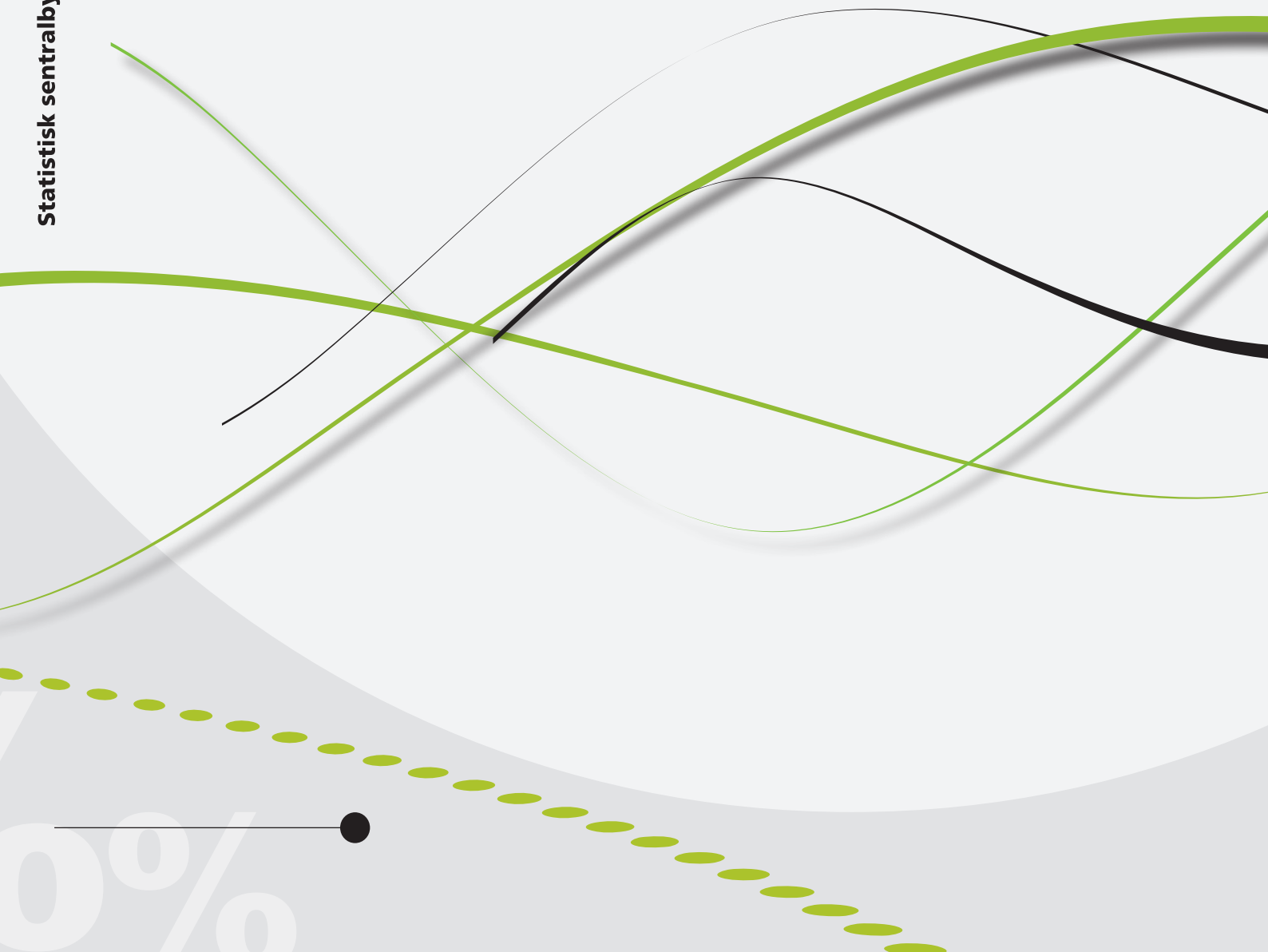Statistics Norway

Statistisk sentralbyrå

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Facts about entrepreneurship in Norway
Who become entrepreneurs and how do they perform?

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Reports In this series, analyses and annotated statistical results are published from various surveys. Surveys include sample surveys, censuses and register-based surveys.

Preface

This report is a part of an ongoing entrepreneurship project conducted at Statistics Norway. The purpose of the project is to obtain in-depth knowledge about entrepreneurship in Norway and serve as a knowledge base for both entrepreneurship research and public policy, e.g. tax policy and government programs targeting start-ups.

Statistics Norway, 4 November 2013.

Hans Henrik Scheel

Abstract

The report focuses on the identification of entrepreneurs and entrepreneurial firms from registry data. We provide characteristics of new firms: their distribution by cohort, industry and size: their survival, growth and productivity patterns and compare the results with corresponding patterns among incumbent firms. We then address key questions regarding who become entrepreneurs and how they perform. We define an entrepreneur as an individual having at least a blocking minority position in a private incorporated company (>33 percent) and who is either an employee or has a formal role (CEO, chairman of the board, or both) in the firm during start-up.

The typical entrepreneur has at least upper secondary education (13−14 years of schooling) when setting up a company. Most entrepreneurs have a background in natural sciences, vocational and technical subjects (34 percent), general programmes (23 percent) or business and administration (19 percent). In the reference population, 13, 38 and 19 percent, respectively, have an education in these fields. In terms of their main income source, 75 percent of new entrepreneurs are wage earners and 16 percent are self-employed prior to becoming entrepreneurs, compared to 85 and 4 percent, respectively, in the reference population.

The share of female entrepreneurs is less than one fifth during the whole period 2001-2011. The much higher entrepreneurship rates for men compared to women have very little to do with educational field; the relative entrepreneurship rate for men are in the range of 3−5 times higher than for women across all main fields of education.

Whereas the number of entrepreneurial firms makes up roughly 3/4 of all new firms in a given cohort, their shares of their cohort's total assets, sales revenues or employment during start-up are roughly 60 percent. Overall, entrepreneurial firms exhibit lower relative size growth (measured in terms of sales revenues and number of employees) than corresponding cohorts of all new firms, whereas new surviving firms grow much faster than surviving incumbent firms. Still, the incumbent firms of 2002 make up 85 percent of total sales revenues in 2011, whereas firms established in 2002−2010 account for 13 percent and firms established in 2011 make up only 2 percent. In terms of labor productivity (value added per employee) growth rates are quite similar between entrepreneurial firms and other (new or incumbent) firms.

Sammendrag

Denne rapporten fokuserer på identifikasjon av entreprenører og entreprenørforetak fra registerdata. Vi gir en beskrivelse av fordelingen av nye foretak etter kohort, næring og størrelse, samt deres overlevelse, vekst og produktivitetsutvikling, og sammenligner med tilsvarende mønstre blant etablerte foretak. Deretter besvarer vi sentrale spørsmål mht. hvem som blir entreprenører og hvordan de lykkes. Vi definerer en entreprenør som en person som har minst blokkerende mindretall i et privat aksjeselskap, og som i tillegg enten er ansatt eller har en formell rolle i foretaket under oppstart (daglig leder, styreformann eller begge).

Den typiske entreprenør har minst videregående, avsluttet utdanning (13−14 år) når han etablerer et foretak. De fleste entreprenører har bakgrunn i naturvitenskapelige fag, håndverksfag og tekniske fag (34 prosent), allemenne fag (23 prosent) eller økonomiske og adminsitrative fag (19 prosent). I referansepopulasjonen har hhv. 13, 38 og 19 prosent en utdanning innenfor disse fagfeltene. Mht. hovedinntektskilde, er 75 prosent av nye entreprenører lønnstakere før de blir entreprenører og 16 prosent er selvstendig næringsdrivende, sammenlignet med hhv. 85 og 4 prosent i referansepopulasjonen.

Andelen kvinnelige entreprenører er i underkant av 1/5 i hele perioden 2001-2011. Den mye høyere entreprenørskapsraten blant menn enn kvinner har veldig lite med utdanningsfelt å gjøre: entreprenørraten er 3−5 ganger høyere for menn enn kvinner innenfor alle utdanningsfelt.

Mens antallet entreprenørforetak utgjør 3/4 av alle foretak innenfor en gitt kohort av nye foretak, utgjør deres andel av kohortens totale aktiva, driftsinntekter og antall ansatte ca. 60 prosent ved oppstart. Generelt viser entreprenørforetak lavere vekstrater målt ved driftsinntekter eller antall ansatte enn tilsvarene kohorter av alle nye foretak, mens nye foretak generelt vokser mye raskere enn etablerte foretak (betinget på at de overlever). Likevel står foretak etablert før 2002 for 85 prosent av totale driftsinntekter i 2011, foretak etablert i perioden 2002−2010 for 13 prosent og foretak etablert i 2011 kun for 2 prosent. Når det gjelder arbeidsproduktivitet (verdiskapning per ansatt), er vekstratene svært like mellom entreprenørforetak og andre foretak (nye og etablerte) når vi betinger på overlevelse.

Contents

1. Introduction

This report focuses on the identification of entrepreneurs and entrepreneurial firms from registry data. We address key questions regarding who become entrepreneurs and how they perform. In particular, we present new facts about the ownership structure of Norwegian firms established during 2001-2011, the socio-economic background of individual entrepreneurs, and the economic outcomes of entrepreneurship (earnings, firm-survival and -growth). Most of the figures presented in this report are based on a novel matching of individual and firm-level data, where the individuals have a relation to the matched firm either through ownership, by having a formal role during start-up of the firm (to be defined below), or by employment.

Due to a lack of adequate data and common agreement on how to define entrepreneurship, empirical analyses of the role of entrepreneurship are often hampered by ad hoc definitions. Parker (2004) writes that "… (defining entrepreneurship)… happens to be one of the most difficult and intractable tasks faced by researchers working in this area" (p. 5). From a theoretical point of view, there appears to be a consensus that entrepreneurship embodies some new business idea(s), an ambition besides mere self-employment, risk taking, and a close relationship between the owner and manager of the firm (see Spilling, 2006). Gartner and Carter (2003) define entrepreneurship as: "the activities of individuals associated with creating new organizations rather than …. maintaining or changing on-going established organizations."[1] It goes without saying that this definition is not useful in empirical analyses.

In empirical work, entrepreneurship has traditionally been associated either with the creation of new firms or with self-employment. However, empirical definitions tend to contradict important characteristics of the entrepreneurship concept in the classical (Schumpeterian) sense.

Firm-based definitions typically do not distinguish between different types of firms according to the background of the founder or whether the firm actually involves any new activity. Many newly created firms often spring directly out of existing firms, e.g. through mergers, acquisitions or judicial reorganizations, or are merely formal entities without real economic activity. The decision to start a firm may also be motivated by tax planning. For example, in Norway tax planning has had a huge influence on the number of firms established in the aftermath of the 2006 tax reform, when dividends became taxable when distributed to individuals (see Alstadsæter and Fjærli, 2009). Thus one cannot indiscriminately consider all new firms, or even new firms founded by individuals, as entrepreneurial.

Self-employment based definitions of entrepreneurship, which are the most common in the international literature, also suffer from severe weaknesses. First, the highest self-employment rates are found in the primary industries, which are generally not considered to be particularly entrepreneurial (and therefore excluded from most analyses of entrepreneurship – which by itself suggests that the definition is not adequate). Second, self-employment is a close substitute for wage employment in professions where setting up a business requires little capital.[2] Finally, self-employment may be an alternative to unemployment or social benefits, rather than to wage employment (see Berglann et al., 2009).

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[1] A similar definition is proposed by the European commission: "… (entrepreneurship means) … an individual's ability to turn ideas into action. It includes creativity, innovation and risk taking, as well as the ability to plan and manage projects in order to achieve objects."

[2] Outside the primary industries; the education groups with the highest self-employment rates are dentists, hairdressers, veterinaries and physiotherapists.

Hamilton (2000) examines differences in the earnings distribution of wage-earners and self-employed persons and finds that self-employed have, cet. par., lower initial earnings and lower earnings growth than wage-earners. The consensus based on existing evidence is that the pecuniary returns are not the driving force of an individual's decision to become self-employed. In accordance with this view, Figure 1 shows that income from self-employment has contributed very little to personal income growth in Norway during the last 20 years, which is in stark contrast to the development in personal wage income.

Figure 1. **Taxable income for residents in Norway, 17 years and older. Average (in NOK), by year, gender and income source**

Source: Statistics Norway

A combination of a firm-based and self-employment based definition is given by Berglann et al. (2009). Their definition is particularly interesting to us since they also use Norwegian registry data. They define an entrepreneur as "either employed in a firm in which he or she directly or indirectly is a major/active owner (defined as either controlling at least 30 percent of the company or controlling at least 10 percent of the company and being a board member or a chief executive) or who runs his or her own business as a sole proprietor." However, this definition also has weaknesses as it mixes two very different groups: the self-employed and the (incorporated) business owners, which, as already indicated, may have very different motivations for becoming "entrepreneurs."

A third definition is used by Hvide (2009), who defines an entrepreneur as "an individual with a majority stake, i.e., more than 50% of the total shares, in a newly established incorporated company." In our opinion, the main weakness of this definition is that it narrows down entrepreneurship to firms that in the large majority of cases are owned by a single person, whereas it contains no condition that the owner participates actively in the operation of the firm.

Our proposed definition combines elements from both the Berglann et al. (2009) and the Hvide definition. For the reasons stated above, we exclude the self-employed and, like Hvide, center on the entrepreneur as an owner of a _new_ incorporated firm. We require that entrepreneurship involves both a need for risk-sharing and for personal ownership and control. Specifically, we define an entrepreneur as having a blocking minority position in a private limited dependent company (>33%) _and_ that he/she is either an employee or has a formal _role_ (CEO, chairman of the board, or both) during start-up. The 33% threshold includes both direct and indirect ownership positions in the firm. The latter is important due to the extensive use of holding companies after the 2006 tax reform. The choice of a threshold necessarily involves some arbitrariness, but our criteria ensure that the entrepreneur retains a certain

degree of control over the firm and, at the same time, is an *active* owner. Both notions are central in most theoretical definitions of entrepreneurship.
The rest of this report is organized as follows. Section 2 describes data sources and our method for identifying ultimate ownership. Section 3 provides characteristics of new firms: their distribution by cohort, industry and size; their survival, growth and productivity patterns; and, in general, compares results with corresponding ones for incumbent firms. Section 4 describes the ownership structure of new firms, e.g. degree of ownership concentration and direct and indirect ownership. Section 5 describes the entrepreneurs in terms of gender composition, demographic background, education and labor market status, and also identifies and provides statistics about serial entrepreneurs. Finally, Section 6 identifies entrepreneurial firms, according to our definition of entrepreneurship, and compares their characteristics with new firms in general.

2. Data sources

We focus our research on private firms registered under the organizational form AS (private limited dependent company) between 2001 and 2011. AS owners are obliged to inject a minimum capital of 100,000 NOK at start-up (which was reduced to 30,000 from 2012) and they have no personal liability for the company's obligations. In this period AS firms account for about 90% of employment in the private sector in Norway[3], excluding the primary industries, as depicted in Figure 2.

Figure 2.   **Share of employment in private limited dependent companies (AS) and sole proprietorship firms (ENK) out of total employment in private firms**
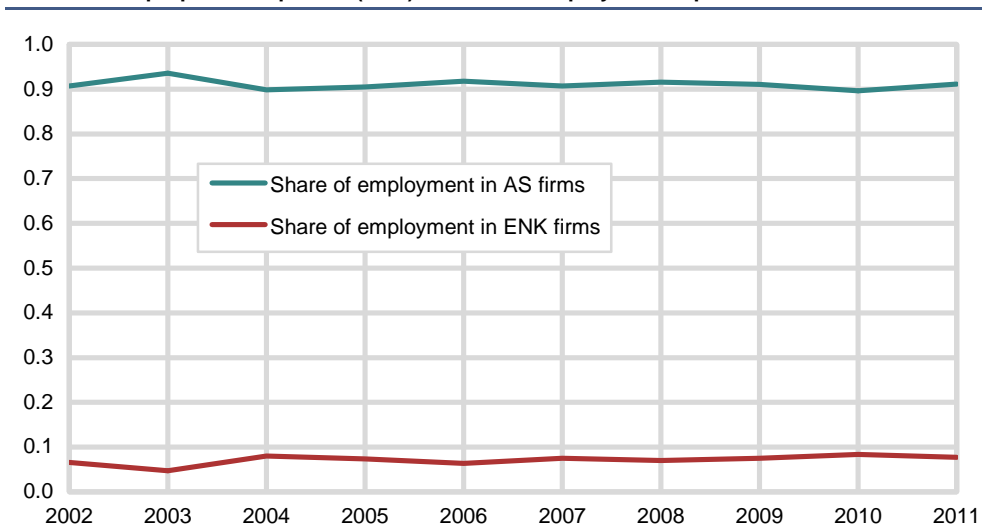
Note: Only firms with the organizational form AS, ENK (Enkeltpersonforetak / sole proprietorship), DA (Selskap med delt ansvar / general partnership with apportioned liability) and ANS (Ansvarlig selskap / general partnership with mutual liability) are included (cf. Footnote 3).

The data sources used for this report are:
- the Household register; which is a register with a wealth of information about individuals and households obtained by merging several primary registers. It contains annual information until 2011 about income, wealth, education and demographic variables for all persons above the age of 18 with permanent residence in Norway[4];

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[3] Norwegian affiliates of foreign firms (NUF) are not included, as we have little information about these firms and their owners. Due to changes in accounting requirements for AS firms taking effect from 2011, the number of firms with the organizational form NUF is rapidly declining.

[4] Persons employed in military or foreign services, living in Svalbard, in prison or in psychiatric hospitals are not included.

- the Directorship register, providing details for each individual appointment in positions such as general manager, chairman or member of the board from 2002 until 2011;
- the Register of employers and employees, with data on employment contract duration, wage and contractual working hours for each employee between 2001 and 2011;
- the Shareholder register, containing information about owners (both individuals and firms) and their shareholdings between 2004 and 2011, as well as a set of data with similar information for the 2001-2003 period[5];
- the Accounts statistics, containing data from the financial statements of AS firms between 2001 and 2011.

The Shareholder register also includes information about the various share classes issued by a firm and held by the same owner. For the purpose of this study, however, differentiating between share classes is not relevant; therefore we aggregate across share types and obtain unique shareholder – share issuer observations. In addition, we exclude all listed firms (those under the organizational form ASA) from our analysis, because they are not entrepreneurial in our sense, but "mature" firms with a very large number of owners.

For more accuracy, we identify both direct and indirect owners, covering relatively complex ownership structures, such as pyramids and ownership chains up to three levels. We find several cases of cross-ownership, when firms simultaneously hold shares in each other. However, as there are few such cases (between 308 cases in 2004 and 429 in 2005) and it is difficult to accurately establish who the ultimate owner is, we exclude cross-ownership cases from our study.

Once these adjustments are made to the Shareholder register, we match the observations where the owner is an individual (direct ownership) with those where the owner is another firm (indirect ownership). We thus eliminate the first intermediary firm and then reapply the matching procedure to eliminate the second intermediary firm. For more than three quarters of the firms, this method identifies all shareholders, indicating that most private firms in Norway are owned directly or through maximum two intermediary firms.

3. Characteristics of new firms and their survival, growth and productivity

3.1. Number of new firms distributed according to cohort, industry and size

Table 1 shows the annual number of newly created firms in the population, by industry. We group firms into cohorts according to their establishment year (*t*) and we define a firm's *first-active* year as the year following the establishment year (*t+1*). The cohorts with the largest number of new firms are 2006 and 2007, due to a tax reform that has led to the creation of many firms, such as holding companies, for tax purposes. The large drop in number of new firms in 2008-2009 is clearly due to the financial crises.

We deal with the effects of the tax reform by defining holding companies as companies with an ownership share of minimum 90% in at least one other firm in their first or second year of activity (if they are missing from the accounting database in the first one).[6] Before performing our analysis, we exclude holding companies

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[5] The ownership data for 2001–2003 were acquired from a private consulting firm, Experian.

[6] This enables us to account for cases when there is a one-year delay between firm registration and the submission of the first accounting statements

from our databases. We also exclude firms in Financial intermediation (but report their numbers in Table 1). These mostly have portfolio investments as their main activity. In addition, we exclude firms with an unspecified industry code. Averaging over all years, 42% of the firms founded operate in Real estate, renting and business activities, about 19% in Wholesale and retail trade, repair of vehicles, personal and household goods, and approximately 11% in Construction. The Manufacturing industry is next, with 5% of the new firms, followed by the industries Financial intermediation, Hotels and restaurants, Other community social and personal service activities, and Transport, storage and communication, each of these sectors comprising about 4% of the new firms. Firms operating in Health and social work account for 3% of the total.

Tables 2-4 display the size distribution by deciles for the 2001−2010 cohorts of firms in their first-active years (2002−2011), with size measured, respectively, as sales revenues, total assets (both in fixed prices), and number of employees. Since firms are established randomly in time throughout their establishment year, the corresponding accounting figures will on average comprise only six months, causing an artificially high increase in firms' growth from the first year to the second. In order to eliminate this bias, the distribution refers to the first-active year, i.e. the year following the establishment year, as explained above. We adjust the numbers in Tables 2−3 for inflation, using the CPI as deflator and 2011 as the base year. The discrepancy between the total number of new firms from Table 1 and the number of observations presented in Tables 2−4 is due to missing values in the accounting data for the omitted firms.

Table 2 reveals considerable variations in sales revenues in the first-active year. The highest average values are achieved in 2002 and 2011, while the lowest values are reported in 2007 and 2008. The two middle deciles, and hence the median, show large fluctuations and reach minimum values in 2008. The upper 10th decile includes firms which are significantly larger than the majority of firms established in each cohort, indicating that most of the revenue creation is concentrated in a small number of large private firms. In fact, from the numbers in Table 2 we derive that the 10% largest firms account for about 65−75% of total sales revenues (over the first-active years), whereas the 20% largest account for 80−85%.

Table 3 is a variation of Table 2 showing the distribution of total assets by decile for each cohort of firms, also in the first-active year. Below the 8th decile, new firms from different cohorts have a similar distribution of assets. More heterogeneity across cohorts is visible among the 20% largest firms.

Table 1.　　Number of newly established firms by establishment year (cohort) and industry

Industry　　　　　　　Cohort	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Agriculture, hunting and forestry	108	52	49	62	85	92	73	49	39	55	63
Construction	522	683	660	835	953	1 157	1 200	1 434	984	1 500	1 667
Education	202	49	49	62	91	71	82	78	59	91	115
Electricity, gas and water supply	39	17	40	46	62	76	102	102	54	87	62
Financial intermediation	285					814	1 107	954	481	905	3
Fishing	177	123	97	97	87	106	104	75	64	81	103
Health and social work	611	187	193	235	460	367	336	259	223	291	282
Hotels and restaurants	413	412	393	353	474	428	400	289	271	439	407
Manufacturing	471	402	426	443	461	464	496	329	308	359	379
Mining and quarrying	53	30	30	26	46	53	51	46	11	33	21
Other community social and personal service activities	678	250	270	262	351	395	424	323	267	396	378
Real estate, renting and business activities	3 632	2 588	2 447	3 240	4 689	6 551	6 114	3 991	2 554	3 920	4 021
Transport, storage and communication	338	361	298	371	451	509	509	370	278	402	387
Wholesale and retail trade, repair of motor vehicles, motorcycles, personal and household goods	1 828	1 629	1 708	1 941	2 010	1 962	1 855	1 362	1 195	1 750	1 566
Total	9 357	6 783	6 660	7 973	10 220	13 045	12 853	9 661	6 788	10 309	9 454
Total without Financial intermediation	9 072	6 783	6 660	7 973	10 220	12 231	11 746	8 707	6 307	9 404	9 451

Table 2. **Distribution of sales revenues (in 1000 NOK) in the first-active year, in fixed 2011 prices**

Deciles	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
1 (10%)	0	0	0	0	0	0	0	0	0	0
2 (20%)	0	0	1	0	0	0	0	0	0	0
3 (30%)	45	84	143	45	1	0	0	0	29	6
4 (40%)	368	437	525	373	168	13	0	66	323	197
5 (50%)	796	872	989	852	631	265	79	441	850	697
6 (60%)	1 328	1 394	1 532	1 460	1 197	783	568	1 065	1 466	1 375
7 (70%)	2 127	2 094	2 277	2 274	1 958	1 475	1 258	1 825	2 314	2 218
8 (80%)	3 407	3 283	3 518	3 502	3 096	2 543	2 281	2 975	3 617	3 624
9 (90%)	6 560	6 167	6 420	6 539	5 549	4 688	4 407	5 369	6 239	6 617
10 (100%)	50 533	33 214	33 705	34 187	30 824	25 436	28 009	30 734	27 639	45 130
Average	6 516	4 754	4 911	4 923	4 342	3 520	3 660	4 247	4 247	5 986
No. of obs.	6 066	6 192	6 073	7 235	9 446	11 039	9 924	7 310	5 689	8 298

Note: The reported numbers in each decile are the mean values of all the observations that fall within that decile. The median is approximately equal to the average of the entries for the 5th and 6th deciles. Table 2 is based on fewer observations than Table 1 because of missing accounting data.

Table 3. **Distribution of assets (in 1000 NOK) in the first-active year, in fixed 2011 prices**

Deciles	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
1 (10%)	80	83	78	82	93	96	84	94	93	86
2 (20%)	223	224	226	235	277	283	263	259	268	258
3 (30%)	390	378	390	420	491	523	499	481	487	485
4 (40%)	599	557	585	650	753	833	785	768	750	756
5 (50%)	866	798	834	954	1 111	1 233	1 210	1 150	1 082	1 124
6 (60%)	1 249	1 143	1 204	1 372	1 652	1 789	1 836	1 708	1 550	1 689
7 (70%)	1 844	1 639	1 749	2 063	2 436	2 736	2 841	2 573	2 265	2 558
8 (80%)	2 813	2 511	2 625	3 286	3 903	4 323	4 631	4 139	3 479	4 053
9 (90%)	5 243	4 513	4 529	6 350	7 567	8 454	8 858	7 741	6 643	7 621
10 (100%) ...	54 213	33 531	31 487	53 378	54 876	68 441	67 094	54 190	46 422	66 623
Average	6 752	4 537	4 370	6 879	7 315	8 871	8 810	7 310	6 303	8 525
No. of obs. ...	6 066	6 192	6 073	7 235	9 446	11 039	9 924	7 310	5 689	8 298

Table 4. **Distribution of number of employees in each cohort in their first-active year**

Deciles	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
1 (10%)	0	0	0	0	0	0	0	0	0	0
2 (20%)	0	0	0	0	0	0	0	0	0	0
3 (30%)	0	0	0	0	0	0	0	0	0	0
4 (40%)	1	1	1	1	0	0	0	0	1	1
5 (50%)	1	1	1	1	1	1	0	1	1	1
6 (60%)	2	2	2	2	1	1	1	1	1	1
7 (70%)	4	3	3	3	2	2	1	2	2	2
8 (80%)	5	5	5	4	4	3	2	3	4	3
9 (90%)	9	9	8	8	6	5	5	6	6	6
10 (100%) ...	48	35	31	37	33	23	27	27	23	32
Average	7	5.6	5.1	5.6	4.7	3.5	3.6	4	3.8	4.6
No. of obs. ...	6 066	6 192	6 073	7 235	9 446	11 039	9 924	7 310	5 689	8 298

Table 4 shows the distribution of number of employees in the first-active year of each cohort. In more than 50% of the cases, number of employees is missing or zero in the data. In these cases we have imputed the variable based on firms' wage costs. Only firms with zero wage costs have zero employees. If the number of employees is missing, but wage costs are positive, we calculate the ratio of the firm's wage costs to the average wage costs per employee in the corresponding year (among firms with positive employment). This ratio is rounded to the nearest (positive) integer to impute the number of employees, which in the large majority of cases in one or two.

Table 4 shows that the average number of employees in the first-active year is between 4 and 7 for most cohorts, whereas the median is 1−2. In most years about 30% of the firms have zero employees, increasing to 40−50% in 2006−2009. This is also consistent with the time patterns in Tables 1−2, and is clearly influenced by firms being established for tax purposes after the 2006 reform, with littele economic activity, and by the financial crises.

Also for number of employees the distribution is heavily skewed with the 10% largest firms creating 60−75% of all jobs in each cohort, measured at the end of their first-active year.[7] Averaging over all the cohorts, we find that 2/3 of all the

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[7] For example, the 2001-cohort created $6066 \times 7 = 42,462$ jobs in total by the end of their first active year (2002). Of these, the number of jobs created by the 10% largest firms is $6066 \times 0.1 \times 48 = 29177$.

new jobs are created by the 10% largest new firms, and 4/5 by the 20% largest
firms.

3.2. Survival and exit of new firms

Figure 3 presents survival and exit rates throughout the period for the 2001-2003
cohorts, as percentages of the total number of firms in each cohort. The three graphs
illustrate survival patterns starting with the first-active year. The exit year is the last
full year when a firm is present in the data. We do not include 2011 in the survival
analysis, to allow for delays in the registrations (exit in year *t* is identified from the
t+1 registers). By the end of 2010, between 50% and 60% of the firms established in
each cohort had survived, and as shown in Figure 3, the percentage of firms who exit
each year is similar. Also the shares of firms exiting due to specific reasons;
bankruptcy, dissolution, mergers and acquisitions, as well as the exit patterns, are
similar across cohorts.

The percentage of firms exiting through bankruptcy fluctuates around 1% through-
out the sample period for all cohorts, with a visible jump in bancruptcy rates in
2004, which was the turning point of the 2002−3 recession, and in 2009 due to the
impact of the finacial crisis.

The share of firms entering a dissolution process is about 1−2% annually throughout
the period. The fewest exits are due to restructuring activities such as mergers and
acquisitions – below 1% of each cohort undergoes such a process in the first three
years of activity. The largest fraction of exits takes place due to reasons which are
not specified in the registers.

Table 5 presents survival and exit rates by industry for firms with first-active year *t*
($t = 2002,...,2007$), after three years of full activity (at *t+3*), pooled across the
cohorts. Most industries have survival rates of over 80% after three years. The
industry with the highest survival rate is Health and social work, with 90% of the
firms still active after three years.

Figure 3.   Firm survival for the 2001-2003 cohorts
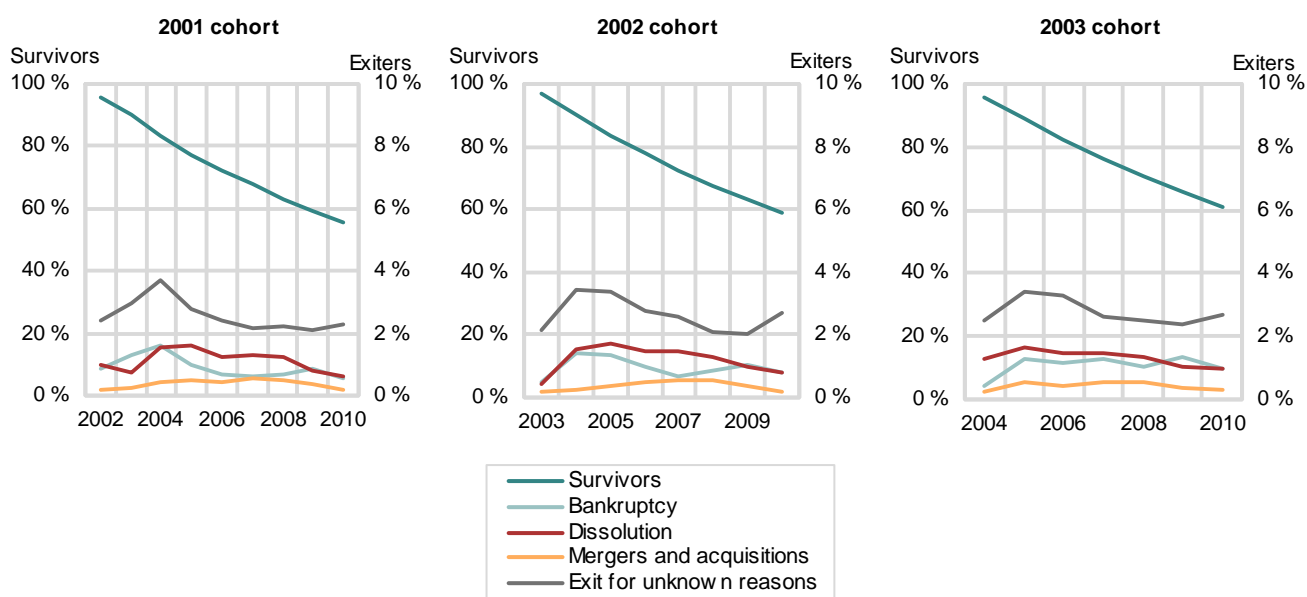
Note: The exit year refers to the last full year of operation

Table 5. **Survival and exit rates (in %) by industry, three years after the first-active year**

Industry	Survival	Bankruptcy	Dissolution	Mergers and acquisitions	Unknown reason for exit
Agriculture, hunting and forestry	87	3	5	1	5
Construction	86	5	3	1	6
Education	85	2	4	1	7
Electricity, gas and water supply	85	1	4	1	8
Fishing	81	2	4	3	10
Health and social work	90	1	4	1	5
Hotels and restaurants	76	7	5	1	11
Manufacturing	84	3	4	2	8
Mining and quarrying	79	0	4	2	14
Other community social and personal service activities	84	3	5	1	8
Real estate, renting and business activities	86	1	3	1	8
Transport, storage and communication	81	2	4	2	11
Wholesale and retail trade, repair of motor vehicles, motorcycles, personal and household goods	78	5	5	1	10

The industries with the lowest survival rates are Hotels and restaurants (76%) and Wholesale and retail trade, repair of motor vehicles, motorcycles and personal and household goods (78%). The industries with the highest bankruptcy rates are Hotels and restaurants (7%), Construction and Wholesale and retail trade (5%). The same industries emerge as dominant when adding up the number of bankruptcy and dissolution cases. There are few mergers and acquisitions − only 1−2% of the firms exit through a take-over.

3.3. Firm dynamics: size and productivity growth

Tables 6 and 7 compare growth rates of new firms from different cohorts. We also include, as a benchmark, growth rates for the population of incumbent firms in 2002, that is, all firms first active *before* 2002 (registered before 2001). The base year is either the first-active year or, for the incumbent firms, 2002. In Tables 6−7 size is measured by total sales revenues and number of employees, respectively. Whereas Tables 6−7 include all firms in the given cohort (or all incumbent firms), regardless of whether the firm exits during the period, the corresponding figures *conditional on survival* are shown in Tables 8−9.

If we look at the new firms (from different cohorts), aggregate sales revenues seem to increase by about 100% over a ten year period. The annual growth rates appear to be quite similar over the different new cohorts. The financial crisis had a visible negative impact on sales growth in 2009. On the other hand, number of employees is remarkably stable over time for each cohort as a whole, with almost zero net growth from the first-active year to 2011. Job destruction due to exits is exactly offset by job creation in surviving firms. If we look at the incumbent firms, they experience an aggregate net job loss of 14% over the period 2002-2011, whereas aggregate sales revenues increase by 68%. Clearly, these figures indicate a very strong productivity growth.

When we condition on survival, the new cohorts of firms have much higher sales revenues and employment growth than the incumbent firms. Over the 9-years observation period sales revenues and employment growth were 120% and 20%, respectively, among the surviving incumbent firms, and roughly 220% and 60%, respectively, for the 2001-cohort. However, there are large variations over time. If we compare 5-years growth from 2006-2011, we find that sales revenues and employment growth were 30% and 10% for incumbent firms, compared to 67% and 30% on average for the 2001-2005 cohorts. Thus we may safely conclude that new firms grow much faster than incumbent firms, when we condition on survival.

Table 6. **Sales revenues in new and incumbent firms relative to a base year, in fixed 2011 prices**

Year	Incumbent in 2002	First active in:									
		2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
2002	1.00	1.00									
2003	1.01	1.08	1.00								
2004	1.13	1.16	1.19	1.00							
2005	1.27	1.25	1.23	1.11	1.00						
2006	1.44	1.41	1.32	1.28	1.27	1.00					
2007	1.48	1.38	1.44	1.39	1.30	1.15	1.00				
2008	1.59	1.59	1.46	1.41	1.29	1.04	.96	1.00			
2009	1.56	1.58	1.48	1.41	1.18	1.09	.99	1.03	1.00		
2010	1.58	1.81	1.62	1.58	1.33	1.14	1.03	1.14	1.09	1.00	
2011	1.68	1.93	1.64	1.65	1.36	1.15	1.11	1.22	1.20	1.21	1.00
No. of firms	117775	6062	6192	6073	7235	9446	11032	989	7295	5676	8246

Note: Total sales in each cohort relative to the base year. The base year is 2002 for the incumbent firms, and the first-active year for the different cohorts of new firms. The last row shows the number of firms in the base year. These values can be higher that the corresponding totals in Table 1 due to missing accounting information in the establishment year.

Table 7. **Number of employees in new and incumbent firms relative to a base year**

Year	Incumbent in 2002	First active in:									
		2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
2002	1.00	1.00									
2003	.95	.96	1.00								
2004	.93	.92	1.02	1.00							
2005	.93	.89	1.02	1.03	1.00						
2006	.93	.90	1.05	1.06	1.05	1.00					
2007	.94	.92	1.06	1.08	1.07	1.14	1.00				
2008	.85	1.03	1.08	1.10	1.10	1.12	1.06	1.00			
2009	.82	.97	1.04	1.05	1.06	1.04	1.02	1.02	1.00		
2010	.87	.97	.99	1.01	1.04	.98	.96	.97	1.02	1.00	
2011	.86	.98	.97	1.00	.99	.96	.95	.99	1.03	1.09	1.00
No. of firms	117775	6062	6192	6073	7235	9446	11032	8989	7295	5676	8246

Note: Total number of employees in each cohort relative to the base year.

Table 8. **Sales revenues in new and incumbent firms relative to a base year, in fixed 2011 prices. Contingent on survival until 2011**

Year	Incumbent in 2002	First active in:									
		2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
2002	1.00	1.00									
2003	1.06	1.18	1.00								
2004	1.26	1.34	1.26	1.00							
2005	1.45	1.51	1.37	1.20	1.00						
2006	1.68	1.78	1.63	1.49	1.36	1.00					
2007	1.77	1.79	1.90	1.70	1.51	1.23	1.00				
2008	1.98	2.23	2.07	1.86	1.62	1.28	1.10	1.00			
2009	1.80	2.32	2.11	1.95	1.56	1.38	1.17	1.14	1.00		
2010	2.01	2.76	2.42	2.29	1.86	1.56	1.32	1.43	1.24	1.00	
2011	2.23	3.19	2.58	2.52	2.08	1.74	1.55	1.68	1.45	1.37	1.00
No. of firms	70471	3153	3345	3444	4324	6327	7640	6993	6046	5100	8246

Note: Only firms that are still operative in 2011 are included.

Table 9. **Number of employees in new and incumbent firms relative to a base year. Contingent on survival until 2011**

Year	Incumbent in 2002	First active in:									
		2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
2002	1.00	1.00									
2003	.99	1.06	1.00								
2004	1.02	1.10	1.10	1.00							
2005	1.06	1.13	1.18	1.11	1.00						
2006	1.10	1.20	1.25	1.23	1.14	1.00					
2007	1.14	1.20	1.32	1.29	1.24	1.16	1.00				
2008	1.07	1.43	1.36	1.32	1.31	1.16	1.06	1.00			
2009	1.05	1.43	1.39	1.35	1.29	1.19	1.10	1.08	1.00		
2010	1.15	1.58	1.46	1.42	1.49	1.25	1.21	1.21	1.14	1.00	
2011	1.20	1.62	1.51	1.49	1.65	1.32	1.32	1.33	1.23	1.15	1.00
No. of firms	70471	3153	3345	3444	4324	6327	7640	6993	6046	5100	8246

Table 10 compares labor productivity growth between new and incumbent firms, conditional on survival. Labor productivity is measured here as value added in fixed prices divided by total number of employees. Value added is the revenues generated by a firm (before taxes) to be distributed among its employees (as

wages) and owners (as dividends or retained earnings). It is not a measure of physical output, but of value creation in monetary terms.

Table 10.   Labor productivity in new and incumbent firms relative to a base year. Contingent on survival until 2011

Year	Incumbent in 2002	First active in:									
		2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
2002	1.00	1.00									
2003	1.17	1.16	1.00								
2004	1.50	1.36	1.10	1.00							
2005	1.78	1.58	1.20	1.18	1.00						
2006	2.05	1.74	1.43	1.34	1.20	1.00					
2007	2.10	1.81	1.57	1.54	1.33	1.10	1.00				
2008	2.08	1.96	1.55	1.40	1.35	1.04	1.12	1.00			
2009	1.66	1.80	1.73	1.57	1.29	1.16	1.03	1.04	1.00		
2010	1.98	2.08	1.90	1.92	1.36	1.28	1.09	1.48	1.08	1.00	
2011	2.02	2.38	1.90	1.77	1.41	1.28	1.22	1.21	1.21	1.12	1.00
No. of firms	43207	2267	2453	2578	2962	3989	4282	3979	3673	3491	5455

Note: Value added subtracting all capital costs divided by number of employees. Calculated by summing over all firms that survive until (at least) 2011 in each cohort, in each year.

Value added can be operationalized as the sum of wage costs and profits (before taxes). We choose to measure profits after subtracting capital costs; both depreciation, debt interests (net financial costs) and (imputed) costs of equity. To impute costs of equity we use the average nominal interest rate on government bonds during 2002–2011, which is 6%. Thus value added is the sum of wage costs and *pure profits* adjusted for inflation. The benefit of using this measure of value added is that 1) it treats all capital symmetrically regardless of how it is financed (by debt or equity), and 2) it makes value added more comparable across firms with different capital intensity.[8]

Productivity growth varies a lot from year to year, e.g. with a clear negative impact of the financial crises 2008-2009. For the 9-years period 2002-2011, labor productivity increased by 100% among incumbent firms and even higher (140%) for the 2001-cohort. The productivity growth rates for the 5-years period 2006-2011, directly obtainable from Table 10, is about 0 for the incumbent firms (bringing to a halt the extreme growth of 105% from 2001 to 2006) and 30%, on average, for the 2001-2005 cohorts. Thus there is evidence that labor productivity growth rates are lower for incumbent firms compared to new ones. In terms of size growth, new surviving firms grow much faster than incumbent firms.

Table 11.   Distribution of sales revenues in 2011, by cohort

Deciles	Incumbent in 2002	First active 2002-2010	First active 2011
1 (10%)	0	0	0
2 (20%)	0	0	0
3 (30%)	0	0	6
4 (40%)	158	96	197
5 (50%)	919	659	697
6 (60%)	2 333	1 561	1 375
7 (70%)	4 775	2 848	2 218
8 (80%)	9 481	4 998	3 624
9 (90%)	21 644	9 732	6 617
10 (100%)	363 996	67 250	45 130
Average	40 330	8 714	5 986
No. of obs.	71 801	50 099	8 298

Table 11 shows the distribution of sales revenues among the firms operating in 2011 according to cohort. The incumbent firms of 2002 still make up 85% of total sales revenues in 2011, whereas firms first active in 2002−2010 account for 13% and firms established in 2010 (first active in 2011) make up only 2%. Interestingly,

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[8] The goal 1) could be achieved also by operationalizing value added as wage costs plus operating profit (profit before interests and taxes), which subtracts no capital costs except depreciation. However, this will not achieve 2). We have calculated labor productivity by using this measure of value added as well. Generally this leads to higher labor productivity growth than in Table 10, but qualitatively the productivity comparisons across different cohorts of firms are the same.

the share of inactive (but formally surviving) firms seems to be stable over the cohorts at 30%, whereas the distribution of sales revenues within each cohort is increasingly skewed with the age of the firms. The 10% largest firms make up 75% of total sales revenues in the cohort of new firms, 73% among the firms first active in 2002−2011, and 90% among the firms that were incumbent in 2002.

4. Characteristics of owners

4.1. Direct and indirect ownership

The procedure applied to identify ultimate owners enables us to differentiate between three levels of ownership. Level 1 represents direct ownership (the individual shareholder owns part of the firm directly), while levels 2 and 3 indicate indirect ownership (there are, respectively, one and two firms acting as intermediaries between the ultimate owner and the firm). For about 80% of the firms during 2001–2003 and 90% during 2004–2009, we identify all shareholders, indicating that most firms in Norway are owned directly or indirectly through only one or two intermediary firms. The difference between the two periods is due to the change in data sources, which enabled a more accurate identification of ultimate owners after 2003. Due to this discrepancy in data sources, we do not include the period 2001–2003 in the analyses of this section. When the total ownership fraction held by individuals identified up to level 3 is less than 100%, we consider the remaining shareholdings as belong to other owner types, such as foreign or institutional investors. Foreigners cannot be identified through a Norwegian personal number, while institutions (such as enterprises in the public sector) or listed (ASA) firms are not included in our database.

We identify about 60% of direct owners as persons (level 1-ownership), while the remaining 40% are other owner types (Figure 4). The effect of the 2006 tax reform is visible in Figure 4, as the share of direct ownership held by individuals declines between 2005 and 2007 and does not reach its 2004 level again in the following years. As far as total ownership (direct plus indirect) in firms established during 2004-2011 is concerned, the share held by individuals in the start-up year is very stable, at about 90%.

4.2. Ownership concentration

To obtain more insight into investment patterns, we analyze the degree of ownership concentration. Tables 12 and 13 display the distribution across firms of the Herfindahl index per deciles, based on owners' total (direct plus indirect) ownership shares at start-up (establishment) year (*t*) and three years later (*t+3*).

The Herfindahl index of owner concentration is defined as $\sum_{i=1}^{n} s_i^2$, where s_i is the ownership share of individual *i* and *n* is the number of individual owners of the firm. For firms with at least one non-personal owner, e.g. an institution, the Herfindahl index reflects only the shares held by the personal owners and therefore in that case the ownership shares will not sum to 1.

The numbers in the tables represent the average ownership concentration for the firms in each decile. The maximum value of the index is 1, which corresponds to the firm being held entirely by one owner. The median value of the Herfindahl index at start-up is 0.5 throughout the period (which corresponds to 2 owners with 50% ownership share each), revealing a high ownership concentration. Firms in later cohorts tend to have more concentrated ownership than firms in earlier cohorts. In 2011, more than 40% of new firms were held by one individual, compared to 20% in 2004. This probably reflects increased popularity of the organizational form AS compared to ENK and NUF (cf. Footnote 3).

Figure 4. Average ownership fraction by owner type, ownership level and cohort
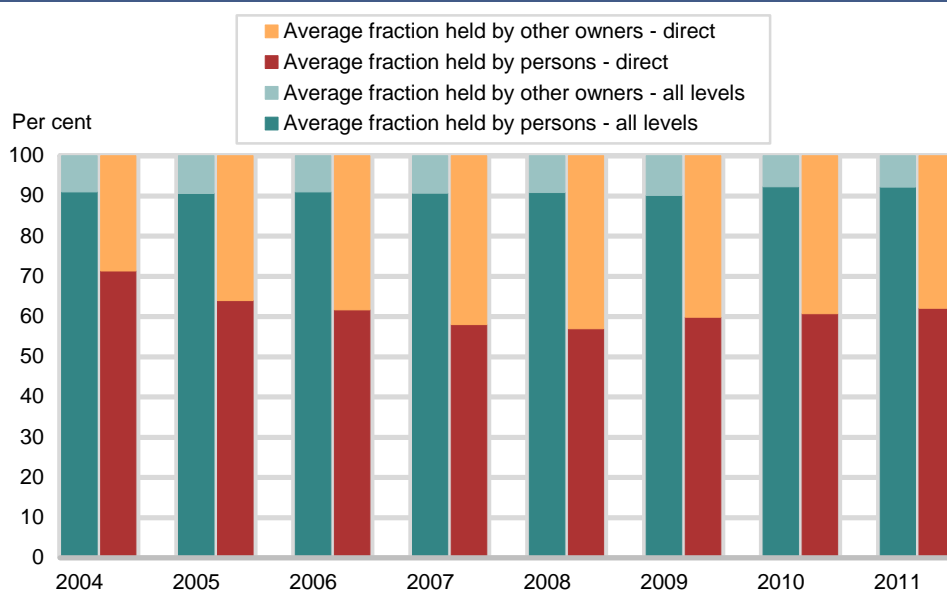
Table 12. Distribution of the Herfindahl index by deciles and cohort, at start-up

Deciles	2004	2005	2006	2007	2008	2009	2010	2011
1 (10%)	0.07	0.07	0.07	0.05	0.05	0.06	0.07	0.08
2 (20%)	0.22	0.23	0.23	0.20	0.20	0.22	0.22	0.24
3 (30%)	0.31	0.33	0.33	0.31	0.31	0.32	0.32	0.35
4 (40%)	0.38	0.46	0.46	0.43	0.44	0.44	0.45	0.49
5 (50%)	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
6 (60%)	0.50	0.55	0.58	0.54	0.55	0.53	0.52	0.65
7 (70%)	0.57	0.97	0.99	0.95	0.97	0.94	0.93	1.00
8 (80%)	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00
9 (90%)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10 (100%)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Average Herfindahl	0.55	0.60	0.61	0.59	0.60	0.60	0.60	0.63
No. of obs.	7 709	9 916	11 906	11 498	8 541	6 105	9 235	9 217

Table 13 follows the 2004-2008 cohorts three years after start-up. The cohorts are very uniform with respect to the degree of ownership concentration at every decile, indicating that initial differences even out after three years of activity. In every cohort, 40% of the firms are held by a single (personal) owner, whereas the median index value is 0.5.

Table 13. Distribution of the Herfindahl index by deciles, three years after start-up

Deciles	2007	2008	2009	2010	2011
1 (10%)	0.06	0.06	0.06	0.06	0.06
2 (20%)	0.22	0.23	0.22	0.23	0.22
3 (30%)	0.34	0.34	0.34	0.34	0.34
4 (40%)	0.48	0.47	0.47	0.48	0.47
5 (50%)	0.50	0.50	0.50	0.50	0.50
6 (60%)	0.73	0.83	0.78	0.78	0.76
7 (70%)	1.00	1.00	1.00	1.00	1.00
8 (80%)	1.00	1.00	1.00	1.00	1.00
9 (90%)	1.00	1.00	1.00	1.00	1.00
10 (100%)	1.00	1.00	1.00	1.00	1.00
Average Herfindahl	0.57	0.75	0.62	0.61	0.60
No. of obs.	8 566	25 699	12 411	13 452	9 655

Tables 14–15 show the relative frequency of firms according to how many owners they have in the establishment year (*t*) and three years later (*t+3*), respectively. Firms with at least one non-personal owner, such as an institution, are included in the "3 or more owners" category. The two tables reveal that throughout the period at least one third of the firms are held by a single owner at start-up (*t*), slightly less than one third have two owners, while the remaining third have three or more owners. After three years, more firms in the later cohorts have a single owner and fewer have two owners.

Table 14.   Number of owners per firm at start-up, by cohort

Number of owners per firm	Share of firms							
	2004	2005	2006	2007	2008	2009	2010	2011
1 owner ………………………	0.28	0.38	0.39	0.37	0.38	0.37	0.37	0.41
2 owners ………………………	0.30	0.27	0.26	0.26	0.25	0.26	0.28	0.26
3 or more owners …………	0.41	0.35	0.35	0.37	0.37	0.37	0.35	0.33

Table 15.   Number of owners per firm three years after start-up, by cohort

Number of owners per firm	Share of firms				
	2007	2008	2009	2010	2011
1 owner ………………………	0.33	0.60	0.42	0.41	0.39
2 owners ………………………	0.27	0.17	0.22	0.22	0.23
3 or more owners …………	0.40	0.23	0.36	0.37	0.37

5. Entrepreneurs

As we discussed in the Introduction, we define entrepreneurs as individuals initially holding a minimum aggregate (direct plus indirect) ownership share of more than 33% in an AS firm in its start-up year and who are either employed in the firm or have a role (CEO, chairman of the board or both) in the establishment year or the year after (first-active year). Throughout this section, we refer to entrepreneurs in the start-up year of the new companies as "new entrepreneurs" − thus "new" refers to the firm, not the person. Some of them might therefore not be "first-time entrepreneurs," but are already founders of existing AS firms (serial entrepreneurs).

5.1. Gender, education, and the demographic background of entrepreneurs

As far as individual owners are concerned, there is an obvious gender imbalance. Table 16 reveals the ownership composition by gender for the 2004-2011 cohorts of new firms at start-up. The share of female owners is very stable across time; only one fifth of the personal owners of new firms are female throughout the period.

**Table 16.   Share of owners of new firms (in %) by gender**

Firm cohort	Male	Female
2004 ……………………………………	79	21
2005 ……………………………………	79	21
2006 ……………………………………	79	21
2007 ……………………………………	79	21
2008 ……………………………………	78	22
2009 ……………………………………	78	22
2010 ……………………………………	78	22
2011 ……………………………………	78	22

Figure 5 shows that the gender difference is maintained even after filtering out non-entrepreneurial owners, as the number of new male entrepreneurs is more than four times higher than that of new female entrepreneurs throughout the entire period. For both genders, the number of new entrepreneurs peaks in 2005, declines afterwards until 2009, and then picks up again.

As seen from Table 17, the typical entrepreneur has at least upper secondary education (13−14 years of schooling) when setting up a company. The distribution of education levels is quite similar for men and women. A few noticeable exceptions include a larger fraction of male entrepreneurs with upper secondary and post-secondary non-tertiary education, as well as a larger share of female entrepreneurs with undergraduate degrees. The share of male entrepreneurs with upper secondary education of at least 13 years or post secondary education (approximately 44%) is larger than the share of male entrepreneurs with tertiary education (33%), while for female entrepreneurs these two fractions are reversed,

at 35% and 42%, respectively. The proportions of entrepreneurs at the different education levels change little over time (not displayed here).

Figure 5.   Number of new entrepreneurs by gender and by cohort
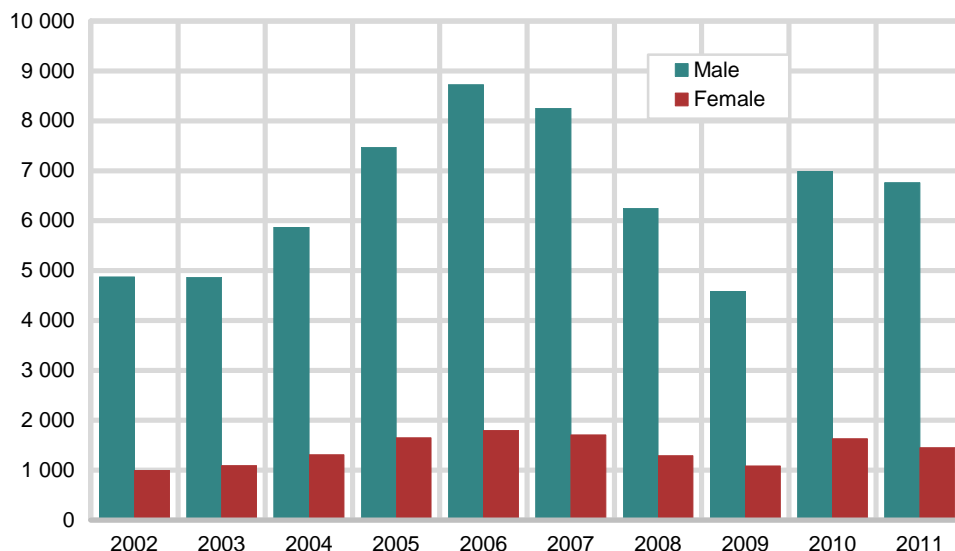
Table 17.   Education level of entrepreneurs at start-up compared with the reference population (in 2011).

Education field	Male entrepreneurs	Female entrepreneurs	Population - males	Population - females
Lower secondary (8-10)	15 %	15 %	27 %	28 %
Upper secondary - basic (11-12)	8 %	7 %	11 %	13 %
Upper secondary - final (13+)	38 %	32 %	33 %	30 %
Post-secondary non-tertiary ed. (14+)	6 %	3 %	4 %	2 %
1st stage of tertiary ed. undergraduate level (14-17)	22 %	30 %	18 %	23 %
1st stage of tertiary ed. graduate level and higher (18+)	11 %	12 %	8 %	5 %

Note: The reference population consists of all employed persons above 18 years who are either wage owners or self-employed. Persons with primary education or unknown education level are excluded

Table 18 shows that most entrepreneurs have a background in natural sciences, vocational and technical subjects, general programmes or business and administration. The least popular education fields among entrepreneurs are primary industries, teacher training and pedagogy, and social science and law. The proportion of entrepreneurs with background in different education fields is stable throughout time. We compare the percentage of entrepreneurs with different educational backgrounds with the percentage of graduates per education field in a reference population consisting of all employed persons above 18 years who are either wage owners or self-employed in 2011.

We find that the shares of entrepreneurs with business and natural sciences education are higher than the percentages of graduates in these fields in the reference population. While 13% and 19% of the individuals in the reference population have an education in, respectively, business and administration and natural sciences, vocational and technical subjects, approximately 19% and 34%, respectively, of the entrepreneurs have such educational backgrounds. In contrast, general programmes are a less frequent education path among entrepreneurs compared to the reference population. Only about 23% of the entrepreneurs have studied a general programme, compared to 38% of the individuals in the reference population. As far as the other education fields are concerned, there are marginal differences between the entrepreneurs and the reference population.

Table 18. Education field of entrepreneurs at start-up compared with the reference population (in 2011)

Education field	Male entrepreneurs	Female entrepreneurs	Population - males	Population - females
General programmes	23 %	25 %	34 %	42 %
Humanities and arts	3 %	10 %	3 %	7 %
Teacher training and pedagogy	2 %	7 %	2 %	5 %
Social science and law	2 %	4 %	2 %	3 %
Business and administration	17 %	21 %	11 %	16 %
Natural sciences, vocational and technical subjects	42 %	6 %	31 %	6 %
Health, welfare and sport	4 %	18 %	3 %	12 %
Primary industries	3 %	1 %	2 %	1 %
Transport and communications, safety and security, and other services	4 %	9 %	4 %	2 %

Note: Individuals with an unspecified education field have been excluded

Table 18 reveals large gender differences in entreprenurship rates. More than 80% of the male entrepreneurs graduate natural sciences, vocational and technical studies; general programmes; or business and administration studies, while about 65% of the female entrepreneurs graduate general programmes; business and administration; or health, welfare and sport studies. The percentage of female entrepreneurs with a degree in general programmes; business and administration; or health, welfare and sport is higher than the share of male entrepreneurs with a degree in these fields. There are also more female entrepreneurs with an educational background in humanities and arts; teacher training and pedagogy; and in transport and communications safety and security and other services. On the other hand, a much higher fraction of male entrepreneurs have a degree in natural sciences, vocational and technical subjects (42% vs 6%).

From Table 18, the probability that a male with a grade from natural sciences, vocational and technical studies is an entrepreneur is 2.17 relative to that of a randomly selected individual from the population.[9] For a woman with the same education, the relative probability that she becomes an entrepreneur is 0.4. The relative probability of becoming an entrepreneur between a male and female from this education group is therefore 2.17/0.4=5.4. The corresponding numbers for male and female graduates from business and administration studies are 2.47 and 0.53, respectively, their relative probability being 4.7. For a male graduate from humanities and arts, the probability that he becomes an entrepreneur relative to a randomly selected individual is 1.6, compared to 0.57 for a female. Thus males have 2.8 times higher probability of becoming entrepreneurs than females in this education group. For graduates from health, welfare and sport studies, the corresponding three numbers are 2.13, 0.6 and 3.6, respectively (in favour of the men), and for general programmes, 1.08, 0.24 and 4.5, respectively. To conclude, the much higher entrepreneurship rates for men compared to women has very little to do with educational field; the relative entrepreneurship rate for men are uniformly much higher (in the range of 3−5 times higher) than for women across all main fields of education.

7% of the entrepreneurs are first generation of immigrants without Norwegian background (the percentage being higher for female entrepreneurs), 4% and 3% are

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[9] Let E be the event that a person is an entrepreneur, and let X denote field of education and G gender. Then the probability that a randomly selected individual with gender G and education field X is an entrepreneur relative to that of a randomly selected individual from the reference population is: $\Pr(E\,|\,G,X)/\Pr(E) = \Pr(G,X\,|\,E)P(E)/\big(\Pr(E)\Pr(G,X)\big) = \Pr(G,X\,|\,E)/\Pr(G,X)$. Moreover, $\Pr(male,X\,|\,E) = \Pr(X\,|\,E,male)\Pr(male\,|\,E) = \Pr(X\,|\,E,male)\times 0.8$ and $\Pr(female,X\,|\,E) = \Pr(X\,|\,E,female)\Pr(female\,|\,E) = \Pr(X\,|\,E,female)\times 0.2$, where we have used that $\Pr(male\,|\,E) = 0.8$. For example, if $X =$ "graduate from natural sciences, vocational and technical studies," then $\Pr(E\,|\,male,X)/\Pr(E) = \Pr(male,X\,|\,E)/\Pr(male,X) = 0.42\times 0.8/(0.31\times 0.5) = 2.17$, where we used that $\Pr(male,X) = \Pr(X\,|\,male)\times 0.5$.

born in Norway with one and respectively, two foreign parents, 1% are born abroad with both parents Norwegian, another 1% are born abroad with only one Norwegian parent, and less than 0.5% are the second generation of immigrants. These results are consistent across genders.

The distribution across family types of new entrepreneurs is also very stable in time. About half of the new entrepreneurs are married and have at least one child living in the same household, while over 20% are single. At the opposite end, single parents constitute the smallest category of entrepreneurs, totaling less than 10 percent. These findings could suggest that married individuals become entrepreneurs more often due to the increased financial stability provided by having two incomes in the same household.

5.2. Serial vs first-time entrepreneurs and the importance of previous employment and ownership status for entrepreneurship

Up to this point, new owners are identified as owners of new firms during the first year of activity, irrespective of whether they are first-time entrepreneurs or not. Table 19 classifies entrepreneurs into serial and non-serial ones according to how many firms they already have founded (before the current one). Serial entrepreneurs are entrepreneurs who have previously founded at least one AS firm with ownership share exceeding 33% at start-up. Table 19 counts the number of new entrepreneurs for each cohort of firms and classifies them according to how many firms they already have founded. Only firms established after 2000 are included in the table. With regard to the share of serial entrepreneurs, there is a clear upward trend in the data until 2010−2011, when it stabilizes at 20% as the impact if left-censoring is lessened.

Complementary to Table 19, Table 20A is a two-way table showing the joint distribution of the main income source and the largest ownership share of entrepreneurs in year *t-1* – the year *before* they become entrepreneurs for the first time (in *t)*. Main income source has four categories: wage income, business income from self-employment, social benefits and capital income (dividends + interest income + realized net capital gains). A person is classified into one of these categories according to which income item is the largest. Largest ownership share refers to previously established AS firms (before *t)* and is either 0, or lies in one of three intervals, as shown in Table 20A. For comparison, Table 20B shows the corresponding distribution for the reference population (see note to Table 17) in 2011. We see that the main source of income is wage income for both first-time entrepreneurs and in the reference population (75% and 85%, respectively). Somewhat surprisingly, ownership in AS firms is less common among first-time entrepreneurs than in the reference population (30% vs. 40%), but self-employment is more common (16% vs. 4%).

Table 19. **Number of (serial) entrepreneurs by number of firms they previously have founded**

	Number of entrepreneurs with >33% ownership share in:			
Cohort	0 firms	1 firm	2 firms	3 or more firms
2003	4 557	82	5	–
2004	5 310	203	15	3
2005	6 835	416	44	9
2006	7 779	667	85	49
2007	7 290	937	156	87
2008	5 529	810	154	98
2009	4 264	639	155	89
2010	6 493	1 108	271	164
2011	6 278	1 182	339	237

Table 20A. **First-time entrepreneurs in year *t* according to their largest ownership share and main source of income in *t-1*, $t \in [2002, 2011]$. Joint distribution, in percent**

Main income source:	Largest ownership share (%)			
	0	(0 – 10]	(10 – 33]	(33 – 100]
Wage income	54	7	4	10
Business income (self-employed) ..	11	2	1	2
Social benefits	2	0	0	0
Capital income	3	1	1	2

Note: Largest ownership share in AS firms established before year *t*.

Table 20B. **Largest ownership share and main source of income in the population (in 2011). Joint distribution, in percent**

Main income source:	Largest ownership share (%)			
	0	(0 – 10]	(10 – 33]	(33 – 100]
Wage income	59	13	4	9
Business income (self-employed)	0	2	1	1
Social benefits	1	5	0	1
Capital income	0	2	0	1

Note: Largest ownership share in AS firms established before 2011.

6. Entrepreneurial firms

We identify entrepreneurial firms as those held by entrepreneurs, according to the definition of entrepreneurship provided in the previous section. Table 21 provides an overview of the entrepreneurial firms founded between 2002 and 2011 according to industry. Among the firms established throughout the entire sample period, 40% operate in Real estate, renting and business activities, 20% in Wholesale and retail trade and 13% in Construction. This pattern is similar to the overall firm creation by industry depicted in Table 1. Compared with 2002, a lower share of new firms is established within Wholesale and retail trade in 2011 and a higher share is founded in Construction, while firm creation is relatively stable in the other industries. In 2006 the Real estate industry reaches a peak, with a share of 48%.

As far as firm size is concerned, at the end of the first-active year, entrepreneurial firms in different cohorts are similarly distributed across deciles, when measuring size as sales revenues (Table 22) or total assets (Table 23). At least 20% of the new entrepreneurial firms in each cohort report zero sales revenues. To some extent, this may be due to sleeping firms. Irrespective of the decile, entrepreneurial firms in the 2008 cohort have lower sales revenues, while those in subsequent cohorts return to normal values.

Table 21. **Number of newly established entrepreneurial firms, by cohort and industry**

Industry Cohort	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Agriculture, hunting and forestry	44	43	54	72	81	68	48	35	51	57
Construction	538	540	702	833	1 003	1 029	1 083	793	1 199	1 294
Education	35	40	44	70	53	70	67	45	77	100
Electricity, gas and water supply	5	12	20	24	36	42	56	17	34	31
Financial intermediation					683	922	806	397	766	1
Fishing	69	62	61	57	80	78	53	50	60	85
Health and social work	152	153	181	402	311	283	219	190	247	235
Hotels and restaurants	284	258	280	358	339	325	225	214	347	327
Manufacturing	253	294	291	321	337	346	240	222	273	287
Mining and quarrying	19	12	15	30	28	29	25	4	21	14
Other community social and personal service activities	177	186	196	273	303	337	247	210	321	302
Real estate, renting and business activities	1 746	1 660	2 266	3 480	4 870	4 350	2 876	1 850	2 934	2 843
Transport, storage and communication	240	200	246	299	345	352	267	188	285	284
Wholesale and retail trade, repair of motor vehicles, motorcycles, personal and household goods	1 190	1 341	1 559	1 633	1 580	1 490	1 120	966	1 397	1 291
Total	4 752	4 801	5 915	7 852	10 049	9 721	7 332	5 181	8 012	7 151
Total without Financial intermediation ..	4 752	4 801	5 915	7 852	9 366	8 799	6 526	4 784	7 246	7 150

Table 22.   Entrepreneurial firms: Size distribution by sales revenues (1000 NOK) in the first-active year, in fixed 2011 prices

Deciles	2003	2004	2005	2006	2007	2008	2009	2010	2011
1 (10%)	0	0	0	0	0	0	0	0	0
2 (20%)	0	10	0	0	0	0	0	0	0
3 (30%)	138	226	104	8	0	0	4	90	25
4 (40%)	490	622	483	243	41	0	178	474	301
5 (50%)	878	1 050	931	702	367	99	627	993	804
6 (60%)	1 348	1 534	1 479	1 220	857	513	1 219	1 554	1 423
7 (70%)	1 959	2 203	2 212	1 911	1 487	1 043	1 932	2 318	2 171
8 (80%)	2 966	3 252	3 309	2 921	2 450	1 711	2 965	3 506	3 424
9 (90%)	5 270	5 504	5 842	4 981	4 223	3 045	5 047	5 818	5 840
10 (100%)	20 202	20 536	26 179	21 947	16 476	15 162	20 061	22 798	24 386
Average	3 325	3 493	4 053	3 393	2 590	2 157	3 203	3 755	3 837
No. of obs.	4 482	4 439	5 432	7 342	8 532	3 135	5 549	4 311	6 449

Table 23.   Entrepreneurial firms: Size distribution by assets (1000 NOK) in the first-active year, in fixed 2011 prices

Deciles	2003	2004	2005	2006	2007	2008	2009	2010	2011
1 (10%)	82	79	83	95	96	72	97	92	87
2 (20%)	213	224	230	269	269	198	255	258	252
3 (30%)	352	377	393	460	479	373	452	453	456
4 (40%)	506	547	591	696	750	573	694	678	682
5 (50%)	718	759	843	1 002	1 080	813	1 011	944	983
6 (60%)	999	1 057	1 190	1 473	1 519	1 184	1 460	1 325	1 431
7 (70%)	1 411	1 496	1 753	2 121	2 212	1 736	2 129	1 878	2 117
8 (80%)	2 048	2 191	2 712	3 260	3 414	2 717	3 281	2 757	3 242
9 (90%)	3 402	3 459	4 855	5 893	6 045	4 849	5 608	4 717	5 627
10 (100%)	17 391	15 787	37 483	33 750	32 512	22 813	26 146	22 409	26 361
Average	2 712	2 597	5 013	4 901	4 837	3 532	4 113	3 551	4 123
No. of obs.	4 482	4 439	5 432	7 342	8 532	3 135	5 549	4 311	6 449

Table 24.   Entrepreneurial firms: Distribution of number of employees in each cohort in their first-active year

Deciles	2003	2004	2005	2006	2007	2008	2009	2010	2011
1 (10%)	0	0	0	0	0	0	0	0	0
2 (20%)	0	0	0	0	0	0	0	0	0
3 (30%)	0	1	0	0	0	0	0	0	0
4 (40%)	1	1	1	1	0	0	0	1	1
5 (50%)	1	1	1	1	1	0	1	1	1
6 (60%)	2	2	2	1	1	1	1	2	1
7 (70%)	3	3	3	2	2	1	2	2	2
8 (80%)	5	5	4	4	3	2	3	4	3
9 (90%)	8	7	7	6	5	3	6	6	6
10 (100%)	23	20	28	20	17	14	19	17	20
Average	4.3	4	4.6	3.5	2.9	2.1	3.2	3.3	3.4
No. of obs.	4 482	4 439	5 432	7 342	8 532	3 135	5 549	4 311	6 449

When comparing firm size at start up for all the new AS firms in the economy with entrepreneurial AS firms, we find that firms in both categories have a similar amount of assets in lower deciles (below the median), while entrepreneurial firms in upper deciles are much smaller than equivalent non-entrepreneurial firms. Whereas the number of entrepreneurial firms make up roughly 3/4 of all firms in a given cohort, their shares of their cohort's total assets, sales revenues or employment in their first-active years are roughly 60% (except in 2008, when these shares drop to below 20%).

Table 24 is comparable to Table 4 (for all new firms) and shows that the average number of employees in the first-active year is between 2 and 5, whereas the median is 1−2. The distribution is heavily skewed, but less so than the distribution for all new firms (Table 4). The 10% largest firms create between 50−65% of all jobs in each cohort (highest in 2008), whereas the 20% largest firms create 70−80%. These numbers are slightly lower than the corresponding numbers for all new firms.

Survival patterns for entrepreneurial firms in the 2002 and 2003 cohorts (Figure 6) are very similar to those for the corresponding cohorts of all new firms, so we do not comment further on these.

Figure 6.   Firm survival for the 2002-2003 cohorts
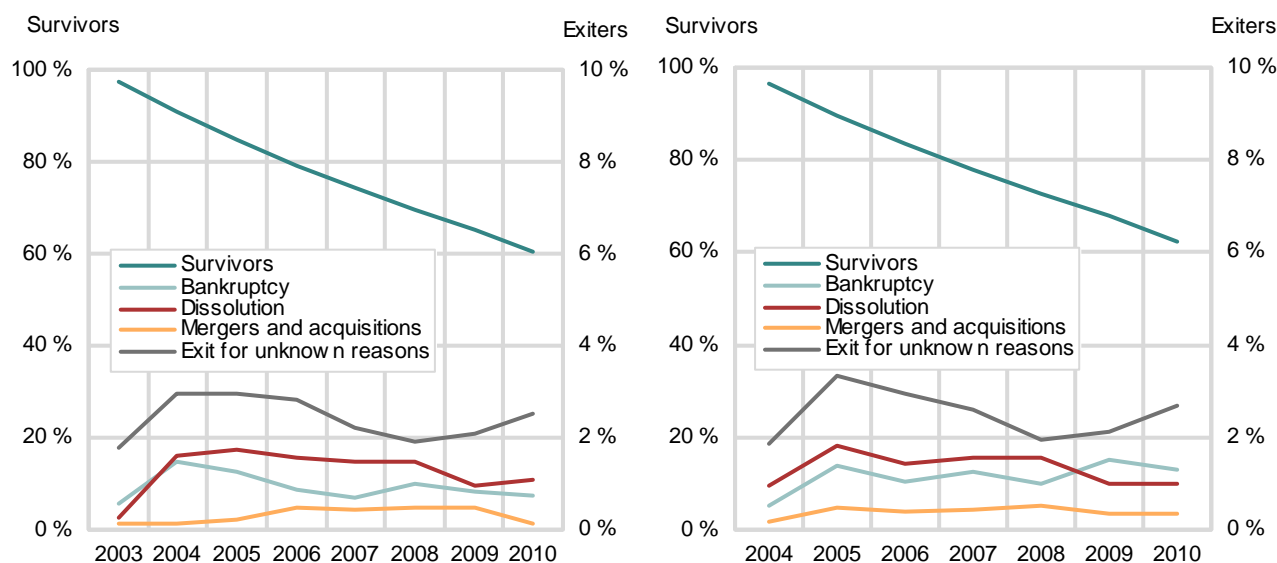

Table 25 is analogous to Table 6. Seen together they offer a comparison of revenue growth rates, cohort by cohort, between entrepreneurial firms and all new firms. With very few exceptions, the cohorts of entrepreneurial firms exhibit lower growth rates than the corresponding cohorts of all new firms, when each cohort is considered as an aggregate unit (obtained by summing sales revenues across all operative firms in each cohort).

Table 25.   Sales revenues in new entrepreneurial firms relative to the first-active year, in fixed 2011 prices

Year	First active in:								
	2003	2004	2005	2006	2007	2008	2009	2010	2011
2003	1.00								
2004	1.11	1.00							
2005	1.20	1.09	1.00						
2006	1.33	1.23	1.16	1.00					
2007	1.40	1.33	1.25	1.13	1.00				
2008	1.40	1.26	1.18	1.03	.97	1.00			
2009	1.35	1.20	1.10	1.03	.92	.98	1.00		
2010	1.45	1.35	1.20	1.11	1.04	1.08	1.09	1.00	
2011	1.55	1.35	1.26	1.14	1.10	1.21	1.14	1.23	1.00
No. of firms	4482	4439	5432	7342	8528	2355	5538	4304	6407

Table 26 and Table 7 provide a similar comparison with regard to number of employees. Here, the patterns are the same for both entrepreneurial and all new firms: For a given cohort, the aggregate number of employees changes very little over the years.

Tables 27 and 28 show, respectively, sales revenues and employment growth rates for entrepreneurial firms *conditional on survival*. Comparing, cohort by cohort, with the corresponding growth rates in Tables 8-9 (for all new firms), we again find similar results. Averaging over the 2002−2005 cohorts, sales revenue and employment growth from 2006−2011 are about 60% and 30%, respectively. This holds for all new firms as well as entrepreneurial firms. Hence, the results regarding labor productivity growth shown in Table 29 are not surprising: The growth rates (cohort by cohort) in Table 29 are very similar to the corresponding growth rates in Table 10 (for all new firms). Averaging over the 2002−2005 cohorts, labor productivity growth from 2006−2011 is about 30%.

Table 26. **Number of employees in new entrepreneurial firms relative to the first-active year**

	First active in:								
Year	2003	2004	2005	2006	2007	2008	2009	2010	2011
2003	1.00								
2004	1.08	1.00							
2005	1.11	1.06	1.00						
2006	1.09	1.10	1.06	1.00					
2007	1.06	1.07	1.07	1.10	1.00				
2008	1.05	1.09	1.05	1.16	1.08	1.00			
2009	1.09	1.03	1.01	1.07	1.03	1.00	1.00		
2010	1.04	1.00	1.00	1.03	.98	1.00	1.03	1.00	
2011	1.02	.96	1.02	1.01	.99	1.06	1.06	1.07	1.00
No. of firms	4482	4439	5432	7342	8528	2355	5538	4304	6407

Table 27. **Sales revenues in new entrepreneurial firms relative to the first-active year, in fixed 2011 prices. Contingent on survival in 2011**

	First active in:								
Year	2003	2004	2005	2006	2007	2008	2009	2010	2011
2003	1.00								
2004	1.19	1.00							
2005	1.38	1.19	1.00						
2006	1.62	1.43	1.26	1.00					
2007	1.84	1.66	1.44	1.20	1.00				
2008	2.01	1.69	1.50	1.23	1.13	1.00			
2009	2.00	1.69	1.44	1.30	1.13	1.19	1.00		
2010	2.24	2.00	1.68	1.49	1.35	1.48	1.24	1.00	
2011	2.57	2.16	1.89	1.65	1.53	1.73	1.40	1.39	1.00
No. of firms	2477	2560	3277	5000	5978	5296	4617	3873	6407

Table 28. **Number of employees in new entrepreneurial firms relative to the first-active year. Contingent on survival in 2011**

	First active in:								
Year	2003	2004	2005	2006	2007	2008	2009	2010	2011
2003	1.00								
2004	1.21	1.00							
2005	1.31	1.12	1.00						
2006	1.34	1.21	1.13	1.00					
2007	1.37	1.24	1.21	1.13	1.00				
2008	1.36	1.27	1.22	1.19	1.09	1.00			
2009	1.49	1.29	1.19	1.21	1.07	1.12	1.00		
2010	1.59	1.41	1.39	1.33	1.21	1.28	1.15	1.00	
2011	1.66	1.45	1.52	1.43	1.33	1.41	1.28	1.14	1.00
No. of firms	2477	2560	3277	5000	5978	5296	4617	3873	6407

Table 29. **Labor productivity in new entrepreneurial firms relative to the first-active year. Contingent on survival until 2011**

	Cohort								
First-active year	2003	2004	2005	2006	2007	2008	2009	2010	2011
2003	1.00								
2004	1.05	1.00							
2005	1.16	1.13	1.00						
2006	1.40	1.25	1.15	1.00					
2007	1.63	1.64	1.31	1.17	1.00				
2008	1.67	1.39	1.25	1.09	1.20	1.00			
2009	1.73	1.50	1.37	1.22	1.02	1.10	1.00		
2010	1.82	1.61	1.36	1.23	1.10	1.20	1.08	1.00	
2011	1.94	1.68	1.40	1.30	1.16	1.26	1.15	1.11	1.00
No. of firms	1844	1982	2323	3247	3495	3192	2978	2783	4397

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