 0.38 when regressing against only companies that increased their sales. The effects of PublicRestricted and PublicNotRestricted are negative and the effects are consistent for PublicRestricted T1-T5 and PublicNotRestricted T1-T4. Higher sales at the time of investment have a positive and significant effect that is consistent throughout T1-T5. Ind1 have a positive effect T2 to T4, while Ind2 has a positive effect in T4. Decomposing the variable indicating public ownership into one variable per seed fund, we find that the majority of coefficients are negative and that the companies owned by seed funds thus increase less in sales than the private peers. The exception is Pub4 that has positive coefficients in T3 and T4 and thus contribute to a higher increase than the private seed funds.

Regression conducted on companies that decreased sales

Table 9: NOK change in sales - regression conducted on companies that decreased sales

*>=5% sign, 10% sign	Natural Logarithm of NOK change in sales				
	T1	**T2**	**T3**	**T4**	**T5**
AgeInv					-0.06*
PublicRestricted	0.77				
PublicNotRestricted					
LnOpInc0/LnWage0					
LnSales0	-0.80*	-0.64*	-0.73*	-0.75*	-0.81*
OSESXZ					
Ind1					
Ind2	-0.54	-0.58	-0.79		
Ind4			-0.83		
Ind5					
Pub1					
Pub2					
Pub3	2.04*	2.30*	-0.94*		
Pub4	1.22*				
Pub5				0.5	
Pub7				1.47	
Pub8					
Pub9					
Number of observations	102	79	82	54	24
Clustered observations	71	49	54	37	18
R-squared	0.87	0.78	0.83	0.87	0.93

Performing the regression in companies that decreased in sales yields a high explanatory power with a R^2 of between 0.87 and 0.93. Age has a slight negative effect in T5, while PublicRestricted has a slight positive effect in T1. Sales at investment have a negative effect for T1-T5, while ind2 has a negative effect T1-T3. Decomposing the variables for public ownership into one variable for each seed fund does not produce too many significant coefficients. Pub3 does have significant coefficients in T1-T3, however, while T2 is positive, T3 is negative.

Relative change in wage costs

Regression conducted on all observations

Table 10: Relative change in wage - regression conducted on all observations

*>=5% sign, 10% sign

	Relative change in wage				
	T1	T2	T3	T4	T5
AgeInv	-0.03				
PublicRestricted				1.89*	1.88
PublicNotRestricted					
LnOpInc0/LnWage0				0.89*	0.74
LnSales0					
OSESXZ					
Ind1					
Ind2					
Ind4					
Ind5					
Pub1		0.89		1.86*	
Pub2					
Pub3					
Pub4			-3.43*		
Pub5				2.03	1.78
Pub7	0.95	1.20*			
Pub8					
Pub9		-6.04*	-5.19		-11.34*
Number of observations	320	298	245	177	106
Clustered observations	198	183	149	113	69
R-squared	0.05	0.02	0.03	0.13	0.11

Relative increases in wage costs are not well explained by the variables and regression model. The R^2 ranges from 0.11 (T5) to 0.05 (T1) and few coefficients are significant. The most consistent results are that PublicRestricted and wage at investment has a positive effect on wages in T4-T5.

Regression conducted on companies that increased sales

Table 11: Relative change in wage - regression conducted on companies that increased sales

*>=5% sign, 10% sign	Relative change in wage				
	T1	T2	T3	T4	T5
AgeInv					
PublicRestricted				-0.69	
PublicNotRestricted					
LnOpInc0/LnWage0	-0.24*	-0.27			
LnSales0					
OSESXZ					
Ind1					
Ind2					
Ind4					
Ind5					
Pub1					
Pub2					
Pub3	-0.66*	-0.89*		-0.91*	
Pub4		-0.88*			
Pub5					
Pub7					
Pub8					
Pub9		-7.26*		-10.09*	
Number of observations	185	194	157	113	77
Clustered observations	125	124	98	71	48
R-squared	0.06	0.08	0.11	0.24	0.3

The results does not seem to have much better explanatory power for those companies that increased their sales. Higher wages in the year of investment has a negative effect on wages changes in T1 and T2. Pub3 also has a negative effect on wages in T1, T2 and T4.

Regression conducted on companies that decreased sales

Table 12: Relative change in wage - regression conducted on companies that decreased sales

*>=5% sign, 10% sign	Relative change in wage				
	T1	T2	T3	T4	T5
AgeInv	-0.08		-0.14		
PublicRestricted		2.70*		5.39*	8.88*
PublicNotRestricted				4.07	
LnOpInc0/LnWage0	0.53			2.01*	
LnSales0		-0.14		-0.25*	
OSESXZ	-1.66*				
Ind1					
Ind2					
Ind4			-5.20*	3.88	
Ind5					
Pub1					
Pub2				4.7	
Pub3	2.16*	3.44	6.58*	6.12*	13.06*
Pub4	1.49	3.95*	-3.94*		
Pub5				5.42*	
Pub7		3.27*			
Pub8					
Pub9				5.75	
Number of observations	135	104	88	64	29
Clustered observations	88	63	56	43	21
R-squared	0.19	0.16	0.25	0.36	0.5

The regression has higher explanatory power and more significant variables for those companies that decreased sales. PublicRestricted has a positive effect in T2, T4 and T5. The effect of the public seed funds was also evident when splitting the public variable into one for each seed fund: pub3 had a positive effect on changes in wages consistently throughout T1-T5.

Natural Logarithm of NOK change in wage costs

Regression conducted on all observations

Table 13: NOK change in wage - regression conducted on all observations

*>=5% sign, 10% sign	Natural Logarithm of NOK change in wage				
	T1	**T2**	**T3**	**T4**	**T5**
AgeInv	-0.27	-0.27	-0.34		
PublicRestricted				9.22*	8.04*
PublicNotRestricted					
LnOpInc0/LnWage0				2.39*	
LnSales0				-0.46*	
OSESXZ	-6.97*				
Ind1					
Ind2					
Ind4					
Ind5					
Pub1	4.32*	5.20*			6.95
Pub2				-16.36*	
Pub3				9.69*	11.10*
Pub4				11.84*	
Pub5		5.62*	5.73*	8.59*	7.54*
Pub7	4.23*				
Pub8					
Pub9			-12.06*		-22.16*
Number of observations	320	298	247	184	107
Clustered observations	198	183	151	117	70
R-squared	0.08	0.03	0.04	0.14	0.1

Increasing age at the time of investment had a negative impact on the increase in wage in T1-T3, while PublicRestricted had a positive effect on wage in T4 and T5. The positive effect on wages is also present when decomposing into one variable per seed fund. Pub5 had a significant positive effect T2-T5, while T3 had a significant positive effect in T4 and T5.

Regression conducted on companies that increased sales

Table 14: NOK change in wage - regression conducted on companies that increased sales

*>=5% sign, 10% sign	Natural Logarithm of NOK change in wage				
	T1	T2	T3	T4	T5
AgeInv					
PublicRestricted					
PublicNotRestricted					
LnOpInc0/LnWage0					
LnSales0				-0.25	
OSESXZ					
Ind1					
Ind2					
Ind4					
Ind5					
Pub1	3.17*	3.32*			
Pub2	2.82				
Pub3		-9.69			
Pub4					
Pub5					
Pub7		3.77*			
Pub8					
Pub9		-12.25		-17.88	
Number of observations	185	194	157	113	77
Clustered observations	125	124	98	71	48
R-squared	0.07	0.04	0.09	0.12	0.11

Few variables were significant in explaining the change in absolute wages after investment and the explanatory power, measured by R^2, ranges between 0.11 and 0.07. The effect also varies between seed funds with pub1 having a positive effect in T1 and T2 and Pub3 and Pub9 having negative effects in T2 and T2/T4 respectively.

Regression conducted on companies that decreased sales

Table 15: NOK change in wage - regression conducted on companies that decreased sales

*>=5% sign, 10% sign	Natural Logarithm of NOK change in wage				
	T1	T2	T3	T4	T5
AgeInv	-0.52*		-0.63		
PublicRestricted				12.70*	17.4*
PublicNotRestricted				12.41*	
LnOpInc0/LnWage0				2.97*	
LnSales0				-0.91*	
OSESXZ	-13.07*			-13.45	
Ind1					
Ind2					-14.74*
Ind4			-11.68*		-20.82*
Ind5					
Pub1			-13.06*		
Pub2	-14.34*		-14.17*		
Pub3			13.00*	12.09*	35.06*
Pub4			-16.49*		
Pub5		9.94		13.05	
Pub7	10.79*			13.5	
Pub8				14.80*	
Pub9			-16.53*	17.68*	
Number of observations	135	104	90	71	30
Clustered observations	88	63	58	47	22
R-squared	0.24	0.16	0.17	0.37	0.52

The regression has higher explanatory power and more significant variables for those companies that decreased sales, however, the coefficients are not consistent over time. T4 (i.e. from 2007 to 2011 or 2008 to 2012) was a time period with many significant variables. The effect of PublicRestricted and PublicNotRestricted are both significant in T4, while PublicRestricted is significant in T5. Drilling down on each individual seed fund we observe that while the effect on wages in T3 was negative for Pub1, Pub2, Pub4 and Pub9, it was positive for Pub3. In T5 the effect was positive for Pub3, Pub5, Pub7, Pub8 and Pub9

Natural Logarithm of NOK change in operating income

Regression conducted on all observations

Table 16: NOK change in operating income: regression conducted on all observations

*>=5% sign, 10% sign	Natural Logarithm of NOK change in				
	T1	T2	T3	T4	T5
AgeInv	0.31*				
PublicRestricted					
PublicNotRestricted		-4.96*	-7.27*		
LnOpInc0/LnWage0			-0.16	-0.25*	-0.53*
LnSales0	0.24*		0.52*	0.54*	0.72*
OSESXZ					
Ind1					
Ind2					
Ind4					
Ind5	-4.17*	14.92*			-9.17
Pub1		-10.46*	-12.74*		
Pub2	-7.30*	-7.95	-18.72*		
Pub3					-8.93*
Pub4			17.86*	22.19*	
Pub5				-10.39*	
Pub7		-8.70*			
Pub8					
Pub9					
Number of observations	373	349	294	222	134
Clustered observations	242	225	189	148	90
R-squared	0.08	0.05	0.12	0.13	0.26

With 134 observations in T5 and 373 in T1 the regression achieved an explanatory power, measured by R^2, of 0.26 in T5 and declining constantly to 0.08 for T1. While PublicNotRestricted effected operating income negatively in T2 and T3, PublicRestricted did not display any significant coefficients. Sales and operating income in the year of investment had significant effect T3-T4, with higher operating income negatively effecting the Natural Logarithm of NOK change in operating income and higher sales having a positive effect.

Regression conducted on companies that increased sales

Table 17: NOK change in operating income – regression conducted on companies that increased sales

*>=5% sign, 10% sign	Natural Logarithm of NOK change in				
	T1	T2	T3	T4	T5
AgeInv			-0.48		
PublicRestricted	'				
PublicNotRestricted	-4.17	-6.04*	-8.09*		
LnOpInc0/LnWage0					-0.47*
LnSales0	0.42*		0.49*	0.64*	0.84*
OSESXZ					
Ind1					-13.12*
Ind2	6.15				-11.54*
Ind4					-10.84
Ind5					
Pub1		-8.43*	-9.97*		
Pub2	-9.64*		-16.78*		
Pub3					
Pub4		10.17	20.81*	21.32*	
Pub5	7.45				
Pub7		-7.68			
Pub8					
Pub9					25.52*
Number of observations	196	207	168	119	82
Clustered observations	135	135	106	75	51
R-squared	0.14	0.12	0.17	0.12	0.33

With 82 observations in T5 and 196 in T1 the regression performed on those companies that increased sales achieve a higher explanatory power of R^2 being 0.33 (T5) to 0.14 (T1). The effect of PublicNotRestricted is negative for T1-T3, while higher sales in the year of investment has a positive effect in T1, T3, T4 and T5. Industry 1,2 and 4 had a negative effect in T5. Drilling down on each individual seed fund show differences between the funds. While Pub1 had a negative effect in T2 and T3, pub2 had a ditto effect in T1 and T3. Pub4 on the other hand had a positive effect T2-T4.

Regression conducted on companies that decreased sales

Table 18: NOK change in operating income - Regression conducted on companies that decreased sales

*>=5% sign, 10% sign	Natural Logarithm of NOK change in				
	T1	**T2**	**T3**	**T4**	**T5**
AgeInv	0.49*				
PublicRestricted		-8.49*			-17.14*
PublicNotRestricted					
LnOpInc0/LnWage0	-0.26*	-0.50*	-0.51*	-0.73*	-0.61*
LnSales0			0.70*	0.70*	0.81*
OSESXZ	7.25*				
Ind1			10.52*		
Ind2					
Ind4					
Ind5	-7.45*	16.45*			
Pub1		-7.56			
Pub2			-9.59		
Pub3					
Pub4			23.52*		
Pub5		-13.15*	-17.42*		-26.04*
Pub7					
Pub8	12.22*				
Pub9					
Number of observations	177	142	126	103	52
Clustered observations	122	94	88	74	39
R-squared	0.14	0.22	0.28	0.34	0.48

The regression performed on those companies that decreased sales yields the highest R^2, ranging from 0.48 to 0.14. The impact of PublicRestricted is negative in T2 and T5, while higher operating income at the time of investment has a negative impact. Increasing sales on the other hand, had a positive effect. Again, the effect of the individual seed funds varies: Pub1 and Pub2 have negative impact T2 and T3 respectively, Pub5 has negative impact in T2, T3 and T5, while pub4 and pub8 have positive effects in T3 and T1 respectively.

Absolute changes in sales and operating income

Table 19: Absolute changes in sales and operating income

*>=5% sign, 10% sign	Natural Logarithm of NOK change in sales				
	T1	T2	T3	T4	T5
AgeInv		-0.05*	-0.07*		-0.08
PublicRestricted	-1.20*	-1.44*	-1.05*	-1.53*	-1.42
PublicNotRestricted	-1.80*	-1.82*	-1.52*	-2.15*	-0.93
LnOpInc0/LnWage0					
LnSales0	0.15*	0.13*	0.16*	0.13*	0.15*
OSESXZ					
Ind1		0.84*			
Ind2				0.88	1.47*
Ind4					
Ind5					
Number of observations	303	291	256	179	115
Clustered observations	200	186	161	116	76
R-squared	0.25	0.28	0.29	0.31	0.29

*>=5% sign, 10% sign	Natural Logarithm of absolute NOK change in Operating Income				
	T1	T2	T3	T4	T5
AgeInv					
PublicRestricted	-1.03*	-1.51*	-1.36*	-0.95	
PublicNotRestricted		-1.08*	-0.67*	-0.77*	
LnOpInc0/LnWage0					
LnSales0	0.11*	0.10*	0.08*	0.52	
OSESXZ					
Ind1					
Ind2					-1.76*
Ind4					
Ind5	-1.95*	-2.19*	-2.65*	-2.34*	-2.53*
Number of observations	373	349	294	222	132
Clustered observations	242	225	189	148	90
R-squared	0.19	0.21	0.16	0.11	0.15

The above regressions suggest a lower variance in sales and operating income for companies that receive public investments, i.e. that companies with a public investor will have a smaller Natural Logarithm of NOK change in operating income and sales regardless of whether the company's revenues go up or down. Regressing the absolute changes sales and operating income tests if the variance is lower. The results of both regressions show that "PublicRestricted" and "PublicNotRestricted" are negative for T1-T5 for change in sales. For Natural Logarithm of NOK change in operating income, "PublicRestricted" was negative T1-T4 and "PublicNotRestricted" negative from T2 to T4. The explanatory power measured by R^2 ranged between 0.25 to 0.29 for change in sales and 0.11 to 0.21 for change in operating income.

Conclusion

Univariate analysis and descriptive statistics

The analysis of the characteristics of private and public companies at the time of investment shows small differences in the industry and age distributions of investments. Differences are however more notable when studying the financial statements at the time of investment. A higher share of public companies has negative operating income while also having lower sales revenues. Low sales and operating income is what we would expect to see for innovative companies in their early development.

At later development stages of the young innovative company we would expect to see sales rising rapidly and finally also operating income picking up. The aggregate portfolio of public companies did exhibit growth, creating 317 mNOK in additional revenue from year of investment and throughout 2012. However, the variation between portfolio companies was high. Generally, companies receiving investment in 07 and 10 grew the most and these companies also clearly outperformed private companies receiving investment in the same year. The opposite was true for 08 and 09. It is natural to expect that few early stage ventures will grow strongly while the majority will have moderate to no success. Five years after investment 22% of the public companies (and 15% of privates) had increased their sales by more than 25 mNOK and 30% (32 % for privates) by more than 5 mNOK. There are public success stories.

Aggregate operating income of the public portfolio companies receiving investments 2007 to 2009 declined, but increased slightly (4%) for those receiving investments in 2010. A negative operating income is not necessarily an indication of poor company performance, but potentially that the companies not yet have reached the stage where they reap the full benefits of their innovative products. The private companies receiving investment in 2007 had a negative development in operating income, while the opposite was true for the 09-10 companies. The positive debt build up in the public companies is an indication that financial investors believe in the solidity of the business despite negative operating income. The strong build up of the asset side of the balance sheet is an indication of the same but also include equity investors (as equity and debt equals assets). The build up of assets in the public companies was slightly higher than for the private ones (and much higher than the private 2009 investments).

There is little doubt from the data that despite the failure and moderate success of some public portfolio companies, some were successful in terms of revenue growth and investor confidence. The univariate analysis' of the aggregate development is informative in itself, but not very useful to compare public and private companies, as companies differ on a range of characteristics (such as industry, size and age). The regression analysis, however, takes differences into account and therefore serves as a better method of comparison.

Conclusions from Regression analyses

The regression analysis provides significant statistical results on the impact of public ownership and on other variables.

Sales

On one hand the regression results show a tendency that public seed funds have a positive effect on the change in sales revenues given that these revenues decrease. On the other hand the same effect is negative for those companies that increase their sales revenues. The net effect when regressing all companies together is consequently less clear: the positive and negative effects cancel each other out. The tendency is the same for both absolute and relative changes in sales. The pattern observed in the regressions is consistent with the

public seed funds investing in less risky ventures than the rest of the market. Companies that experience smaller changes in sales seem to have more stable demand and/or prices for their products. If costs are moderate and proportional to the magnitude of sales revenues, these companies can be considered less risky investments. Regressing absolute changes in sales confirm the findings: negative coefficients for dummy variables of public ownership indicate that the variance – and thus risk – is lower for publics.

The regression of the impact of each individual seed fund yields more significant coefficients. The overall results indicate a positive effect on sales. This is especially true for Pub1 and Pub4. Regressing companies with decreasing/increasing sales separately give more significant coefficients. The effect on companies that increases in sales is mainly negative for most seed funds except pub4. The effect for companies decreasing their sales is positive for all seed funds except pub9 in T2.

Operating Income
The overall picture is that public ownership has a negative effect on absolute change in operating income, although the effect is not consistent in all time periods. The negative effect of public ownership on companies that increased their sales seems to be larger in magnitude than for those who decrease their sales. The regression controls for industry, age, operating income and sales at time of investment. The overall picture is somewhat consistent with the hypothesis that public seed funds make less risky investments: the portfolio companies seem to have a lower operating income upside. The negative effect on the operating income of companies that decrease their sales might indicate overall lower performance on operating income for publically owned companies, however, the practical significance of the magnitude of the effect draws them into question. Regressing absolute changes in operating income strengthens the evidence that public investments are associated with lower risk: negative coefficients for dummy variables indicating public ownership suggest that the variance – and thus risk – is lower, though the evidence is less convincing than for the effect on sales.

The effect on operating income varies between seed funds, however, whether the portfolio company increased or decreased its sales seem to have less effect. Pub4 has a positive effect on operation income while the other funds have mainly a negative or no effect.

Wage Cost
The effect on wages is not clear. Regressing on all companies we do observe some positive effect on wage costs (i.e. that wages go up) 4 and 5 years after investment. The effect is not present – or actually weakly the opposite – when regressing on companies that increases their sales. The effect is clearest however for those companies that decreased their sales: public ownership has a strong positive effect on wage cost 4 and 5 years after investment given that the sales go down. In short: the publically owned companies does not differ on changes in wages when sales increase, but public ownership has a positive effect on wages when sales decrease. The pattern observed could be consistent with less variable wage policies, i.e. that wages are less dependent on whether the business is successful or not.

The effect of individual seed funds seems to be inline with the overall effect.

Remarks on riskiness of portfolio companies
The regressions on sales and to some extent operating income are consistent with public investments exhibiting less risk than the general market. The regression findings is also consistent with the univariate analysis finding that while a higher share of private companies went bankrupt post investment, the surviving companies on aggregate created a higher percentage increase in sales. The public companies also exhibited a

higher growth in debt than private companies, which is consistent with being less risky as debt financing is mostly used for less risky business.

Global conclusions

The public seed funds have made investments in companies that have created significant value from the year of investment and throughout 2012: over 300 mNOK in sales, 1.1 billion in assets and almost 150 mNOK in wages.

The seeds funds were initiated with a goal of investing in "… innovative, internationally competitive growth companies"[xxi]. The launch of innovative, internationally competitive growth companies often carries significant risk and it would therefore be reasonable to expect that the portfolio companies of the public seed funds also exhibited significant amount of risk. However, both the univariate and regression analysis suggest that the portfolio companies exhibited lower risk than the private comparison sample.

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Appendix

Absolute development in sales: investment year versus TZ

The tables show the sales revenues in the year of investment on the vertical axis and the change in sales from year of investment to year Z on the horizontal axis.

Table 20: Sales Development from T0 to T5

		-100	-50	-10	0	1	5	10	15	20	25	50	100	500
								T5 - T0 Public						
	-100	-	-	-	-	-	-	-	-	-	-	-	-	-
	-50	-	-	-	-	-	-	-	-	-	-	-	-	-
	-10	-	-	-	-	-	-	-	-	-	-	-	-	-
	0	-	-	-	3	2	1	-	-	-	-	-	1	-
	1	-	-	-	5	2	-	-	1	-	-	-	1	-
	5	-	-	-	-	-	2	-	-	-	-	1	-	-
T0	10	-	-	-	-	-	1	-	-	-	-	-	-	-
	15	-	-	-	-	-	-	-	-	-	-	1	-	-
	20	-	-	-	-	-	-	-	1	-	-	-	-	-
	25	-	-	-	-	-	-	-	-	-	-	-	-	-
	50	-	-	-	-	-	-	-	-	-	-	-	-	-
	100	-	-	-	-	-	-	-	-	-	-	-	-	-
	500	-	-	-	-	-	-	-	-	-	-	-	1	-
	Total	-	-	-	8	4	4	-	2	-	-	2	3	-
	Percent	0%	0%	0%	35%	17%	17%	0%	9%	0%	0%	9%	13%	0

T5 - T0 Private

T0	-100	-50	-10	0	1	5	10	15	20	25	50	100	500
-100	-	-	-	-	-	-	-	-	-	-	-	-	-
-50	-	-	-	-	-	-	-	-	-	-	-	-	-
-10	-	-	-	-	-	-	-	-	-	-	-	-	-
0	-	-	-	25	7	6	2	-	1	1	1	-	1
1	-	-	-	6	2	4	-	-	-	-	-	-	2
5	-	-	-	4	-	1	-	-	-	-	-	1	-
10	-	-	-	2	-	2	4	2	-	-	1	-	-
15	-	-	-	1	-	-	-	-	-	1	1	-	-
20	-	-	-	-	-	-	1	-	-	1	1	-	-
25	-	-	2	-	-	-	1	-	-	-	-	1	-
50	-	-	-	-	-	1	-	-	-	1	-	-	-
100	-	-	1	-	-	-	-	-	-	-	1	-	-
500	-	-	1	-	-	1	-	-	1	-	-	1	4
Total	-	-	4	38	9	15	8	2	2	4	5	3	7
Percent	0%	0%	4%	39%	9%	15%	8%	2%	2%	4%	5%	3%	7%

Table 21 : Sales Development from T0 to T4

T4 - T0 Public

T0	-100	-50	-10	0	1	5	10	15	20	25	50	100	500
-100	-	-	-	-	-	-	-	-	-	-	-	-	-
-50	-	-	-	-	-	-	-	-	-	-	-	-	-
-10	-	-	-	-	-	-	-	-	-	-	-	-	-
0	-	-	-	9	4	1	-	-	-	-	-	1	-
1	-	-	-	12	3	2	1	-	-	-	-	1	-
5	-	-	-	3	1	1	1	1	-	-	1	-	-
10	-	-	-	-	-	3	1	-	-	-	-	-	-
15	-	-	-	-	-	-	-	1	-	-	-	-	-
20	-	-	-	-	-	1	-	-	-	-	-	-	-
25	-	-	-	-	-	-	-	1	-	-	-	-	-
50	-	-	-	1	-	-	-	-	-	-	1	-	-
100	-	-	1	-	-	-	-	-	-	-	-	-	-
500	-	-	-	-	-	-	1	-	-	-	-	-	-
Total	-	-	1	25	8	8	4	3	-	-	2	2	-
Percent	0%	0%	2%	47%	15%	15%	8%	6%	0%	0%	4%	4%	0

T4 - T0 Private

T0	-100	-50	-10	0	1	5	10	15	20	25	50	100	500
-100	-	-	-	-	-	-	-	-	-	-	-	-	-
-50	-	-	-	-	-	-	-	-	-	-	-	-	-
-10	-	-	-	-	-	-	-	-	-	-	-	-	-
0	-	-	-	42	3	7	1	-	1	-	1	-	2
1	-	-	-	7	6	3	-	1	1	-	-	1	2
5	-	-	-	5	1	-	-	-	-	-	1	2	-
10	-	-	-	5	1	2	5	1	2	-	-	-	-
15	-	-	1	1	-	-	-	1	-	-	1	-	-
20	-	-	-	1	-	-	1	-	-	1	1	-	-
25	-	-	-	-	-	-	2	-	-	-	3	-	-
50	-	-	-	2	-	-	-	-	-	1	1	-	-
100	-	1	-	-	-	-	1	-	1	-	-	-	-
500	-	2	3	-	-	-	-	-	1	-	1	1	6
Total	-	3	4	63	11	12	10	3	6	2	9	4	10
Percent	0%	2%	3%	46%	8%	9%	7%	2%	4%	1%	77%	3%	7%

Table 22 : Sales Development from T0 to T3

T3 - T0 Public

T0	-100	-50	-10	0	1	5	10	15	20	25	50	100	500
-100	-	-	-	-	-	-	-	-	-	-	-	-	-
-50	-	-	-	-	-	-	-	-	-	-	-	-	-
-10	-	-	-	-	-	-	-	-	-	-	-	-	-
0	-	-	-	8	6	2	-	-	-	-	1	-	-
1	-	-	-	14	6	3	1	-	-	1	1	-	-
5	-	-	-	3	-	2	3	-	2	-	-	-	-
10	-	-	-	2	-	2	-	2	-	-	-	-	-
15	-	-	-	-	-	1	-	-	-	-	-	-	-
20	-	-	-	1	-	-	-	-	-	-	-	-	-
25	-	-	-	-	-	-	-	1	-	-	-	-	-
50	-	-	1	-	-	-	-	-	-	-	1	1	-
100	-	1	2	-	-	-	-	-	-	-	-	-	-
500	-	-	-	-	-	1	-	-	-	-	-	-	-
Total	-	1	3	28	12	11	4	3	2	1	3	1	-
Percent	0%	1%	4%	41%	17%	16%	6%	4%	3%	1%	4%	1%	0%

T3 - T0 Private

T0	-100	-50	-10	0	1	5	10	15	20	25	50	100	500
-100	-	-	-	-	-	-	-	-	-	-	-	-	-
-50	-	-	-	-	-	-	-	-	-	-	-	-	-
-10	-	-	-	-	-	-	-	-	-	-	-	-	-
0	-	-	-	42	9	4	4	3	-	-	2	1	1
1	-	-	-	12	6	5	2	4	-	-	-	-	2
5	-	-	-	6	-	1	1	-	1	-	1	1	1
10	-	-	-	6	-	3	3	5	-	-	-	1	-
15	-	-	1	2	-	-	1	1	-	-	1	-	-
20	-	-	1	1	-	-	1	1	1	-	-	1	-
25	-	-	1	1	-	2	-	-	-	1	1	-	-
50	-	-	3	1	-	-	-	1	1	-	-	1	-
100	-	-	1	-	-	-	-	-	-	-	2	-	1
500	1	2	2	1	-	1	-	-	2	-	1	2	6
Total	1	2	9	72	15	16	12	15	5	1	8	7	11
Percent	1%	1%	5%	41%	9%	9%	7%	9%	3%	1%	5%	4%	6%

Table 23 : Sales Development from T0 to T2

T2 - T0 Public

T0	-100	-50	-10	0	1	5	10	15	20	25	50	100	500
-100	-	-	-	-	-	-	-	-	-	-	-	-	-
-50	-	-	-	-	-	-	-	-	-	-	-	-	-
-10	-	-	-	-	-	-	-	-	-	-	-	-	-
0	-	-	-	12	6	2	1	-	-	-	1	-	-
1	-	-	-	13	12	6	1	-	-	1	-	-	-
5	-	-	-	3	3	9	1	-	-	-	-	-	-
10	-	-	-	2	-	2	2	-	-	-	-	-	-
15	-	-	-	-	-	1	-	-	-	-	-	-	-
20	-	-	-	1	-	-	-	-	-	-	-	-	-
25	-	-	-	-	1	-	-	-	-	-	-	1	-
50	-	-	1	-	-	-	-	-	-	-	2	-	-
100	-	1	2	-	-	-	-	-	-	-	-	-	-
500	-	-	-	-	-	-	-	-	1	-	-	-	-
Total	-	1	3	31	22	20	5	-	1	1	3	1	-
Percent	0%	1%	3%	35%	25%	23%	6%	0%	1%	1%	3%	1%	0%

T2 - T0 Private

T0	-100	-50	-10	0	1	5	10	15	20	25	50	100	500
-100	-	-	-	-	-	-	-	-	-	-	-	-	-
-50	-	-	-	-	-	-	-	-	-	-	-	-	-
-10	-	-	-	-	-	-	-	-	-	-	-	-	-
0	-	-	-	53	8	4	1	2	-	-	2	1	2
1	-	-	-	7	12	6	4	2	-	-	-	1	1
5	-	-	-	5	1	4	-	-	1	1	-	2	1
10	-	-	-	7	3	5	5	1	-	-	-	-	1
15	-	-	1	-	1	2	-	-	2	-	1	-	-
20	-	-	-	-	-	2	1	1	1	2	-	-	-
25	-	-	1	1	-	1	-	-	-	2	1	-	-
50	-	-	2	-	-	1	4	1	-	-	1	1	-
100	-	-	1	1	-	-	-	1	-	-	-	1	1
500	2	3	3	2	-	-	1	1	-	-	1	2	8
Total	2	3	8	76	25	25	16	9	4	5	6	8	14
Percent	1%	1%	4%	38%	12%	2%	8%	4%	2%	2%	3%	4%	7%

Table 24 : Sales Development from T0 to T1

T1 - T0 Public

T0	-100	-50	-10	0	1	5	10	15	20	25	50	100	500
-100	-	-	-	-	-	-	-	-	-	-	-	-	-
-50	-	-	-	-	-	-	-	-	-	-	-	-	-
-10	-	-	-	-	-	-	-	-	-	-	-	-	-
0	-	-	-	15	7	1	-	-	-	-	1	-	-
1	-	-	-	15	12	7	-	-	-	-	-	-	-
5	-	-	-	6	5	5	1	-	1	-	-	-	-
10	-	-	-	1	2	4	-	-	-	-	-	-	-
15	-	-	-	1	-	1	-	-	-	-	-	-	-
20	-	-	-	2	-	-	-	-	-	-	-	-	-
25	-	-	-	1	-	-	-	-	-	-	1	-	-
50	-	-	-	1	-	-	-	1	1	1	-	-	-
100	-	-	3	-	-	-	-	-	-	-	-	-	-
500	-	-	1	-	-	-	-	-	-	-	-	-	-
Total	-	-	4	42	26	18	1	1	2	1	2	-	-
Percent	0%	0%	4%	43%	27%	19%	1%	1%	2%	1%	2%	0%	0%

T0	T1 - T0 Private												
	-100	**-50**	**-10**	**0**	**1**	**5**	**10**	**15**	**20**	**25**	**50**	**100**	**500**
-100	-	-	-	-	-	-	-	-	-	-	-	-	-
-50	-	-	-	-	-	-	-	-	-	-	-	-	-
-10	-	-	-	-	-	-	-	-	-	-	-	-	-
0	-	-	-	61	8	5	-	-	1	1	-	-	3
1	-	-	-	14	16	6	2	1	-	-	1	-	-
5	-	-	-	4	5	4	-	3	-	-	1	-	-
10	-	-	-	10	2	7	2	-	-	-	-	-	1
15	-	-	-	2	1	2	1	-	-	1	-	-	-
20	-	-	-	1	-	2	1	1	1	-	1	-	-
25	-	-	1	-	-	2	-	-	2	-	1	-	-
50	-	-	2	2	1	2	1	1	-	1	1	-	-
100	-	-	1	1	-	-	1	-	1	-	1	-	-
500	1	2	7	1	-	1	-	1	2	-	2	5	3
Total	**1**	**2**	**11**	**96**	**33**	**31**	**8**	**7**	**7**	**3**	**8**	**5**	**7**
Percent	0%	1%	5%	44%	15%	14%	4%	3%	3%	1%	4%	2%	3%

Regression details

The regressions were carried out in Stata statistical software. The results are more than 100-pages and are thus not included in the appendix. However, the detailed results can be obtained by contacting the author.

Stata-commands are included below:

import excel "/Users/simenbergeroby/Desktop/260414_ForStatav18.xlsx", sheet("DataDump") firstrow

tabulate IndSimp, gen(Ind)

tabulate PublicSimp, gen(Pub)

rename DlnSales3 DLnSales3

rename DlnSales2 DLnSales2

rename DlnSales1 DLnSales1

*Regressing relative change in sales

regress DLnSales5 AgeInv i.PublicRestricted i.PublicNotRestricted LnSales0 OSESX5 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

regress DLnSales4 AgeInv i.PublicRestricted i.PublicNotRestricted LnSales0 OSESX4 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

regress DLnSales3 AgeInv i.PublicRestricted i.PublicNotRestricted LnSales0 OSESX3 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

regress DLnSales2 AgeInv i.PublicRestricted i.PublicNotRestricted LnSales0 OSESX2 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

regress DLnSales1 AgeInv i.PublicRestricted i.PublicNotRestricted LnSales0 OSESX1 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

*Regressing absolute change in sales

regress LnDSales5 AgeInv i.PublicRestricted i.PublicNotRestricted LnSales0 OSESX5 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

regress LnDSales4 AgeInv i.PublicRestricted i.PublicNotRestricted LnSales0 OSESX4 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

regress LnDSales3 AgeInv i.PublicRestricted i.PublicNotRestricted LnSales0 OSESX3 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

regress LnDSales2 AgeInv i.PublicRestricted i.PublicNotRestricted LnSales0 OSESX2 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

regress LnDSales1 AgeInv i.PublicRestricted i.PublicNotRestricted LnSales0 OSESX1 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

*Regressing absolute change in Operating Income

regress LnDeltaOpInc5 AgeInv i.PublicRestricted i.PublicNotRestricted LnOpInc0 LnSales0 OSESX5 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

regress LnDeltaOpInc4 AgeInv i.PublicRestricted i.PublicNotRestricted LnOpInc0 LnSales0 OSESX4 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

regress LnDeltaOpInc3 AgeInv i.PublicRestricted i.PublicNotRestricted LnOpInc0 LnSales0 OSESX3 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

regress LnDeltaOpInc2 AgeInv i.PublicRestricted i.PublicNotRestricted LnOpInc0 LnSales0 OSESX2 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

regress LnDeltaOpInc1 AgeInv i.PublicRestricted i.PublicNotRestricted LnOpInc0 LnSales0 OSESX1 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

*Regressing relative change in wage cost

regress DLnWage5 AgeInv i.PublicRestricted i.PublicNotRestricted LnWage0 LnSales0 OSESX5 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

regress DLnWage4 AgeInv i.PublicRestricted i.PublicNotRestricted LnWage0 LnSales0 OSESX4 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

regress DLnWage3 AgeInv i.PublicRestricted i.PublicNotRestricted LnWage0 LnSales0 OSESX3 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

regress DLnWage2 AgeInv i.PublicRestricted i.PublicNotRestricted LnWage0 LnSales0 OSESX2 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

regress DLnWage1 AgeInv i.PublicRestricted i.PublicNotRestricted LnWage0 LnSales0 OSESX1 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

*Regressing absolute change in wage cost

regress LnDWage5 AgeInv i.PublicRestricted i.PublicNotRestricted LnWage0 LnSales0 OSESX5 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

regress LnDWage4 AgeInv i.PublicRestricted i.PublicNotRestricted LnWage0 LnSales0 OSESX4 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

regress LnDWage3 AgeInv i.PublicRestricted i.PublicNotRestricted LnWage0 LnSales0 OSESX3 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

regress LnDWage2 AgeInv i.PublicRestricted i.PublicNotRestricted LnWage0 LnSales0 OSESX2 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

regress LnDWage1 AgeInv i.PublicRestricted i.PublicNotRestricted LnWage0 LnSales0 OSESX1 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

*Regressing relative change in sales on data sorted by whether companies increased of decreased/did not change sales

by SalesDirT5, sort: regress DLnSales5 AgeInv i.PublicRestricted i.PublicNotRestricted LnSales0 OSESX5 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

by SalesDirT4, sort: regress DLnSales4 AgeInv i.PublicRestricted i.PublicNotRestricted LnSales0 OSESX4 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

by SalesDirT3, sort: regress DLnSales3 AgeInv i.PublicRestricted i.PublicNotRestricted LnSales0 OSESX3 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

by SalesDirT2, sort: regress DLnSales2 AgeInv i.PublicRestricted i.PublicNotRestricted LnSales0 OSESX2 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

by SalesDirT1, sort: regress DLnSales1 AgeInv i.PublicRestricted i.PublicNotRestricted LnSales0 OSESX1 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

*Regressing absolute change in sales on data sorted by whether companies increased of decreased/did not change sales

by SalesDirT5, sort: regress LnDSales5 AgeInv i.PublicRestricted i.PublicNotRestricted LnSales0 OSESX5 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

by SalesDirT4, sort: regress LnDSales4 AgeInv i.PublicRestricted i.PublicNotRestricted LnSales0 OSESX4 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

by SalesDirT3, sort: regress LnDSales3 AgeInv i.PublicRestricted i.PublicNotRestricted LnSales0 OSESX3 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

by SalesDirT2, sort: regress LnDSales2 AgeInv i.PublicRestricted i.PublicNotRestricted LnSales0 OSESX2 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

by SalesDirT1, sort: regress LnDSales1 AgeInv i.PublicRestricted i.PublicNotRestricted LnSales0 OSESX1 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

*Regressing absolute change in Operating Income on data sorted by whether companies increased of decreased/did not change sales

by SalesDirT5, sort: regress LnDeltaOpInc5 AgeInv i.PublicRestricted i.PublicNotRestricted LnOpInc0 LnSales0 OSESX5 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

by SalesDirT4, sort: regress LnDeltaOpInc4 AgeInv i.PublicRestricted i.PublicNotRestricted LnOpInc0 LnSales0 OSESX4 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

by SalesDirT3, sort: regress LnDeltaOpInc3 AgeInv i.PublicRestricted i.PublicNotRestricted LnOpInc0 LnSales0 OSESX3 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

by SalesDirT2, sort: regress LnDeltaOpInc2 AgeInv i.PublicRestricted i.PublicNotRestricted LnOpInc0 LnSales0 OSESX2 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

by SalesDirT1, sort: regress LnDeltaOpInc1 AgeInv i.PublicRestricted i.PublicNotRestricted LnOpInc0 LnSales0 OSESX1 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

*Regressing relative change in wage on data sorted by whether companies increased of decreased/did not change sales

by SalesDirT5, sort: regress DLnWage5 AgeInv i.PublicRestricted i.PublicNotRestricted LnWage0 LnSales0 OSESX5 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

by SalesDirT4, sort: regress DLnWage4 AgeInv i.PublicRestricted i.PublicNotRestricted LnWage0 LnSales0 OSESX4 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

by SalesDirT3, sort: regress DLnWage3 AgeInv i.PublicRestricted i.PublicNotRestricted LnWage0 LnSales0 OSESX3 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

by SalesDirT2, sort: regress DLnWage2 AgeInv i.PublicRestricted i.PublicNotRestricted LnWage0 LnSales0 OSESX2 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

by SalesDirT1, sort: regress DLnWage1 AgeInv i.PublicRestricted i.PublicNotRestricted LnWage0 LnSales0 OSESX1 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

*Regressing absolute change in wage on data sorted by whether companies increased of decreased/did not change sales

by SalesDirT5, sort: regress LnDWage5 AgeInv i.PublicRestricted i.PublicNotRestricted LnWage0 LnSales0 OSESX5 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

by SalesDirT4, sort: regress LnDWage4 AgeInv i.PublicRestricted i.PublicNotRestricted LnWage0 LnSales0 OSESX4 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

by SalesDirT3, sort: regress LnDWage3 AgeInv i.PublicRestricted i.PublicNotRestricted LnWage0 LnSales0 OSESX3 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

by SalesDirT2, sort: regress LnDWage2 AgeInv i.PublicRestricted i.PublicNotRestricted LnWage0 LnSales0 OSESX2 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

by SalesDirT1, sort: regress LnDWage1 AgeInv i.PublicRestricted i.PublicNotRestricted LnWage0 LnSales0 OSESX1 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

*Regressing relative change in sales with one dummy variable per public seed fund

regress DLnSales5 AgeInv LnSales0 OSESX5 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

regress DLnSales4 AgeInv LnSales0 OSESX4 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

regress DLnSales3 AgeInv LnSales0 OSESX3 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

regress DLnSales2 AgeInv LnSales0 OSESX2 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

regress DLnSales1 AgeInv LnSales0 OSESX1 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

*Regressing absolute change in sales with one dummy variable per public seed fund

regress LnDSales5 AgeInv LnSales0 OSESX5 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

regress LnDSales4 AgeInv LnSales0 OSESX4 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

regress LnDSales3 AgeInv LnSales0 OSESX3 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

regress LnDSales2 AgeInv LnSales0 OSESX2 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

regress LnDSales1 AgeInv LnSales0 OSESX1 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

*Regressing absolute change in operating income with one dummy variable per public seed fund

regress LnDeltaOpInc5 AgeInv LnOpInc0 LnSales0 OSESX5 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

regress LnDeltaOpInc4 AgeInv LnOpInc0 LnSales0 OSESX4 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

regress LnDeltaOpInc3 AgeInv LnOpInc0 LnSales0 OSESX3 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

regress LnDeltaOpInc2 AgeInv LnOpInc0 LnSales0 OSESX2 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

regress LnDeltaOpInc1 AgeInv LnOpInc0 LnSales0 OSESX1 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

*Regressing relative change in wage costs with one dummy variable per public seed fund

regress DLnWage5 AgeInv LnWage0 LnSales0 OSESX5 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

regress DLnWage4 AgeInv LnWage0 LnSales0 OSESX4 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

regress DLnWage3 AgeInv LnWage0 LnSales0 OSESX3 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

regress DLnWage2 AgeInv LnWage0 LnSales0 OSESX2 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

regress DLnWage1 AgeInv LnWage0 LnSales0 OSESX1 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

*Regressing absolute change in wage costs with one dummy variable per public seed fund

regress LnDWage5 AgeInv LnWage0 LnSales0 OSESX5 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

regress LnDWage4 AgeInv LnWage0 LnSales0 OSESX4 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

regress LnDWage3 AgeInv LnWage0 LnSales0 OSESX3 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

regress LnDWage2 AgeInv LnWage0 LnSales0 OSESX2 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

regress LnDWage1 AgeInv LnWage0 LnSales0 OSESX1 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

*Regressing by increase/decrease in sales:

*Regressing relative change in sales with one dummy variable per public seed fund

by SalesDirT5, sort: regress DLnSales5 AgeInv LnSales0 OSESX5 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

by SalesDirT4, sort: regress DLnSales4 AgeInv LnSales0 OSESX4 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

by SalesDirT3, sort: regress DLnSales3 AgeInv LnSales0 OSESX3 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

by SalesDirT2, sort: regress DLnSales2 AgeInv LnSales0 OSESX2 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

by SalesDirT1, sort: regress DLnSales1 AgeInv LnSales0 OSESX1 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

*Regressing absolute change in sales with one dummy variable per public seed fund

by SalesDirT5, sort: regress LnDSales5 AgeInv LnSales0 OSESX5 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

by SalesDirT4, sort: regress LnDSales4 AgeInv LnSales0 OSESX4 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

by SalesDirT3, sort: regress LnDSales3 AgeInv LnSales0 OSESX3 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

by SalesDirT2, sort: regress LnDSales2 AgeInv LnSales0 OSESX2 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

by SalesDirT1, sort: regress LnDSales1 AgeInv LnSales0 OSESX1 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

*Regressing absolute change in operating income with one dummy variable per public seed fund

by SalesDirT5, sort: regress LnDeltaOpInc5 AgeInv LnOpInc0 LnSales0 OSESX5 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

by SalesDirT4, sort: regress LnDeltaOpInc4 AgeInv LnOpInc0 LnSales0 OSESX4 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

by SalesDirT3, sort: regress LnDeltaOpInc3 AgeInv LnOpInc0 LnSales0 OSESX3 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

by SalesDirT2, sort: regress LnDeltaOpInc2 AgeInv LnOpInc0 LnSales0 OSESX2 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

by SalesDirT1, sort: regress LnDeltaOpInc1 AgeInv LnOpInc0 LnSales0 OSESX1 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

*Regressing relative change in operating income with one dummy variable per public seed fund

by SalesDirT5, sort: regress DLnWage5 AgeInv LnWage0 LnSales0 OSESX5 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

by SalesDirT4, sort: regress DLnWage4 AgeInv LnWage0 LnSales0 OSESX4 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

by SalesDirT3, sort: regress DLnWage3 AgeInv LnWage0 LnSales0 OSESX3 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

by SalesDirT2, sort: regress DLnWage2 AgeInv LnWage0 LnSales0 OSESX2 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

by SalesDirT1, sort: regress DLnWage1 AgeInv LnWage0 LnSales0 OSESX1 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

*Regressing absolute change in wage cost with one dummy variable per public seed fund

by SalesDirT5, sort: regress LnDWage5 AgeInv LnWage0 LnSales0 OSESX5 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

by SalesDirT4, sort: regress LnDWage4 AgeInv LnWage0 LnSales0 OSESX4 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

by SalesDirT3, sort: regress LnDWage3 AgeInv LnWage0 LnSales0 OSESX3 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

by SalesDirT2, sort: regress LnDWage2 AgeInv LnWage0 LnSales0 OSESX2 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

by SalesDirT1, sort: regress LnDWage1 AgeInv LnWage0 LnSales0 OSESX1 i.Ind1 i.Ind2 i.Ind4 i.Ind5 i.Pub1 i.Pub2 i.Pub3 i.Pub4 i.Pub5 i.Pub7 i.Pub8 i.Pub9, vce(cluster Org_Nr)

*Generating variables for absolute values of natural logarithm of sales change

gen absLnDSales5 = abs(LnDSales5)

gen absLnDSales4 = abs(LnDSales4)

gen absLnDSales3 = abs(LnDSales3)

gen absLnDSales2 = abs(LnDSales2)

gen absLnDSales1 = abs(LnDSales1)

*Regressing the absolute logarithm of sales change

regress absLnDSales5 AgeInv i.PublicRestricted i.PublicNotRestricted LnSales0 OSESX5 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

regress absLnDSales4 AgeInv i.PublicRestricted i.PublicNotRestricted LnSales0 OSESX4 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

regress absLnDSales3 AgeInv i.PublicRestricted i.PublicNotRestricted LnSales0 OSESX3 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

regress absLnDSales2 AgeInv i.PublicRestricted i.PublicNotRestricted LnSales0 OSESX2 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

regress absLnDSales1 AgeInv i.PublicRestricted i.PublicNotRestricted LnSales0 OSESX1 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

*Generating variables for absolute values of natural logarithm of operating income change

gen absLnDOpInc5 = abs(LnDeltaOpInc5)

gen absLnDOpInc4 = abs(LnDeltaOpInc4)

gen absLnDOpInc3 = abs(LnDeltaOpInc3)

gen absLnDOpInc2 = abs(LnDeltaOpInc2)

gen absLnDOpInc1 = abs(LnDeltaOpInc1)

*Regressing the absolute logarithm of operating income change

regress absLnDOpInc5 AgeInv i.PublicRestricted i.PublicNotRestricted LnOpInc0 LnSales0 OSESX5 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

regress absLnDOpInc4 AgeInv i.PublicRestricted i.PublicNotRestricted LnOpInc0 LnSales0 OSESX4 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

regress absLnDOpInc3 AgeInv i.PublicRestricted i.PublicNotRestricted LnOpInc0 LnSales0 OSESX3 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

regress absLnDOpInc2 AgeInv i.PublicRestricted i.PublicNotRestricted LnOpInc0 LnSales0 OSESX2 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)

regress absLnDOpInc1 AgeInv i.PublicRestricted i.PublicNotRestricted LnOpInc0 LnSales0 OSESX1 i.Ind1 i.Ind2 i.Ind4 i.Ind5, vce(cluster Org_Nr)