

Econometric Analysis of the Danish Innovation Incubator Programme

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Contents

Executive summary	5
Background	5
Analytical focus of the analysis	5
Earlier highly related analyses	6
The survival and growth of IM-firms	6
Mobility of individuals	6
Scope and limitations of the analysis	7
Data limitations	7
Limitations of the treatment-control analysis design	8
Main findings	8
Sammenfatning	11
Analysens fokus	11
Tidligere resultater	11
Analysedesign	12
1. Introduction	17
1.1 A short description of the Danish Innovation Incubator Programme (Innovationsmiljøordningen)	17
1.2 Theoretical considerations, earlier research and related studies	18
1.2.1 General challenges of venture capital finance	18
1.2.2 Earlier results on Danish venture capital finance	19
1.2.3 Measurement issues of venture capital's potential growth effects	20
1.2.4 Earlier studies on aggregated data	20
1.2.5 Firm-level comparison studies - general issues	21
1.2.6 Earlier results of firm-level comparison studies	21
1.2.7 Potential knowledge spill-overs of high-tech firms	23
1.2.8 There is no convergence in the literature on the effects of venture capital	23
2. Data	24
2.1 The Statistics Denmark data	24
2.2 The Experian data	25
2.3 The presence of IM-firms in the Statistics Denmark register data	25
2.4 The treatment of the raw data prior to the analysis	26
2.5 Data limitations	27
2.6 Basic descriptive statistics	27
3. Survival and growth of IM-firms in comparison with a group of reference firms	31
3.1 Selection of reference firms for the subsequent comparisons	31
3.2 Survival	34
Danish Agency for Science, Technology and Innovation	3

3.3 Employment growth	38
3.4 Turnover developments	43
3.5 Value added developments	47
3.6 Annual Earnings	51
4. Individual mobility and generation of start-ups	55
4.1 Data on individuals in the Statistics Denmark Databases	55
4.2 Job mobility and firm creation	55
4.3 New firm creation by the staff of IM-firms	56
4.4 The number of IM-firm 'spin-offs'	58
4.5 Individual mobility in association with firm exit	58
4.6 Emigration decisions of IM-staff	59
4.7 Short summary of the analysis of individual mobility	60
5. References	62
6. Appendix	64

Executive summary

Background

Externalities to innovation often leave innovators underpaid relative to the value of their inventions, and innovations are often not realized in established organisations but in new firms. This creates a rationale for public investments in small innovative firms, which is reflected in almost every OECD country having one or several support programmes for small innovative firms. Examples include the U.S. *Small Business Innovation Research* (SBIR)-programme or the European-level *EUROSTARS*-programme.

In Denmark, public investments in small innovative firms take different forms. One of the programmes to support small new innovative firms is the Danish Innovation Incubator Programme (*IM-programme, Innovationsmiljøordningen* in Danish). This programme, which is the subject of the present report, was established in 1998, and is under the Danish Agency for Science, Technology and Innovation (DASTI). The programme has a decentralized structure, as it is implemented with a number of different incubators financing newly started innovative firms.¹

The innovation incubators, *Innovationsmiljøer* in Danish, in the following IMs, provide loans and equity finance to newly started firms. The IMs operate in the very early stages of the commercialization process where the risk is high and private investors are reluctant to engage. Until now (2013/2014), approximately 1,000 firms have been found eligible for a total support volume of approximately DKK1.75 billion (€250 million).

Analytical focus of the analysis

The main objective of the IM-programme is to bridge the funding gap in the early and most risky stages of the venture market, by supporting the creation of new innovative firms. As part of its ongoing monitoring of the goal attainment of the IMs, DASTI performs a yearly benchmark analysis on a number of selected key performance indicators.² In addition to the benchmark analyses, DASTI has initiated this present report.³ The purpose of the report is to investigate to what extent the IMs increase the economic performance of the firms in the IM-programme. This question is addressed by analyzing the survival and growth of firms that participate in the IM-programme. Also, the report establishes evidence of whether there is indirect firm creation activity related to the IM-programme. This potential indirect effect of the IM-programme would remain unnoticed in a standard evaluation analysis.

¹ From 2014 to 2017 the programme is operated by four incubators, with main offices at the major Danish cities. BOREAN Innovation (Aalborg), Pre-Seed Innovation (Kgs. Lyngby), Syddansk Teknologisk Innovation (Odense), and CAPNOVA (Aarhus and Roskilde). For further information see <http://ufm.dk/forskning-og-innovation/samspil-mellem-viden-og-innovation/fa-hjaelp-til-kommercialisering/innovationsmiljoer>.

² For further information see <http://ufm.dk/forskning-og-innovation/samspil-mellem-viden-og-innovation/fa-hjaelp-til-kommercialisering/innovationsmiljoer/tal-om-innovationsmiljoer-1>.

³ The present analysis and report is by Johan Kuhn, PhD, who has consulted different Danish and European-level organizations on data-based evaluation practice, and has done a set of similar analyses for the DASTI and the Danish Ministry for Business Affairs.

In sum, the present study considers the survival and growth of start-ups participating in the IM-programme, and the propensity of participating firms and individuals to generate new firms in the wake of IM-firms.

Earlier highly related analyses

The additional effects of the IMs on the economic performance of firms have earlier been evaluated by CEBR (2009). The CEBR-analysis failed to detect any significant differences in the economic performance of IM-firms and a reference group of comparable firms.⁴ This is in line with international studies on venture capital. It is a fact that the IM-programme is costly in the sense of negative financial performance of the IMs, as most loans and investments in the IM-firms need to be written off (Oxford Research, 2013). This again is partly due to low survival rates of the IM-firms.

The present study is similar to the earlier CEBR-analysis. However, the present report gains from more data: for example, the statistical robustness of results benefits from a substantial increase in the number of observations for the present analysis relative to the CEBR-analysis. Also, the richness of the data has increased substantially, including additional performance measures, specific information on, e.g., firm employees' background characteristics, business transitions in association with firm exit, and the option to track individuals' mobility across different firms.

The survival and growth of IM-firms

The present study helps evaluating potential growth effects of the IM-programme by describing the growth in employment, value added, turnover and annual earnings (profits) in participating firms on basis of register data information. In order to estimate any potential additional effects of the IM-programme, the IM-firms' survival and growth is compared with a group of other firm start-ups that do not participate in the programme. This group of other firms is selected such that it resembles the group of participating firms in their observable characteristics.

Mobility of individuals

While the comparison study of IM-programme participants and non-participants is a standard evaluation exercise, the present study also casts light on additional aspects: e.g. to what extent individuals of IM-firms are involved in the startup of other firms. This is possible because Danish register data allows tracking individuals who move from one firm to another firm. This information is used to generate evidence on the mobility of individuals of the IM-firms. Of special interest are the following questions:

- (i) How many new firms are created by the individuals of the IM-firms?
- (ii) What happens to the individuals in IM-firms that close operation? Do they start new firms, or do they return to established organisations?

The first set of questions is motivated by the argument that public investments in innovation might not be good business for society when measured by financial returns and at the level of the participating firm, but good business when one takes into account positive externalities. The present study will by no means be able to establish monetary estimates on these externalities, but it might give a first rough indication of business activity in the wake of IM-firms.

⁴ The CEBR report bases its conclusions on a comparison of firms that participate in the programme with other, similar firms that do not participate.

The second set of questions is partly motivated by the same externality argument. But it is also interesting because of the incentive scheme of the IM-programme encouraging firm closure as a means of getting rid of the IM as an outside owner or the obligation to repay loans. The presence of this incentive is of particular importance to high-tech firms whose assets are often uncodified ideas and knowledge which are easily transferred from one organization to another one. And it might be one of the reasons for the high closure rates of IM- firms.

Also, given that the ambition of many portfolio firms is to compete on global markets, and given that Denmark is a high-tax country, there is a strong incentive for entrepreneurs to move the headquarters abroad by closing operation in Denmark and restarting the firm in countries with more favourable business environments. International mobility of entrepreneurs and staff of high-tech start-ups that close down gives an indication of any significance of this issue.

Scope and limitations of the analysis

This report is to be read as a contribution to our general knowledge of the functioning of the IM-programme. Although the richness and scope of Danish business and other register data is outstanding in an international comparison, there is still a lot we do not know about the IM-firms and other firms in our data.

Data limitations

First, there might be success stories of IM-firms that escape our view by simply not being registered in the data.

However, we are not aware of any anecdotal evidence on salient successes that are not reflected in our data, and there are indeed a number of records in the data with outstanding annual earnings numbers in association with successful transactions of IM-firms. Yet, there is a risk of extreme success stories of the IM-programme not being in the data. So this report might be supplemented with the anecdotal evidence of extreme success stories – if they exist - and related to other success parameters, like IMs' return on investments that reflect these financial successes.

The observation period for the analysis starts in 1999 and ends in 2011 for some parts of the analysis and 2012 for others. So the report cannot describe very early projects of the IM-programme and the developments of the most recent years. And it is important to note that it is not just the case that the analysis might not do justice to some single success stories in case they exist, but, generally, is unable to describe the growth and success of all IM-firms that are not in the register data: A first result of the investigation is that there is a substantial share of IM-firms that never reaches critical size and activity levels to become sampled in the official register datasets, and never hands in any annual financial report to the business authorities that collect the firm-level financial data for our analysis.

So the present report misses the - presumably not very significant - economic activity of these IM-firms when investigating IM-firms' total economic activity, and it might be assumed that it paints a more positive picture of the economic performance of the IM-firms in the sample than otherwise would be the case, simply because it cannot consider the least successful IM-firms.

For the analysis of mobility of the individuals of the IM-firms, a share of missing IM-firms in the registers also implies a limited number of worker-firm relationships in the Statistics Denmark employer-employee databases. This comes on top of a significant share of IM-firms not having any individuals being associated with them in the data and a low representation of IM-firms in the Statistics Denmark registers on firm creation and entrepreneurship.

There is no information in the present analysis' data on whether or not IM-firms would have come to life without the IM-programme and how many of them would have been started if the IM-programme did not exist.⁵ Also, the present analysis on register data can not detect the effects of the IM-programme on firms before they occur in the data for the first time. In sum, the data used for the present analysis is not able to evaluate the potential effects of the IM-programme on firm creation or any potential effects in the time period between creation and being in the data for the first time.

Limitations of the treatment-control analysis design

Finally, part of the following analysis does not just provide an overview of IM-firms' survival and growth, but also compares their survival and growth to other, similar, start-ups. These similar start-ups might help the reader to better evaluate to what extent additional effects of the IM-programme on the performance of IM-firms might exist. But, obviously, there are elements of randomness in the selection of this reference group for comparisons: there is freedom in terms of the formulation of the models behind the selection procedure, the selection is based on a limited set of firm characteristics for firms with missing information in the data, and there is a random selection of firms into the reference group in case of more than one firm being equally qualified for selection into the reference group.

Thus, the reference group should not be taken for more than it is: a point of reference that offers the opportunity to relate the survival and growth of participant firms with other firms that can be shown to be highly similar in a number of observable characteristics like the first year in which they occur in the data, the industry, and financial and other characteristics in the first year in which they occur in the data.

Main findings

Keeping the above-described limitations with respect to data and methodology in mind, the general characteristics of the IM-firms can be summarized as follows:

- i) Approximately one third of the IM-firms do not reach critical mass to become sampled in the Statistics Denmark register databases.
- ii) Approximately 70 percent of the IM-firms under observation leave the data over a twelve-year horizon, where twelve years is the maximum time span that we can follow these firms in the data. More than half of the IM-firms' exits are registered as being bankruptcies.
- iii) In 2011, which is the last year for which there is consistent employment information in the data, IM-firms employ 1,600 individuals. This employment is for its largest part created in association with firm creation: 1,200 of the 1,600 employment relationships are already present at the first time the firms figure in the data.
- iv) After firm creation, there is no sustainable employment growth in IM-firms. Surviving firms grow from on average from 2.5 to six employees over a 10-year time period, but this growth is offset by the exit of other IM-firms. In sum, the aggregate

⁵ Based on a survey, the Oxford Research (2013) report concludes that roughly 50 percent of IM-firms would not have come to life in the (hypothetical) absence of the programme. The relationship between the respondents' answers to this survey question and their performance is an obvious issue for further investigation, but is not part of this report.

employment growth in the group of IM-firms cannot be shown to be positive in the long run.

- v) At the end of the analysis' observation period, IM-firms have an aggregate turnover of approximately DKK2.5 billion and a value added of DKK500 million.⁶
- vi) Although there is a couple of highly successful transactions in our data with annual earnings (profits) well above DKK500 million, in total IM-firms generate an accumulated earnings loss of approximately DKK5 billion over this variables' observation period 1999-2012.

As mentioned, the analysis compares IM-firms with other similar firms of the same industry, started in the same year as the IM-firms and similar in a number of observable characteristics like firm size and share of highly educated individuals in their first year of existence. The comparison with these 'reference firms' gives us the following results:

- vii) IM-firms have higher exit rates from the data, higher closure rates, and higher bankruptcy rates. In the beginning of the observation period, i.e., up to approximately 2006, IM-firms have lower growth in employment, turnover, and value added. Afterwards, they catch up and end up at similar levels at the end of the observation period in 2011 for employment and turnover and 2012 for value added and annual earnings.
- viii) While survival is statistically significantly lower for IM-firms in comparison with the reference group, the growth patterns in the other variables are not statistically distinguishable from each other.
- ix) However, there are more successful firms in the group of IM-firms for firm ages approximately 5 years and above. There is tentative evidence of surviving IM-firms being characterised by lower growth performance in terms of value added and earnings than the reference group in the short run and higher performance in the long run. Yet, it is important to note that these findings are associated with a considerable uncertainty.

The Danish register data link individuals to firms. This allows generating the following findings on the mobility of IM-firms' staff:

- x) IM-firms are characterised by high employee turnover: those firms for which worker-firm relationships (jobs) can be identified in the Danish register data dissolve 40 percent of their jobs per year, which is partly due to firm closures. Not all jobs in IM-firms are the individuals' only occupation: almost 25 percent of the individuals in IM-firms are registered to have other jobs in other firms.
- xi) The analysis finds that, on average, roughly one new firm is started by or with IM-firm employees for each IM-firm in the Statistics Denmark's employer-employee-database (FIDA).
- xii) There are only few new firms in the data that inherit groups of individuals from IM-firms and therefore may be considered 'spin-offs'. So the report finds no evidence of any significant 'spin-off' activity in the wake of IM-firms.

⁶ These numbers hide a large degree of heterogeneity at the level of the individual firm. Individual surviving firms increase their turnover by on average DKK8 million over a 11-year time period, which is the longest time span available for the analysis of turnover. They increase their value added by on average DKK3.5 million over a 11-year period and DKK8.8 million over a 12 year period, where the difference is due to a few highly successful transactions of IM-firms at the very end of the analysis' observation period.

- xiii) Also, it rarely happens that groups of individuals of closed-down IM-firms move to the same other firms. So there are no indications of artificial firm closures, i.e. closures as means of re-organization rather than termination of business. Individuals of closed-down IM-firms rarely move abroad in association with firm closure.

In sum, for the time period under investigation and the data limitations in mind, the present report cannot establish any significant evidence of the IM-programme leading to additional effects on the performance of the IM-firms. In the first years of the IM-programme, IM-firms were characterised by lower performance than the other start-ups in the reference group. More recently, they were catching up; however, the analysis cannot establish evidence on whether this development is a trend or just fortunate coincidence. In order to fully understand this seemingly positive development in the IM-firms' performance, it is recommended to follow the developments in the IM's portfolios in the years to come.

Sammenfatning

Eksternaliteter til innovation medfører, at opfindere og entreprenører ofte er underbetalte i forhold til værdien af deres opfindelser, og at innovationer ofte ikke bliver realiseret i etablerede organisationer, men i nye virksomheder. Disse forhold motiverer offentlig intervention i form af investeringer i små innovative virksomheder, og næsten alle OECD-lande har et eller flere støtteprogrammer til små innovative virksomheder. Som eksempler kan nævnes det amerikanske Small Business Innovation Research (SBIR) program, eller, på europæisk plan, EUROSTARS-programmet.

I Danmark antager offentlige investeringer i små innovative virksomheder forskellige former. Et af programmerne til fremme af små nye innovative virksomheder er Innovationsmiljøordningen (IM-ordningen). IM-ordningen, som foreliggende rapport handler om, blev etableret i 1998 og hører i dag under Styrelsen for Forskning og Innovation (FI). IM-ordningen har en decentral struktur, og bliver implementeret igennem danske Innovationsmiljøer, som er private aktieselskaber, hvor universiteterne direkte eller indirekte indgår i ejerkredsen.

Innovationsmiljøerne finansierer nystartede innovative virksomheder (IM-virksomheder eller porteføljevirkomheder i følgende), typisk i form af indskud af egenkapital (ansvarlig lånekapital/risikovillig kapital). Innovationsmiljøerne opererer i de meget tidlige faser af virksomhedernes liv, hvor risikoen er høj og private investorer ofte holder sig tilbage. Indtil videre (2013/2014) har cirka 1.000 virksomheder modtaget finansiering i størrelsesorden ca. 1,75 milliarder kr.

Analysens fokus

Innovationsmiljøernes primære opgave er at afhjælpe dette *funding gap* i de tidligste og mest risikofyldte faser af det private marked for risikovillig kapital ved at understøtte dannelsen af nye innovative virksomheder. Som en del af dens løbende tilsyn og monitorering af innovationsmiljøerne, udgiver FI en årlig opgørelse (Performanceregnskab) over innovationsmiljøernes aktiviteter opgjort på en række nøgletal.⁷

Som et supplement til de årlige performanceregnskaber har FI bestilt nærværende rapport. Formålet med rapporten er at undersøge, om det kan sandsynliggøres, at innovationsmiljøerne skaber yderligere effekter ift. IM-virksomhedernes økonomiske præstation. Dette spørgsmål søges besvaret ved at sammenligne overlevelseseffekter og en række økonomiske nøgletal for IM-virksomhederne og en referencegruppe af sammenlignelige virksomheder. Derudover undersøges rapporten omfanget af iværksætteraktiviteten blandt de personer, der har været tilknyttet IM-virksomhederne.

Tidligere resultater

Hvorvidt innovationsmiljøerne kan siges at skabe yderligere effekter ift. IM-virksomhedernes økonomiske præstation er tidligere blevet undersøgt af CEBR (2009). CEBR-analysen kunne ikke finde stærke indikationer for tilstedeværelsen af yderligere effekter af IM-ordningen ift. virksomhedernes økonomiske performance.

⁷ For yderligere information se <http://ufm.dk/forskning-og-innovation/samspil-mellem-viden-og-innovation/fa-hjaelp-til-kommercialisering/innovationsmiljoer/tal-om-innovationsmiljoer-1>.

Nærværende rapport har samme metodiske udgangspunkt som CEBR-analysen, men har adgang til mere omfattende data, fx en væsentlig stigning i antallet af observationer. Også informationsmængden i data er øget i forhold til CEBR-analysen, såsom supplerende resultatmål, oplysninger om medarbejderes baggrundsvariabler som f.eks. uddannelse, virksomhedsovergange i forbindelse med virksomhedslukninger, og muligheden for at spore den enkeltes mobilitet på tværs af forskellige virksomheder.

Analysedesign

Nærværende rapport undersøger, om det ved hjælp af registerdata kan sandsynliggøres, at innovationsmiljøerne skaber yderligere effekter ift. IM-virksomhedernes overlevelse og økonomiske præstation, ved at sammenligne væksten i beskæftigelse, værditilvækst, omsætning og indtjening (profit) for IM-virksomheder og en referencegruppe af sammenlignelige virksomheder, der ikke har deltaget i IM-ordningen. Referencegruppen er udvalgt så de ligner IM-virksomhederne på en række observerbare karakteristika.

De tidligere resultater fra CEBR-analysen vedrørende tilstedeværelsen af yderligere effekter af IM-ordningen er i overensstemmelse med de foreliggende internationale undersøgelser af risikovillig kapital. Dog er det et faktum, at IM-ordningen er underskudsgivende i den forstand, at de fleste investeringer i portefølje-virksomhederne skal afskrives med lave finansielle tilbageløb til følge (Oxford Research, 2013). Dette skyldes til dels lave overlevelsesser blandt porteføljeselskaberne. På den anden side, så vides lidt om de potentielt positive effekter af IM-ordningen, f.eks. ift. vækst, innovation, eller iværksætteraktiviteten blandt individerne tilknyttet IM-virksomhederne. Nærværende analyse belyser følgende valg af aspekter:

- (i) Overlevelse og vækst af nystartede virksomheder, der deltager i IM-ordningen. Dette bygger videre på tidligere CEBR-analyse.
- (ii) Tilbøjelighed af IM-virksomheders enkeltindivider til at skabe nye virksomheder i kølvandet af IM-virksomhederne.

Mens selve sammenligningen af deltagende og ikke-deltagende virksomheder er en standard evalueringssøvelse, så kaster undersøgelsen også lys på, i hvilket omfang individerne bag IM-virksomheder skaber nye virksomheder. Dette belyser iværksætterdynamikken blandt projektdeltagerne og er mulig, da de danske registerdata tillader at følge individer, der flytter fra et firma til et andet. Disse oplysninger bruges til at dokumentere mobiliteten blandt IM-virksomhedernes individer.

Af særlig interesse er, hvor mange nye virksomheder er skabt af individerne i IM-virksomheder. Dvs. om IM-virksomheder genererer "spin-off" virksomheder, og hvis ja, hvor mange? Derudover ser rapporten nærmere på, hvad der sker med de individer, som forlader IM-virksomheder, f.eks. når disse lukker. Starter de nye virksomheder, eller vender de tilbage til etablerede organisationer?

Svaret på disse spørgsmål skal give et fingerpeg om omfanget af eventuelle positive eksterne effekter af IM-ordningen ift. iværksætteraktivitet. Argumentet bag er, at de offentlige investeringer i innovation måske ikke er en overskudsforretning for samfundet målt ved det økonomiske afkast for deltagende virksomheder, men en god forretning, når der tages hensyn til de positive afledte effekter, som f.eks. dannelse af nye virksomheder. Nærværende undersøgelse er på ingen måde i stand til at generere monetære estimater på disse eksterne effekter, men giver en første grov indikation af niveauet af iværksætteraktiviteten i kølvandet af IM-virksomhederne.

At belyse medarbejdermobilitet i IM-virksomhederne er også interessant, da IM-ordningens investeringer i form af risikovillig kapital måske kan tilskynde lukninger af virksom-

heder, hvor iværksætteren ”sætter eksterne ejere uden for døren”. Dette incitament kunne være af særlig betydning for højteknologiske virksomheder, hvis aktiver ofte er ideer og viden, som let kan overføres fra en virksomhed til en anden. Derudover kan kombinationen af at mange IM-virksomheder sigter efter globale markeder og et forholdsvis højt skattetryk i Danmark medføre at iværksættere flytter udenlands ved at lukke operation i Danmark og genstarte selskaberne i lande med et gunstigere forretningsmiljø. Så et kig på international mobilitet af iværksættere og ansatte i de højteknologiske nystartede IM-virksomheder giver en indikation af betydningen af denne problemstilling.

Afgrænsning

Denne analyse skal læses som et bidrag til den generelle viden om IM-ordningen. Selvom omfanget af datamaterialet bag analysen er enestående i en international sammenligning, så skal begrænsninger i informationsmængden holdes in mente ved fortolkning af analysens resultater.

For det første kan der være succes historier blandt IM-virksomheder, som undslipper analysen ved ikke at være registreret i data; umiddelbart vides dog ikke noget om anekdotiske succeser, som ikke er med i analysens data. Og der er faktisk en række observationer i analysens data med udestående årlige indtjening, typisk i forbindelse med vellykkede transaktioner i mest biotek branchen som f.eks. salg af licenser. Men der er altid en risiko for at succes historier fra IM-ordningen ikke er i data grundet bogføringsmæssige forhold. Denne rapport kan altså med fordel suppleres med cases af ekstreme succes historier - hvis de findes - og kan med fordel relateres til andre parametre, som fx innovationsmiljøernes finansielle afkast (beskrevet i Oxford Research, 2012), der afspejler disse finansielle succeser.

Analysens observationsperiode er 1999 og frem til 2011 for nogle variable og 2012 for andre. Så data kan ikke beskrive de allerførste projekter, som er iværksat før 1999 derudover mangler data efter 2012. Det er også vigtigt at bemærke, at analysen ikke er i stand til at beskrive vækst og succes i en forholdsvis stor delmængde af små IM-virksomheder: et første resultat af undersøgelsen er nemlig, at en væsentlig andel af IM-virksomheder aldrig når den kritiske størrelse og aktivitetsniveau til at blive samlet i Danmarks Statistiks officielle registerdatasæt, og aldrig afleverer en årsrapport til Erhvervsstyrelsen, der står bag de finansielle oplysninger på virksomhedsniveau for analysen.

Dermed misser analysen den økonomisk aktivitet i disse IM-virksomheder, som formentlig ikke er særlig stor, når den ser på den samlede økonomiske aktivitet i IM-virksomheder. Yderligere må det forventes, at analysen tegner et mere positivt billede af IM-ordningens potentielle bidrag til deltagende virksomheder, end det ellers ville være tilfældet - simpelthen fordi analysen ikke betragter de mindst succesrige IM-virksomheder, som aldrig når ind i datamaterialet.

For så vidt angår analysen af mobiliteten af IM-virksomheders medarbejdere, er det væsentligt at have in mente, at en betydelig andel af IM-virksomhederne ikke har individer tilknyttet i Danmarks Statistiks iværksætter- eller medarbejder-databaserne.

Data siger heller ikke noget om, hvorvidt IM-virksomhederne ville være etableret uden tilstedeværelse af IM-ordningen, dvs. hvor mange af dem ville være startet i en hypotetisk situation, hvor IM-ordningen ikke fandtes.⁸ Og en analyse på registerdata kan naturligvis ikke finde eventuelle effekter af IM-ordningen for virksomhederne, inden de optræder i data første gang. Dermed er analysen ikke i stand til at beskrive programmets eventuelle betydning for virksomhedsopstart og potentielle effekter i perioden mellem opstart og tidspunktet hvor virksomheden optræder i data for første gang.

⁸ Dog viser en spørgeskemaundersøgelse foretaget blandt IM-virksomhederne, at omkring 50% ikke ville være startet uden hjælp fra innovationsmiljøerne, Oxford Research (2012).

Endelig giver en væsentlig del af følgende analyse ikke bare et overblik over IM-virksomhedernes overlevelse og vækst, men sammenligner deres overlevelse og vækst med andre lignende nystartede virksomheder (referencegruppen). Denne sammenligning kan hjælpe ved vurderingen af, i hvilket omfang IM-virksomhedernes præstation skal betragtes som tilfredsstillende.

Men referencegruppen bør ikke tages for mere end den faktisk er: et referencepunkt, der giver mulighed for at forholde sig til spørgsmålet, om overlevelse og vækst i deltagende virksomheder er på højde med andre virksomheder, som kan vises at være meget lig i en række observerbare karakteristika, f.eks. deres første år, hvor de optræder i de data, deres industri, uddannelsesniveau og en række finansielle variable i det første år, hvor de optræder i data.

Resultater

Med de ovenfor beskrevne begrænsninger ift. data og metode in mente kan resultaterne fra den deskriptive analyse opsummeres som følgende:

- i) Ca. en tredjedel af alle IM-virksomheder opnår ikke den kritiske minimum-aktivitet til at optræde i Danmarks Statistiks registrerdatabaser.
- ii) Ca. 70 procent af IM-virksomhederne forlader stikprøven over en 12-årig tidshorisont, hvor 12 år er den maksimale tidsperiode, som vi kan følge IM-virksomhederne i data. Mere end halvdelen af disse virksomhedsophør er registreret som at være konkurser.
- iii) I 2011, som er det sidste år, for hvilket der er konsistente informationer vedrørende beskæftigelsen i data, beskæftiger IM-virksomheder ca. 1.650 individer. Denne beskæftigelse er størstedels skabt i forbindelse med virksomhedsopstart: Ca. 1.200 ansættelsesforhold er allerede til stede første gang virksomhederne optræder i data.
- iv) Når virksomheder følges over tid, finder analysen, at IM-virksomheder som helhed ikke generer vedvarende vækst i beskæftigelsen. Overlevende virksomheder vokser fra i gennemsnit fra 2,5 til seks medarbejdere i løbet af en 10-års periode, men denne vækst opvejes af jobtabet i andre IM-virksomheder, som lukker. Sammenfattende kan den samlede vækst i beskæftigelsen for IM-virksomheder ikke vises at være positiv i det lange løb.
- v) I slutningen af observationsperiode måles IM-virksomhedernes samlede årlige omsætning til at være på ca. 2,5 milliarder kr. og deres værditilvækst (dækningsbidrag) til 500 millioner kr.⁹
- vi) Selvom der er en række meget vellykkede transaktioner i analysens data med årlige indtjening (profit) over 500 millioner kr., så måles IM-virksomhederne som helhed at generere et akkumuleret finansielt tab på ca. 5 milliarder kr. over perioden 1999-2012.

⁹ Disse tal skjuler en stor grad af heterogenitet blandt de enkelte IM-virksomheder. Overlevende IM-virksomheder øger deres omsætning med 8 millioner kr. i gennemsnit over en 11-årig periode. Overlevende IM-virksomheder øger i gennemsnit deres værditilvækst med 3,5 millioner kr. over en 11.-årig periode og 8,8 millioner kr. over en 12-årig periode, hvor forskellen skyldes nogle få meget vellykket transaktioner blandt IM-virksomhederne i slutningen af observationsperioden.

Som nævnt, så sammenligner analysen IM-virksomheder med en referencegruppe af tilsvarende virksomheder, som er i samme branche, startet i samme år som IM-virksomheder og er sammenlignelig i en række andre observerbare karakteristika.

- vii) I sammenligning med referencegruppen forlader en højere andel af IM-virksomheder datamaterialet over observationsperioden, og IM-virksomheder er kendetegnet ved højere andele af virksomhedslukninger og konkurser. IM-virksomheder har i begyndelsen af observationsperioden, dvs. op til ca. 2006, en lavere samlet vækst i beskæftigelsen, omsætning og værditilvækst. Bagefter haler de ind og ender på omtrent samme niveau ved afslutningen af observationsperioden i 2011 for beskæftigelse og omsætning, og i 2012 for værditilvækst og den årlige indtjening.
- viii) Mens overlevelse er signifikant lavere for IM-virksomheder i sammenligning med referencegruppen, så er de andre vækstvariablene for IM-virksomhederne og referencegruppen ikke signifikant forskellige fra hinanden.
- ix) Blandt virksomheder, som overlever deres første fem år er der flere succesfulde virksomheder blandt IM-virksomheder end i referencegruppen. Overlevende IM-virksomheder er kendetegnet ved lavere vækst i værditilvækst og indtjening på kort sigt og højere vækst i det lange løb sammenlignet med referencegruppen. Det er dog vigtigt at bemærke, at disse positive resultater er forbundet med en betydelig statistisk usikkerhed.

De danske registerdata tillader at se på mobilitet blandt IM-virksomheders medarbejdere. Her finder analysen følgende:

- x) IM-virksomheder er kendetegnet ved en høj medarbejderomsætning: I de virksomheder, for hvilke der kan identificeres *worker-firm* relationer (jobs) i de danske registerdata, forlader 40 procent af medarbejderne deres job om året, hvilket til dels skyldes virksomhedslukninger. Ikke alle jobs i IM-virksomheder er medarbejderens eneste beskæftigelse: næsten 25 procent af medarbejderne i IM-virksomheder er registreret til også at have jobs i andre virksomheder.
- xi) Analysen finder, at der i gennemsnit etableres ca. én ny virksomhed af eller med medarbejdere fra IM-virksomheder for hver IM-virksomhed i FIDA-databasen.
- xii) Der findes forholdsvis få nye virksomheder i registerdata, som er startet af IM-virksomheders medarbejdere, og som blev startet ved at mere end én medarbejder flyttede fra IM-virksomheden til den nye virksomhed (spin-offs). Så der findes ikke tegn på nævneværdig dannelse af spin-off-virksomheder i kølvandet af IM-virksomhederne.
- xiii) Det sker sjældent, at grupper af medarbejdere fra lukkede IM-virksomheder flytter til den samme anden virksomhed. Så der findes heller ikke tegn på, at en nævneværdig del af IM-virksomhedernes lukninger i virkeligheden er skjulte omorganiseringer. Det sker også sjældent, at individer fra lukkede IM-virksomheder flytter til udlandet i forbindelse med virksomhedslukning.

Så for den givne tidsperiode og de datamæssige begrænsninger in mente, finder analysen ikke tegn på at innovationsmiljøerne skaber yderligere væksteffekter for IM-virksomhederne. Efter programmet blev startet, har IM-virksomheder været kendetegnet ved svagere performance end andre opstartsvirksomheder som ligner IM-virksomheden i en række observerbare karakteristika. I de seneste år af analysens observationsperiode er IM-virksomheder ved at indhente disse andre virksomheder, men det er for tidligt at afgøre om det er tale om egentlig trend. Derfor anbefales det at følge udviklingen i IM-virksomhederne i de kommende år for at finde svar på, om denne tilsyneladende positive udvikling er del af en længerevarende trend.

1. Introduction

The following report presents the data, methodology, and results of the analysis of the Danish Innovation Incubator Programme (Innovationsmiljøordningen, IM-programme in the following). The analysis was completed by Johan Kuhn/EPAC for the Danish Agency for Science, Technology and Innovation (DASTI) in 2015. It contributes to DASTI's strategy to continuously monitor and evaluate its innovation support programmes, to develop and improve the designs of its programmes, and to improve programme evaluation techniques.

The IM-programme was launched in 1998 and provides finance and counselling to newly started innovative firms. It is under the Danish Agency for Science, Technology and Innovation, DASTI, and administered by locally embedded incubators called Innovationsmiljøer in Danish (IM, "*Innovation environments*").

The IM-programme offers publicly funded risk finance and counselling to researchers, entrepreneurs and others who have an innovative business idea with a commercial potential. The IMs operate in the very early stages of the commercialisation process where the risk is high and private investors are reluctant to engage. Hence, the IM-programme compensates for a potential market failure in the private market for risk finance, by supporting the creation of new innovative start-ups.

For any analysis, it is of course imperative to define the dimensions by which the programme in question is to be analysed. This present report considers the survival and growth of firms that participate in the IM-programme. Growth is measured by the number of employees, turnover, value added and annual earnings (profit) at firm level. Obviously, if IM-firms create a lot of jobs or economic activity, then society gains directly from tax income and indirectly from externalities like demand for services and intermediate products from other firms.

Also, small innovative firms are often short-lived, located in dynamic environments, and ideas can be easily transferred from one firm to the other. So one obvious way by which IM-firms might be assumed to generate positive externalities is by encouraging the creation of other new firms that benefit from assets like knowledge or ideas that are transferred from the IM-firm to the new firm. The present report follows this presumption, and investigates to what extent IM-firm individuals are creating new firms in the wake of existing and closed-down IM-firms.

1.1 A short description of the Danish Innovation Incubator Programme (Innovationsmiljøordningen)

The purpose of the IM-programme is to support commercialisation of business ideas and research and development output. IMs offer consulting and capital, where capital is provided as any combination of two different kinds of loans, distinguished by their priority in case of default, and equity investments (venture capital).

Obviously, in case of equity investments, the IM assumes ownership in the IM-firm. However, for this analysis, it was not possible to take into consideration to what extent IMs are represented in the boards of their portfolio firms and to what extent they exercise influence in these firms. Still, in comparison to other Danish public venture capital initiatives, there is high a transparency of the IMs' investments and identification of IM-firms is univocal. This is because

IMs typically invest directly in their portfolio firms rather than indirectly through private venture capital firms.

In terms of their focus on providing capital for start-ups the IMs are related to another state-owned investor called Vækstfonden (the Danish Growth Fund) and a recently established fund called Dansk Vækstkapital which is primarily financed by state-guaranteed loans from Danish pension funds. In addition to these there are a number of private venture capital firms, some of which can draw on the resources of the industrial foundations of some of the largest Danish firms.

The most significant difference between the IMs and most other investors is that the IMs are focusing exclusively on financing the very early stages of commercialisation processes by limiting their portfolios to newly started firms of a maximum age of one year. So the IMs offer services only to newly started firms and act in the most risky segment of the venture capital market.

With respect to the additional economic effects on the IM-firms, the IM-programme has been evaluated once before, in 2009, by the Centre of Economic and Business Research (CEBR). The CEBR report compared the performance of IM-firms with other firms, and remains largely inconclusive regarding any performance differences.

1.2 Theoretical considerations, earlier research and related studies

1.2.1 General challenges of venture capital finance

The IMs invest venture capital, for which reason it is relevant to place the current study in the literature on the potential effects of venture capital on recipient firms. Also, they provide counselling in association with finance, which in itself should have positive effect on the performance of participating firms (Nielsen and Keuschnigg, 2007). They also provide access to financing through loans. The IM's investments are often levered by private venture capital investors (Oxford Research, 2012).

Investments in start-ups are risky, and venture capital is sometimes considered the only means of finance for firms based on new technologies and is characterised by long development horizons. Yet, venture capital investments in small high-tech start-ups are characterised by typical principal-agents problems that occur when there is uncertainty and private information. The more risky the project, and the lower its growth potential, the more attractive is venture capital compared to loan finance from the point of view of the entrepreneur. Venture capital implies that a share of the financial gains of a project is going to the venture capital investors. So venture capital is an expensive form of finance for highly successful projects. This implies that entrepreneurs who have a choice of how to finance their projects will typically prefer other means of financing than venture capital (Berger and Udell, 1998) – especially those entrepreneurs with a strong belief in their business idea.

On the other hand, venture capital is not leaving any financial obligation in case of business failure, making it a cheap form of finance for unsuccessful start-ups. This implies that, from the entrepreneur's point of view, it is the preferred choice for risky projects or projects with low growth potential. So notwithstanding the effort of investors to screen projects – manifested in 'proof-of-business' and 'due diligence' procedures – it needs to be kept in mind that there is a simple microeconomic adverse selection problem associated with venture finance that can be assumed to lead to poor quality firms being over-represented in the pool of firms financed by venture capital.

Venture capital finance of high-tech start-ups requires detailed contracts (see, e.g., Kaplan and Strömberg, 2002), as there is an incentive for the entrepreneur to close the business to get rid of the venture capital investor, and transfer the firm's intangible assets like knowledge and ideas to another firm afterwards. The critical point in these contracts is the extent to which investors can monitor the entrepreneur and exercise control in the firm.

There is a theoretical argument that any division of ownership and control in venture capital financed firms might lead to opportunistic behaviour like rent extraction (Lerner (2012), CEBR (2009)).

On the other hand, venture capital is often considered the only source of capital for highly risky projects with sometimes long development horizons. For IMs, this view is supported by Oxford Research's (2012) report where they present results of a survey of the firms that have cooperated with an IM: approximately 50 percent of the respondents claim that they would not have been started without the IM.

In sum, venture capital investments put high demands on the investors in terms of selecting projects, contracting and management.

1.2.2 Earlier results on Danish venture capital finance

These challenges of venture capital finance notwithstanding, there are of course a number of highly successful firms being funded and fostered with venture capital. The historical success of (public) venture capital finance is an empirical question, and this and the following subsections will make an attempt to summarise some of the experiences with venture capital.

Venture capital is a financial instrument, so an obvious parameter to gauge its contribution to society is whether or not its financial returns are positive or negative. If positive, this would be a sufficient condition for recommending an increase in the volume of public venture capital.

For Denmark, the question of whether or not financial returns are sufficiently high to make an argument for venture capital has a clear answer: for the Danish venture capital market as such, the rate of return is, according to the Ministry of Business Affairs¹⁰, minus 6.7 percent per year, leaving investors with a forty percent loss of their initial investments. In this context the IMs perform no better than the private venture market. Oxford Research (2012) documents that the different IMs, the portfolio firms of which are the subject of this study, generate losses of between 73 and 91 percent of their initial investments over the (economic downturn) period 2007-2010. One reason of private venture capital outperforming the IMs with respect to return of investment, might be that the IMs operate in the earliest and most risky stages of the venture market (pre-seed and seed capital), where private investors are reluctant to invest, and thus invest in firms with higher risk of failure compared to private venture capital investors.

Given these findings, there is a need for other arguments than positive financial payoffs if one is to invest in venture capital. These arguments can be divided into two parts: first, Danish investors have, until now, been unexperienced or unlucky, or both, and it is only a question of time until Danish business successes financed by venture capital turn financial returns positive.¹¹ Second, one should adopt a wider focus than just concentrating on financial returns, as there might be other positive effects of venture capital investments that are large enough to over-compensate the financial losses.

¹⁰ Økonomi og Erhvervsministeriet (2010).

¹¹ Strictly speaking, the success threshold is not just whether or not venture capital reaches above zero returns, but higher risk-adjusted returns than alternative investments.

To get an indication of the relevance of the first argument, one might turn one's view to the international evidence on financial returns to venture capital investments. There is no clear picture on this issue, yet, in one of the most recent and comprehensive surveys of the international literature by Da Rin et al. (2013), the authors conclude that "there is an emerging consensus that average returns of venture capital funds do not exceed market returns". And the second argument can be investigated on the basis of alternative growth effects of venture capital such as innovation or employment creation. Studies on these issues are discussed further below.

1.2.3 Measurement issues of venture capital's potential growth effects

Unfortunately, studies on venture capital are to their greatest part subject to the problems of unrepresentative samples and statistical omitted variable biases.

The first problem arises when data is based on surveys with insufficient response rates or selected such that only successful venture-firms or firms financed by venture capital are analysed. For example, survey evidence is typically biased by survivorship bias (only surviving firms are asked to participate) and response bias¹², as it must be presumed that the decision to respond to a survey is positively correlated to the success of the venture.¹³

But to find representative data for an analysis of venture capital is a general problem that is not just limited to survey data. Finding and isolating venture investors and their portfolio firms is not a straightforward task in many studies that, as a consequence of this, might be feared to miss out the smallest or least successful venture investors or firms backed by venture capital. This applies to studies like Peneder, 2009, while other studies like, e.g., Botazzi and Rin, 2002, focus on a small and non-representative share of venture-capital-backed firms that are publicly listed.

Omitted variable biases are the result of violations of statistical all-else equal conditions. They are equivalent to alternative explanations of the analysis' findings that the modeller has not taken care of. Alternative explanations of a study's findings cannot be ruled out in any empirical study the data of which is not generated by a lottery design. Statistical analyses are innocent comparisons of subpopulations, however, interpretations of their findings as causal effects rest on all-else equal assumptions.

1.2.4 Earlier studies on aggregated data

Studies, the interpretations of which are prone to omitted-variable biases are studies on country comparisons, like Meyer, 2010. Cross-country studies can document positive correlations between venture capital investments and GDP growth in given years, but these correlations have no simple interpretation and can typically not be used for policy recommendations.¹⁴ Markets for financial instruments fluctuate with business cycles, and the issue of whether venture capital generates innovation activity or innovation activity creates markets for venture capital is far from resolved.

¹² See, e.g., Phalippou, L. and O. Gottschalg, 2009.

¹³ Two examples of these potential biases are Vækstfonden, 2006 and Vækstfonden, 2009.

¹⁴ The Meyer study documents contemporary correlations or correlations with short time lags. This is at odds with venture capital being 'patient' capital typically invested in projects with relatively long development time horizons. One reason for mentioning this study at this place is that it previously has been cited in, e.g., Oxford Research, 2012.

Yet, the question of whether the size of venture capital markets is positively related to innovation activity and the number of highly successful start-ups is of course legitimate. E.g., it is an obvious question of whether the exponential growth in the size of venture capital market over the last decades in the U.S. has been associated with any proportionate increase in innovation activity.

Studies addressing this question remain inconclusive. A heavily cited study that uses a change in legislation as an exogenous shock to identify causality by Kortum and Lerner, 2000, suggests the presence of positive effects of venture capital on patenting activity.

But this is not equivalent to the international evidence univocally suggesting positive effects of venture capital on recipient firms. The commercialisation focus of venture capital investors is not necessarily making recipient firms more innovative, and, e.g., Stuck and Weingarten, 2005 have argued that innovation activity in the U.S. has not followed track with the increase in the volume of the venture capital market.

A more recent study by Ueda and Hirukawa, 2008, that uses the same analysis set-up, suggests the presence of labour productivity effects, but cannot detect any signs of positive total factor productivity effects. This supports notions of more capital intensive production technologies in venture capital recipient firms compared to other firms. And Zucker, Darby, and Brewer, 1998, even document a negative relationship between venture capital market size and the creation of new biotechnology firms.¹⁵

1.2.5 Firm-level comparison studies - general issues

The most straightforward way to reduce omitted variable biases is to analyse potential effects of venture capital at the level of the individual firm, and to compare firms that receive venture capital with other firms that do not receive venture capital.

This is the ‘industry-standard’ in the academic evaluation literature. However, although academic papers on the subject (and most reports) typically claim to establish evidence of causal relationships in the data, it needs to be kept in mind that any non-experimental study is – to some extent – comparing apples with bananas: no matter how carefully the modeller has selected firms for comparisons, there will always be differences in the two groups of firms, some of which might be suspected to drive the later results of the study.

In other words, the results of comparison studies are always a combination of the true (value adding) effects of venture capital and selection effects, i.e., firms with specific characteristics having a higher propensity of receiving venture capital. So part of the findings of these studies is due to venture capital changing receiving firms’ growth paths, and part of the findings is due to venture capital financed firms having specific characteristics to start with.

1.2.6 Earlier results of firm-level comparison studies

For Denmark, there are currently two firm comparison studies of the potential effects of venture capital on firm growth.

First, CEBR, 2009, which cannot document venture capital recipient firms showing higher growth than other comparable firms. And, second, a study by Ernst and Young, 2010, that con-

¹⁵ For Denmark, CEBR, 2012, calculates job creation estimates of public investments in firms on basis of a Keynesian macroeconomic model. This treats these investments as standard fiscal policies and calculates job creation by the model’s Keynesian multipliers. The numerical results of the study are for the hypothetical scenario of these public investments being just as strongly related to job creation as other investments, and rely on the properties of the macroeconomic model.

concentrates on firms receiving capital from the public investor Growth Fund/Vækstfonden that also finds similar or lower increases in economic activity in firms receiving capital from the investor.

Examples of international studies that compare start-ups financed with venture capital with other start-ups are Penneder, 2009, on Austrian data, Engel and Keilbach, 2007, on German data, and Puri and Zarutskie, 2009, on U.S. data.

When comparing venture capital recipient firms with other firms, Engel and Keilbach, 2007, find high innovation activity in venture capital financed firms prior to the venture capital investment, but not afterwards. They document higher growth rates in venture capital financed firms than other firms that, however, the firms are not equivalent in their patenting activity prior to receiving venture capital.

Peneder, 2009, finds that venture capital financed firms grow faster than other similar firms. His study also addresses an important aspect of venture capital finance: the question of how large a share of venture capital recipient firms would exist in the first place in the absence of venture capital finance. This question has of course no general answer, as capital supply is highly volatile over time, but it is also a question typically evading stringent analysis.

Puri and Zarutskie, 2012, give evidence of the relatively few firms that have received venture capital in the U.S. having created substantial numbers of jobs.¹⁶ This evidence finds counterparts in the statements of various venture capital associations (including the Danish one), which, however, have not been scrutinized by independent research.¹⁷ Puri and Zarutskie also find that venture-capital financed firms grow faster in terms of employees and sales than other highly similar firms, and have lower exit risk.¹⁸

The Puri and Zarutskie study is interesting as it gives evidence of venture capital investors concentrating on growth rather than profitability. This agrees with the tentative findings for IMs of this present report and the comparison of the studies of Kortum and Lerner, 2000, on the one hand, and Hirukawa, M, and M. Ueda, 2011, on the other: while the former of the two gives evidence of venture capital investments leading to higher levels of innovation (measured by patenting activity) the second finds venture capital investments being negatively related to productivity growth.

The results of higher growth in venture capital backed firms are in line with other often cited studies like Brav and Gompers, 1997, Hellman and Puri, 2000, and Kortum and Lerner's,

¹⁶ Note the job creation argument of venture capital rests on the assumption that substantial shares of employees in venture capital recipient firms were unemployed in the counterfactual case of an absence of venture capital. This assumption is not necessarily realistic, especially in the light of venture capital firms employing high shares of high-skilled individuals who are characterized by low unemployment. Unfortunately, there is little general evidence on the extent to which new firms create new economic activity and to what extent they crowd out activity in established firms. Technological innovations, like, for example, the power loom, can have negative effects on employment as well. And new firms as such are generally not being more productive than established ones (van Praag and Versloot, 2007), indicating that there is no simple relationship between entrepreneurship activity and economic growth.

¹⁷ There is no convergence towards any harmonized Danish database on venture capital recipient firms. This database would be a first step towards commonly agreed evidence on the most basic features of the Danish venture capital market.

¹⁸ Their study gives indications of venture-financed firms being characterized by relatively low exit risk of in the first years, and relatively high exit risk after the first years of existence. So venture capital investors are suggested to be patient at first, but get determined when closing unsuccessful projects.

2000, study on innovation increases in association with an exogenous increase in the volume of the venture capital market.

1.2.7 Potential knowledge spill-overs of high-tech firms

As mentioned in the outset of this section, an important aspect of public innovation support programmes like public venture capital, is that innovations create externalities. Thus, mobility of knowledge implies that even firms that go bankrupt can make positive contributions to society, for example if the ideas developed in the unsuccessful firm lead to the foundation of new (and successful) firms afterwards. A single and ground-breaking analysis that follows this argument is Møen, 2004, who, however, cannot establish evidence of positive growth effects on firms that were created in the wake of a government innovation support programme that was generally deemed unsuccessful.

1.2.8 There is no convergence in the literature on the effects of venture capital

So, in sum, making general statements on the economic effects of venture capital is difficult. Studies typically reporting low financial returns on venture capital investments meet a number of studies that find positive growth developments in venture-capital financed firms.

So at present, we know too little about how important venture capital is to create growth for being able to making policy recommendations. Insiders statements like “taken together, the evidence supporting the positive impact of venture capital on innovation is weak at best (Ueda and Hirukawa, 2009)” or “We believe that the role of government in venture capital remains under-researched (Da Rin et al, 2012)” indicate that the question of whether public intervention in the venture capital market is good business for society remains unanswered in the academic literature.

2. Data

The data for the analysis comes from DASTI, Experian A/S, and Statistics Denmark:

1. DASTI supplied information on 1,034 individual IM-projects from the period 1998 to 2013. Information includes firm-identifiers, and the start date of the project. This will henceforth be called *the DASTI IM data*.
2. Firm background information comes from the Danish Business Authority, including industry and date of establishment. These data, typically referred to as ‘Stamdata’, are made available by the business intelligence company Experian A/S. Of the 1,034 firms in the DASTI IM data, 1,017 can be found in the firm background information.
3. Data from annual financial reports that incorporated firms are obliged to submit to the Business authority. Just like it is the case for the firm background information, these data were made available by Experian A/S. Of the 1,034 individual IM-firms, 877 hand in at least one financial report that is in the financial data. So there are 140 firms that are in the firm background information but are not represented in the financial report data. Of these, a number were started too recent to be in the accounting data; 91 were started after 2011 and not so important for the analysis that is supposed to follow firms over a couple of years after start-up.
4. Register information from *Statistics Denmark* from 1999 onward. This is matched employer-employee data including information on individuals (demographic information, information on education, wage and occupation) and firms (e.g. size, turnover). These data will be referred to as the *Statistics Denmark data*.

2.1 The Statistics Denmark data

Characteristics for individuals and firms are drawn from Statistics Denmark’s register. Data is available up to 2011, which implies that there is no information on the most recent projects. Statistics Denmark data is available on an annual basis, with census date in mid-November. The data comes with individual and firm identifiers; these allow associating individuals with their firms. Over the last decades, the data resources of Statistics Denmark have been continuously extended. For example, the present analysis benefits from Statistics Denmark’s individual-level information on education (degrees, focus of electives, grades) and firm-level information on turnover.

The most relevant Statistics Denmark databases for the analysis are as follows:

1. The Statistics Denmark education register data has information for all Danish citizens and most immigrants, and distinguishes between 2,800 different educations. For the analysis, these will be categorised according to the Danish Education Classification system (DUN) similar to the International Standard Classification of Educations (ISCED).
2. The Statistics Denmark *FIRM*-database has information on turnover and a few other variables for all firms above some minimum activity levels for all private sector firms with the exception of a few industries, that Statistics Denmark considers non-business-related (e.g. social institutions).

3. The Statistics Denmark *Entrepreneurship*-database is a sub-sample of the FIRM-database and available from 2001 onwards. It associates new firms in the FIRM-database with individuals, that, according to Statistics Denmark's algorithm (which, again, is based on individual-related background information), are the founders of these firms.
4. The *FIDA*-database that links firms with individuals.
5. The Statistics Denmark Migration Database having individual-id's and emigration and immigration dates for all (registered) individuals moving in and out of Denmark. For the project, there is information on approximately 580,000 emigration events of 440,000 different individuals over the period 1973 to 2012.

2.2 The Experian data

The Experian data consists of approximately 1.7 million financial records in the period from 2000 to 2010. The timing of the records is based on the closing dates of the financial report periods. In case of firms filing multiple reports in a calendar year, only one of these is selected for the analysis. The merge of the information from Statistics Denmark and the Experian data is based on firm registration numbers and the calendar year of Statistics Denmark's census dates in November on the one hand and the closing dates of the financial report periods on the other.¹⁹

2.3 The presence of IM-firms in the Statistics Denmark register data

There are 1,034 registered projects in the DASTI sample, but not all of these are in the Experian data, and a substantial share is not in the register databases maintained by Statistics Denmark. Of the 1,034 firms, 44 firms never hand in any financial report, and 55 firms cannot be found in any of the different Statistics Denmark register datasets. It is most likely that the records in the DASTI data belong to firms that never reach critical mass for registration at Statistics Denmark.

Of the 1,034 firms, 834 are at some point in time in Statistics Denmark's *FIRM*-database, 683 are in the *FIDA*-database, and 395 are in the *Entrepreneurship* database. It is remarkable that such large shares of IM-firms are not in the Statistics Denmark data which is supposed to collect largely all economic activity.

With regards to the Statistics Denmark *Entrepreneurship* database, and to a lesser extent the *FIRM*-database, the low representation of IM-firms might be due to firms being required to be above minimum activity thresholds to get sampled in these databases. With regards to the *FIDA*-database, part of the attrition might be assumed to individuals in IM-firms having other jobs (individual-firm-matches) in other firms, and the *FIDA*-database sampling a maximum two jobs per individual.

This implies that it should be kept in mind that associating firms with individuals is not possible for all programme participant firms. As a consequence of the fact that the Statistics Denmark registers are not able to identify the entrepreneurs behind a share of IM-firms, we consider the union of entrepreneurs identified by the *Entrepreneurship* database and the staff identified by the *FIDA* database when analysing individual mobility in the second part of the analysis.

¹⁹ Most firms have their closing date at the end of December, which implies a short time difference between the Statistics Denmark information (of end-November) and the financial report information. However, there are also firms that have chosen other dates, e.g. end of March, to close their books. For these firms, the information from the Statistics Denmark registers comes with a time lag of up to 11 months.

The extent to which IM-firms are represented in the different databases has implications for the analysis: for example, both the selection of reference firms for the statistical comparisons is based on information in the data, and we can thus only analyse success variables for the sub-samples of firms that have the relevant pieces of information in the data.

In total, 926 IM-firms have information in either the Statistics Denmark or the Experian data at some point in time, with the number of participating firms in the data increasing from 81 in 1999 to 453 in 2011. Not all IM-participant firms are considered for the analysis: first, firms started after 2011 are not considered, as 2011 is the last year with full representation in the Statistics Denmark registers.²⁰ Moreover, there are firms started in 1998 for which there is no information in the Statistics Denmark registers either.

2.4 The treatment of the raw data prior to the analysis

Before being able to analyse the data, there is a need for making decisions regarding the definition of variables and the treatment of extreme observations.

For example, extracting estimates of firm starting dates from the different data sources is an exercise in itself, as there is a degree of uncertainty in the data with regards to the year in which a given firm is founded: establishment year information is collected in the DASTI data, the business authority's firm background data (STAMDATA), and Statistics Denmark's General firm Statistics and Entrepreneurship database. The information on starting years from these sources is not necessarily consistent, and may further deviate from the first years the given firm occurs in the Statistics Denmark FIDA-employer-employee data or hands in its first annual report to the business authority.²¹

In the following, we follow firms after the first year in which they occur in either the Statistics Denmark or the Experian data. This year will be referred to as "year zero" or "base year". In the following, firm age is defined by the number of years after the base year, that is, firm age is zero in the base year.

Firm age is not the only variable that can be defined in different ways. The same is true for the number of employees. The realisations of this variable will be primarily defined on the basis of the Statistics Denmark registers, and supplemented with information of the Experian database. Also, there are variables which describe the staff characteristics of the firms, e.g., the average age of the firm's individuals and the share of women or employees with a long tertiary-level education degree. The firms' individuals are identified on basis of the Statistics Denmark FIDA-database which links individuals to firms. For firms that are not in the FIDA database, but in the Entrepreneurship database, individuals are identified on basis of this database instead. E.g., for the latter group of firms, the firm's individuals' average age is defined by the age of the entrepreneur who is registered in the Entrepreneurship database.

²⁰ The analysis requires being able to follow firms over time, and this possibility is obviously not given for very recent projects.

²¹ For one of the IM-firms, DASTI has no date information. For the remaining firms, the DASTI date information is close to the first year in which the firm occurs in the registers for the first time. For only three percent of observations, start date information in the two data sources is deviating by more than one year. In absolute numbers, there are 28 firms that occur in the Statistics Denmark data two or more years after they are registered as started by either DASTI or the business authority's firm background data. In three cases, the firm's first year in the Statistics Denmark data precedes the information of the DASTI or Experian data. And in 308 cases, the first year of the firm is in the Statistics Denmark data is just one year later than the registration year of either the DASTI or Experian data.

Of specific importance for the analysis is the treatment of extreme observations (outliers). Investments in small innovative firms are risky, and any public programme might be considered a success, if only it makes the difference between success and failure for one single highly successful firm. On the other hand, the statistical tools of the analysis are designed to describe general features of the data, and it is impossible to tell whether one single highly successful firm is a coincidence or a general feature of the data generating process of the programme.

For the evaluation exercise of the analysis, the sample of IM-firms is reduced by a very small number of firms having less than DKK-50 million in gross profit or earnings before taxes in year zero, and a very small number of firms on the top of the earning distribution in year zero with earnings greater than DKK750,000.²² Also, industrial foundations (not showing any salient features in the data) are deleted. This leaves us with 888 IM-firms for the comparison analysis.

2.5 Data limitations

The sampling condition that only active firms can be followed in the data naturally implies that any potential effects of the IM-programme can only be analysed after year zero. In other words, the IM-programme might have an effect on firms before they are registered for the first time, and an effect on firms that never get registered. These potential effects are not covered by the analysis. The following analysis cannot estimate the importance of the IM-programme on the formation of the firms.²³

Also, we ignore the fact that firm closure and registration of a new firms is an easy administrative exercise. As a consequence, managers might decide to close and re-open start-ups to qualify for participation in the IM-programme to get access to finance. In this analysis, a firm is considered as new when it becomes registered as a new firm and occurs in the data as stretched out above, independently of any potential strategic closures and re-openings.

2.6 Basic descriptive statistics

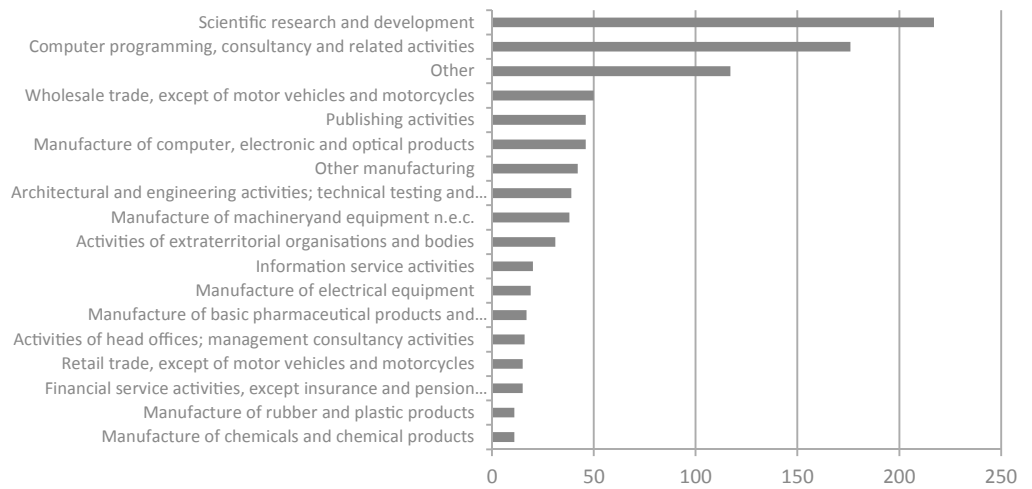
The following describes the sample of IM-firms in a few dimensions. These descriptions can stand alone, and qualify our general knowledge on these firms. The variables that are described is somehow arbitrary, however, we are of course interested to developing some 'feel' on these firms, i.e., their industries, their size, and the characteristics of their employees. Later, we are of course interested in their performance, for example their survival and growth, but these variables will be described in comparison to other firms that have not participated in the IM-programme and considered in section 3 of the report.

We set out with a look at the industry distribution of IM-firms in FIGURE 2.1. Note all descriptive statistics with the exception of firm growth figures are from year zero, which is the first year the firm is in the data. All monetary figures are inflated or deflated by the Danish Consumer price index to prices as of 2009.

²² Not considering firms on basis of year zero characteristics is motivated by the wish to extract the most similar reference group for comparisons. The firms that were deleted are not characterised by any salient developments in their success parameters. The DKK750,000 threshold for year zero annual earnings might be considered strict, however, it only affects a very small number of IM-firms. The deleted firms are characterised by low performance growth after year zero, with, e.g., annual earnings dropping to below DKK-50 million.

²³ Based on a survey, Oxford Research (2012) conclude that approximately 50 percent of IM-firm would not have been started in a hypothetical situation of an absence of the IM-programme.

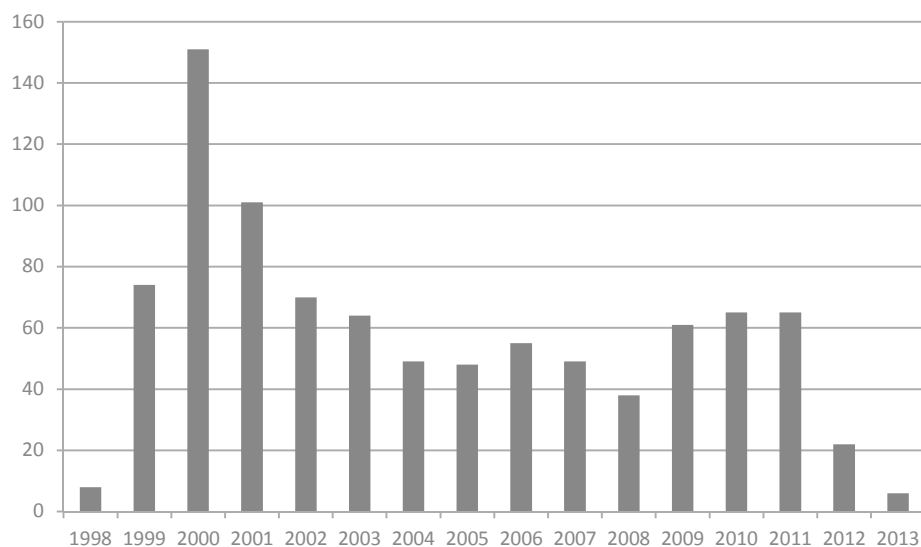
FIGURE 2.1: Industry distribution of IM-firms



We find that large shares of IM-firms are in industries commonly described as high-skilled, with 23 percent of firms in scientific research and development and 20 percent in IT.

We also find, cf. FIGURE 2.2, that the largest numbers of IM-firms were financed at the turn of the century, with a peak at year 2000 with 150 firms having received finance. Recall starting years are defined as the first year in which the firm is either in the DASTI, Experian, or Statistics Denmark data, and may for this reason deviate from earlier investigations. After 2003, numbers of new firms in the data average at approximately 50 new entries per year. The drop in the number of observations at the end of the observation period is a result of incomplete data coverage and not decreasing start-up activity; and firms started after 2011 are not part of the subsequent analyses – which are supposed to follow firms in the years after start-up.

FIGURE 2.2: IM-firms by the first year they occur in the data



Earlier, it was found that many of the IM-firms are in industries that often are considered as ‘high-tech’ industries.

This is confirmed by an investigation of the individuals behind the IM-firms, the characteristics of which are described in TABLE 2.1: IM-firms are far more skill-intensive than most other firms, with an almost ten percent share of individuals associated with these firms having holding a PhD-degree and almost thirty percent having completed a tertiary (university-level) education.

TABLE 2.1: IM-firms firm-level average characteristics of first-year individuals

	Number of observations	Mean	Standard deviation	Minimum	Maximum
Number of employees	798	1.58	2.59	0	<40
Average age	597	37.50	9.87	>16	<75
Share of women	616	0.10	0.26	0	1
Share of immigrants	616	0.07	0.21	0	1
Share of highly (tertiary-level) educated	640	0.29	0.40	0	1
Share of PhDs	640	0.09	0.27	0	1

Also, we find that IM-firms are registered to be started with on average less than two individuals, and for a large number of these start-ups, no employees are registered at all.²⁴ There are single firms that are started with more employees than would be expected for start-ups, which might be the result of these firms being funded as part of organisational changes of existing firms rather than being ‘greenfield-’start-ups.

The average age of the individuals involved and the share of immigrants might be considered as being in the expected range by being roughly equal to the Danish working population averages. However, the share of women in newly started IM-firms is only ten percent and, thus, is significantly lower than might be expected on basis of women’s general labour market participation rates in Denmark being similar to men’s.

There is another important aspect to be kept in mind that is illustrated by TABLE 2.1: the lack of information for a substantial share of IM-firms in the Statistics Denmark registers. For example, for almost a third of all firms there is no individual-level information. There are two reasons for this: first, the firm never reaches sufficient activity levels to become part of the FIRM statistics database (which has the Entrepreneurship database as one of its subsamples). Second, no employee has her highest or second highest paid job in the IM-firm. In other words: many of the IM-firms are closed before reaching critical thresholds for firm registration and employment in the registers.

We close the description of IM-firms in their first year of registration by taking a look at their financial figures in TABLE 2.2.

Average turnover (this is variable is from VAT registers and part of Statistics Denmark’s FIRM database) is at DKK3.6 million, which is quite high but in line with the average number of employees. There are few firms with very high turnover from the very beginning, but we do not have access to any additional information which might make us consider these records as firms that are misreporting or simply registration errors.

²⁴ Employment information is both from the Experian data and the Statistics Denmark data (variable GF_inkl). The Statistics Denmark registers allow for maximum two jobs (firm-individual-relationships) per individual, ordered by pay, at census date in mid-November.

We also find that IM-firms are often relatively capital intensive, with an average equity per employee of approximately DKK1 million and more than DKK2 million total assets per employee – this might be presumed to be related to the IMs’ capital investments in these firms.

TABLE 2.2: IM-firms financial statistics

	Number of observations	Mean	Standard deviation	Minimum	Maximum
Turnover (DKK 1,000)	777	1220.89	2211.78	0	<26,000
Value added (DKK 1,000)	334	-214.590	524.79	>-4,000	<3,000
Annual earnings (DKK 1,000)	484	-722.58	2067.29	>-40,000	<600
Total assets; balance (DKK 1,000)	484	1304.86	2134.87	>20,000	<30,000
Equity (DKK 1,000)	484	526.59	1648.2	>-3,500	<20,000

After having described IM-firms in their first year of existence in the data, a straightforward question is of course how IM-firms are developing over time. In the following, we take a few looks at some of the most obvious performance criteria: Survival and growth in employment, turnover, value added and annual earnings (profit).

3. Survival and growth of IM-firms in comparison with a group of reference firms

In the following, IM-firms are analysed in terms of their survival and growth in employment, turnover, value added and annual earnings (before-tax profits). Their performance is benchmarked to a group of similar firms that serve as a point of reference. These other 'reference firms' help evaluating the extent to which the survival and growth of IM-firms reflect any potential effects of the IM-programme on these variables. The reference firms are selected such that they resemble the IM-firms in a number of observable characteristics in the first year of existence.

Before turning to the analysis of the single variables, the following section 3.1 shortly describes the procedure by which non-participating firms are selected into the reference group. Readers not interested in the somewhat technical details can jump directly to the analysis of survival in section 3.2.

3.1 Selection of reference firms for the subsequent comparisons

Prior to the analysis, a reference group of firms is selected from the data for latter comparisons. We attempt to make the comparisons with the reference group as meaningful as possible, by selecting firms that can be shown to be highly similar in a number of variables in the first year in which they occur in the data.

The point of departure for the selection of reference firms is the universe of firms in the combined Experian-Statistics Denmark firm level data. As a first step, these databases are adjusted by only considering firms in the first year in which they occur in the register data, by only considering firms in industries in which there is at least one IM-firm, and by not considering firms much larger than the largest IM-firm in its first year of existence.

These conditions are motivated by the objective to make the reference group as similar as possible to the group of participants in most possible dimensions. The resulting sample is described in some dimensions in TABLE 3.1.

It is no surprise that the above-mentioned adjustments to the data are not sufficient to isolate a reference group of firms that can be claimed to be highly similar to the IM-firms, as TABLE 3.1 gives evidence of IM-firms and potential reference firms being very different from each other in their observable characteristics.

TABLE 3.1: IM firms. Comparison of IM-firms and all other new firms in the Experian-Statistics Denmark database that share basic characteristics. New firms in the first year they occur in the combined Experian/Statistics-Denmark data

	IM firms					Firms in the adjusted sample					T-test
	N	Mean	Std	Minimum	Maximum	N	Mean	Std	Minimum	Maximum	
Number of employees	798	1.58	2.59	0	36	388,633	1.67	3.28	0	50	
Average age	597	37.50	9.87	17	72	332,108	37.99	11.28	17	94	
Share of women	616	0.10	0.26	0	1	348,544	0.29	0.42	0	1	***
Share of immigrants	616	0.07	0.21	0	1	348,544	0.08	0.25	0	1	
Share of highly (tertiary-level) educated	640	0.29	0.40	0	1	351,716	0.09	0.28	0	1	***
Share of PhDs	640	0.09	0.27	0	1	351,716	0,00	0.07	0	1	***
Turnover (DKK 1,000)	777	1220.89	2211.78	0	25742	222,605	4,109	28,600	0	713,000	*
Value added (DKK 1,000)	334	-214.59	524.79	-3913	2749	90,033	864	2,665	-24,985	24,964	***
Annual earnings (DKK 1,000)	484	-722.58	2067.29	-38168	574	152,629	-151	2,598	-49,570	5,000	***
Total assets; balance (DKK 1,000)	484	1304.86	2134.87	25	28002	152,990	21,599	1,912,593	-18,010	724,000,000	***
Equity (DKK 1,000)	484	526.58	1648.20	-3406	17184	152,976	9,216	442,419	-311,507	127,000,000	***

Notes: ***, **: significant at 1,5 percent significance level;
*: significant at 10 percent significance level

So there is a need to find more similar reference firms, and this is achieved by means of a ‘propensity score matching’-procedure. This is standard in the evaluation literature, and e.g. described in greater in detail in Kopeinig and Caliendo, 2008.

In short, the procedure first estimates a statistical binary choice model for each firm in the sample. This allows for calculating the estimated IM-programme participation probability, called propensity score, on the basis of observed firm characteristics included as explanatory variables in the binary choice model. Then the procedure selects, for each IM-programme participant firm, one non-participant firm into the reference group. This non-participant firm is characterised by (a) being in the same (NACE 2-digit) industry, (b) occurring in the data in the same year for the first time and (c) having as similar as possible a propensity score as the participant firm.

The statistical binary choice model used to calculate the propensity scores is displayed in TABLE A.1 in the appendix of this report. Its main variables are again industry, but also individual characteristics like the share of female or highly educated employees, or average age and financial characteristics.

It is found that there are strong associations of firms’ of IM-programme participation probabilities with their worker characteristics. For example, a low share of women and a high share of highly educated employees significantly increase the probability of IM-programme participation. Also, financial indicators are important, with relatively weak initial performance in terms of value added and net income increasing the probability of any randomly chosen firm in the sample of TABLE 3.1 being a IM-programme participant firm.

In practice, the selection of reference firms iterates on the specification of the binary choice model. A list of observable variables for which the highest possible similarity is wanted is speci-

fied, and explanatory variables are added to the binary choice model until firms in the reference group share most of their observed characteristics with the group of IM-firms.²⁵

Again, it should be acknowledged that individual-level information can only be included in the selection procedure for firms the individuals of which are in the data. We have seen earlier, that this is not the case for a considerable share of firms in the data. In these cases, matching is on other, available variables like industry or financial information.

The success of the matching procedure is just the similarity of IM-firms and firms in the reference group in terms of observable characteristics – in the first year the given firm is in the data. It might be noted at this place that, as a result of balancing on industry and starting year in the procedure, IM-firms and reference firms are exactly equal in their industry distribution (at a 2-digit NACE level) and the distribution of starting years.

Other variables are compared in TABLE 3.2. It is found that a number of firms in both groups of firms (IM-firms and reference firms) have missing information for a couple of variables. This should be kept in mind when interpreting the results of the analysis. Besides that, average values of IM-firms and reference firms are highly similar, with only one of the t-test statistics indicating a significant difference for the share of highly educated.

The statistical distributions of the variables can be tested by Kolmogorov-Smirnov (KS) tests. These indicate differences for the distributions of financial variables. So although averages are highly similar, there are for example relatively more firms in the participant group with relatively poor net income figures in the first year they occur in the data. So this should also be kept in mind for the subsequent analysis.²⁶

It might also be noted that a number of participant firms are matched to the same reference firms; these reference firms' records are weighted accordingly in following analysis – simply by expanding the records (i.e. creating duplicates) of the relevant reference firms by the number of times they have been chosen as reference firms.

In terms of interpretation of later results, it can be noted that, if the two groups were indeed equal on average in all their characteristics, any differences in outcomes between the IM-firms and firms in the reference group would be the IM programme's causal effect. In the present case, there is equality in industry, and a high similarity in other variables like firm size. But there are of course differences between the two groups of firms in unobserved variables. And some of these might be correlated both to IM-programme participation and later performance, and it is thus suggested that the reference group is used as a point of reference for benchmarking and not a means to draw causal inference.

²⁵ Similarity is evaluated by two-sided t-tests. Testing for statistically significant differences between IM-firms (“treatments”) and reference firms (“controls”) by two-sided t-tests is a standard procedure in the literature. However, note that this test of non-rejection of the null of equality is not equivalent to ‘proving’ equality: instead, it just indicates that average differences in the two groups are small relative to the statistical variation of the variable in question.

²⁶ Growth statistics of surviving firms will be relative to the given firms' realisations of the success variables in year zero, so any initial level differences net out. However, firm survival statistics will be affected by different distributions of year 0 characteristics.

TABLE 3.2: Comparison of IM-firms and reference firms

	IM firms					Reference firms					T-test (p-values)	KS-test
	N	Mean	Std	Minimum	Maximum	N	Mean	Std	Minimum	Maximum		
Number of employees	798	1.58	2.59	0	36	797	1.54	2.27	0	24	0.793	1
Average age	597	37.50	9.87	17	72	591	38.13	10.11	17	69	0.276	0.095*
Share of women	616	0.10	0.26	0	1	620	0.09	0.23	0	1	0.697	0.971
Share of immigrants	616	0.07	0.21	0	1	620	0.09	0.23	0	1	0.532	1.00
Share of highly (tertiary-level) educated	640	0.29	0.40	0	1	643	0.32	0.43	0	1	0.253	0.23
Share of PhDs	640	0.09	0.27	0	1	643	0.05	0.20	0	1	0.001***	0.141
Turnover (DKK 1,000)	777	1,221	2,212	0	25,742	783	1,324	3,369	0	42,226	0.475	0.024**
Value added (DKK 1,000)	334	-215	525	-3,913	2,749	345	-180	912	-7,183	1,610	0.539	0.001***
Annual earnings (DKK 1,000)	484	-723	2,067	-38,168	574	475	-708	2,635	-42,224	540	0.923	0.000***
Total assets; balance (DKK 1,000)	484	1,305	2,135	25	28,002	476	1,211	2,716	0	23,987	0.551	0.000***
Equity (DKK 1,000)	484	527	1,648	-3,406	17,184	476	506	2,340	-2,868	23,119	0.873	0.000***

Notes: T-test: Two sided t-tests with unequal variances. KS-test: Kolmogorov-Smirnov tests *, **, ***: statistically significant at 10, 5 and 1 percent level.

3.2 Survival

Understanding survival is a crucial part of any empirical analysis on young firms. And firm exit is indeed the prime reason for why IM's investments need to be written off, so it is important to have an overview of the performance of IM-firms in terms of survival.

Yet, it is important to keep in mind that policy will typically be based on potential growth effects of a programme, which is a combination of the survival of firms, and the growth in surviving firms. If survivors show exceptionally high growth, then low survival rates themselves may not be considered any major problem.

In the following, three different definitions of firm transitions are considered:

- i) Firm exits: Firms that leave the combined Experian-Statistics Denmark data before 2011. This transition category makes no effort to distinguish different reasons of why the given firms leave the data. So 'firm exit' covers over, e.g., both organisational transitions like IPOs on the one end of the scale and bankruptcy on the other.
- ii) Firm closures: Firms that the Danish Business Authority registered as closed ("ophørt" or "opløst"), liquidated ("likvidation"), or subject to enforced winding-up ("tvangsopløsning") or bankruptcy ("konkurs").
- iii) Bankruptcy ("konkurs"). This is the most precise measure of business failure in the present data.

Note the different definitions are nested: all bankruptcies are closures, and all closures are exits. Exits and (to a lesser extent) closures can take place as the result of organisation changes. The background information used to define the firm closure and the bankruptcy events are from the Business Authority's files that are part of the Experian data delivery. Unfortunately, these data do not have any information on firm sales; these might be assumed to be the most prominent reason for firms exiting the data without being registered as closures.

To follow firm transitions, it is necessary to identify the year of the transition from active to inactive. This is achieved by defining a firm as active as long as it hands in an annual financial report to the business authority or is sampled in any of the Statistics Denmark databases. The

latter are having information up to 2011, thus, we can only follow transitions from active to inactive up to the years 2010 to 2011.

A first look at the data reveals that up to the most recent information in 2013, 492 (55 percent) of the 888 IM-firms in the combined treatment-control data are categorised as firm closures. The corresponding number for firms in the reference group is 286 (32 percent). And 180 IM-firms (20 percent) are categorised as bankruptcies, against 97 reference firms (11 percent).²⁷

All raw transition data up to 2010 is collected in TABLE A.2.1 in the appendix. FIGURES 3.1.A-C illustrates the results of the table by calculating firms' survival shares as functions of calendar year and firm age. For example, FIGURE 3.1.A graphs columns C/A against D/B and FIGURE 3.2.C depicts columns G/A and H/B.

FIGURES 3.1.A-C show that approximately 10 percent of all IM-firms leave the data as exits per year, that approximately ten percent are registered as closures every year, and that approximately 4 percent of firms are subject to bankruptcy. IM-firms' experience highest transition rates in the first half of the observation period, and decreasing rates at its end. It is not possible to make statements on whether or not IM-firms' transition rates are 'high' or 'low', however, it should be noted that they are higher than the transition rates of the reference group.

FIGURE 3.1.A: The shares of firms that leave the combined Experian-Statistics Denmark data between year t and t+1



²⁷ In 2010, which is the last year with full coverage in the Statistics Denmark data, 445 IM-firms have left the data as exits, against 378 of the reference firms.

FIGURE 3.1.B: The shares of firms that leave the combined Experian-Statistics Denmark data between year t and t+1 as closures



FIGURE 3.1.C: The shares of firms that leave the combined Experian-Statistics Denmark data between year t and t+1 as bankruptcies



Knowing the shares of firms that leave at given firm ages allows calculating empirical survivor functions. These are summarized in FIGURES 3.2.A-C. Approximately 30 percent of a cohort of IM-firms is found to be expected in the data 12 years later. Again, it is not possible to make any statements on whether this number is high or low, but, it is again the case that IM-firms have higher transition rates compared to the firms in the reference group. This exit difference becomes even more apparent when considering not just firm exits from the data, but firm exits that are categorized as closures or bankruptcies in the business authority/Experian data.²⁸

²⁸ FIGURES 3.2.B and C consider firms as surviving in case of no closure or bankruptcy.

FIGURE 3.2.A: Empirical survivor function: Shares of firms that stay (i.e. are not subject to exit) in the combined Experian-Statistics Denmark data (firm age on horizontal axis)

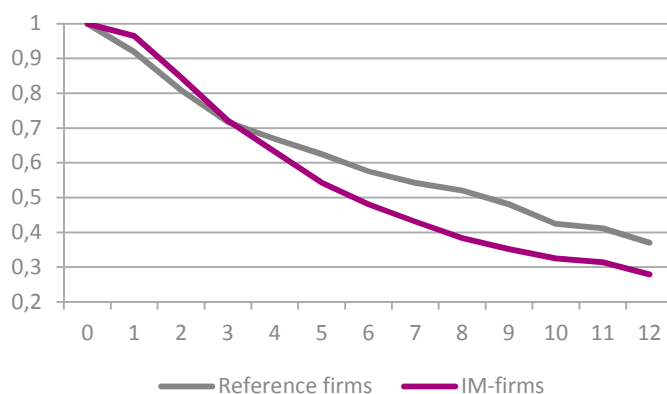


FIGURE 3.2.B: Empirical survivor function: Shares of firms not subject to closure in the combined Experian-Statistics Denmark data (firm age on horizontal axis)

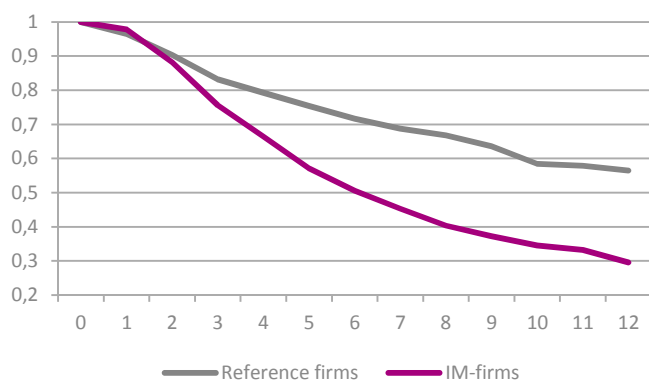
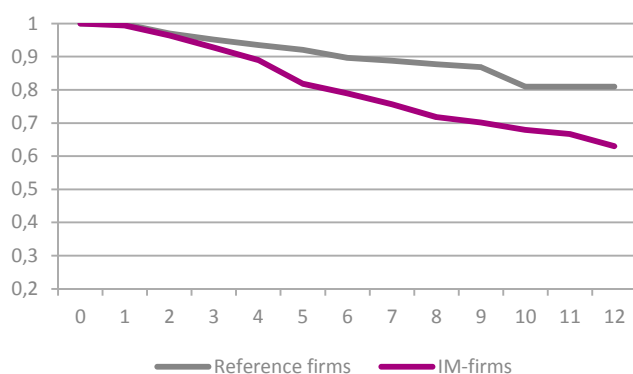


FIGURE 3.2.C: Empirical survivor function: Shares of firms not subject to bankruptcy in the combined Experian-Statistics Denmark data (firm age on horizontal axis)



We conclude the elaboration on firm transitions by taking a look at the statistical robustness of the findings of TABLE A.2.1 by the means of a simple discrete-time hazard models.²⁹ The coeffi-

²⁹ This follows the simple discrete-time estimation set-up suggested by Jenkins, 1995. Note that exponentiated coefficients of the logit models of the table approximate the increases in the predicted probabilities of any of the exit events taking place at a given firm age.

cient estimates of these models approximate the percentage-wise changes in the transition probabilities in association with firm age and whether or not the firm is an IM-firm or not. Results are summarized in TABLE A.2.2 and show that differences in the different transition probabilities between the two groups of firms are outside the ‘normal’ variation, and, thus, statistically significant.³⁰ So these simple statistical tests confirm that IM-firms must be regarded as having higher exit probabilities than other firms sharing basic characteristics.

3.3 Employment growth

Employment growth is one of the most simple and robust measures of additional economic effects that can be expected to be created by the IM-programme. Also, employment growth might be considered the most prominent success measure brought out by the advocates of Innovation support programmes.

For the analysis, employment information is obtained by merging the Experian data and Statistics Denmark’s FIRM statistics database.³¹ Firms’ employment figures are following a skewed distribution, with a large share of firms not showing any positive number of individuals being associated with the firm in the data. For 2011, median employment is two jobs for IM-firms and one job for reference firms, mean employment is 4.2 employees for IM-firms and 4.9 employees for reference firms, and maximum employment is 114 for IM-firms and 178 for reference firms. Recall we only consider firms with a maximum number of 30 employees in the first year they occur in the data.

There are a few highly successful firms in terms of employment growth in both the group of IM-firms and the group of reference firms. These firms realize employment increases of more than a hundred employees over a period of a few years. Although impressive, these developments are still considered to be in a realistic range and not to give any reason to doubt the validity of the employment information in the data. So these ‘outliers’ are kept in the data for the investigations.

At first, it might be noted that we do not observe single firms with any significant job destruction taking place when they exit the data.³² For IM-firms, the largest number of employees in the last year of firm existence (before 2011) is 22 jobs. The corresponding number for reference firms is six jobs. So, spurious job destruction in association with for example firm sales is not suggested to be any major issue in the data.

By construction, IM-firms and reference firms in the data have the same distribution of starting years, i.e., the years in which they occur in the data for the first time. In the following, we distinguish two kinds of job creation of IM-firms and reference firms: (a) job creation before being in the data for the first time, and (b) subsequent job creation. The job creation before being in the data for the first time is equivalent to the number of jobs at firm age zero, which we defined as the first year in which the firm is in the data.

³⁰ This finding is robust to including characteristics of the firms when they were started into the models. These year zero characteristics are statistically significantly related to the exit probabilities, but do not change the estimates related to the comparisons of participant and reference firms.

³¹ Strictly speaking, it is the number of staff and not the number of employees that is measured by these databases. So employment numbers includes the entrepreneur or the owner of the firm, as far as he or she is registered in the data.

³² The year 2011 is the year after which there is no employment registration by Statistics Denmark in our data, which implies a break in the way employment data is registered for the project between 2011 and 2012.

So the number of jobs at firm age zero is the number of jobs in the firm the first time it is in the data, and will be referred to as job creation in association with start-up. And the job creation after firm age zero will be referred to as job creation after start-up.

Employment developments – and the developments of all other success variables of the report – can be followed over calendar time and by firm age. TABLES A.3.1 and A.3.2 in the appendix of this report collect all employment information of all entry cohorts - aggregated and accumulated over firm age and calendar year. Rather than solely concentrating on surviving firms, these tables have the advantage of incorporating employment losses associated with firm exit.

FIGURES 3.3.A-C illustrates the main findings of tables TABLES A.3.1 and A.3.2. First, the development in the number of employees in the combined Experian-Statistics Denmark data over the observation period is illustrated in FIGURE 3.3.A. There is an increase in employment in IM-firms, approaching approximately 1,650 jobs being registered at the end of the observation period.³³

IM-firms have generated fewer jobs than the firms in the reference group. This is mostly due to different increases in the early years of the observation period. The gap in the aggregate employment figures is closing over time, indicating that later cohorts of IM-firms are characterised by higher employment creation compared to the reference firms.

Up to 2011, IM-firms have generated 1,258 jobs before being in the data for the first time. Thus, until 2011, IM-firms have created $(1,644 - 1,258 =)$ 386 jobs on top of the job creation in association with start-up. The corresponding number for firms in the reference group is 444.

So the most prominent share of job creation in both IM-firms and reference firms takes place in association with firm start-up, i.e. before firms are in the data for the first time. See FIGURE 3.3.B for a summary of job creation on top of job creation in the first year of the firms' existence. This figure also illustrates that job creation in the more recent years of the observation period has slowed down: in the period 2006-2011, IM-firms can be shown to have generated 40 additional jobs and reference firms have even reduced employment by 54 jobs.

Up to 2010, all newly started IM-firms of age zero years had a total number of 1,130 jobs. And up to 2011, the same IM-firms, now of firm age 1, had a total number of 1,818 jobs. In other words, the aggregate employment between firm age zero and firm age has increased by $(1,818 / 1,130 = 1.61)$ 61 percent. And up to 2010, all IM-firms of age 1 had a total number of 1,701 jobs. The year after, the same firms had a total number of 1,841 jobs. In other words, the aggregate employment between firm age 1 and firm age 2 years has increased by $(1,841 / 1,701 = 1.08)$ 8 percent.

The rightmost column of TABLE A.3.2 and FIGURE 3.3.C continue this exercise for all firms of all ages. FIGURE 3.3.C uses the growth rates to depict the employment developments of both IM-firms and reference firms relative to employment at age zero. It is found that employment increases on top of first-year employment are taking place in young firms. After approximately three years, the group of IM-firms starts decreasing its number of employees, and after more than approximately nine years, IM-firms' aggregate employment is lower than it was at the first time they figured in the data. The developments in the reference group are more positive in the sense of sustaining higher employment levels, but follow the same negative long-term trend.

In comparison with reference firms, IM-firms grow faster in their first years. This finding would suggest a higher job creation in the first years of the observation period than shown in

³³ Additional investigation suggests that this increase is not a result of single firms (outliers) or large IM-firms started with more than five individuals.

FIGURE 3.3.B. Instead, the seeming divergence of FIGURES 3.3.B and C is evidence of more recent cohorts of IM-firms being more successful in terms of job creation than earlier ones. Yet, the data does not allow for the conclusion that IM-firms and reference firms generate sustainable employment growth on top of the job creation in association with firm start-up.

FIGURE 3.3.A. Employment in the combined Experian-Statistics Denmark database by year



FIGURE 3.3.B: Employment in the combined Experian-Statistics Denmark database by year (net of employment in the first year the firms occur in the data)



FIGURE 3.3.C: Employment in the combined Experian-Statistics Denmark database (aggregate employment relative to employment at firm age zero years (=100%) and firm age on horizontal axis)



Obviously, the aggregate job creation development is hiding a large amount of firm heterogeneity in employment growth, and are combinations of some firms growing and others failing. To shed light on this issue, the subsequent elaborations on employment increases will follow individual firms rather than considering aggregate numbers.

These considerations allow for a higher precision with regards to establishing statistical significance. However, it needs to be kept in mind that any conclusions based on the analysis of individual firms only apply to the subsample of firms that survive in the data, and are thus suffering from what is termed survivorship bias in the literature on evaluation design.

The first evidence on surviving individual firms' employment growth is depicted in FIGURE 3.4.A, which shows that surviving IM-firms are on average increasing their number of jobs by between four and six in the years after start-up.

These numbers are similar to those of the reference group. There is a drop in the average number of employees in the group of IM-firms at firm age seven to eight years. As can be seen in FIGURE 3.4.B, this is a result of a limited number of successful firms in both groups reducing their number of employees or not being observable in the data for more than seven years.

FIGURE 3.4.A: Number of employees in participant and reference firms subtracted the number of employees in year 0 (means and firm age on horizontal axis)

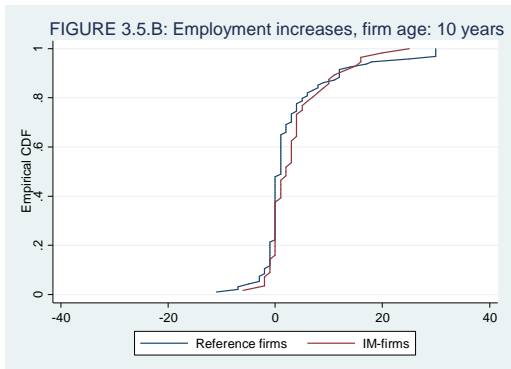
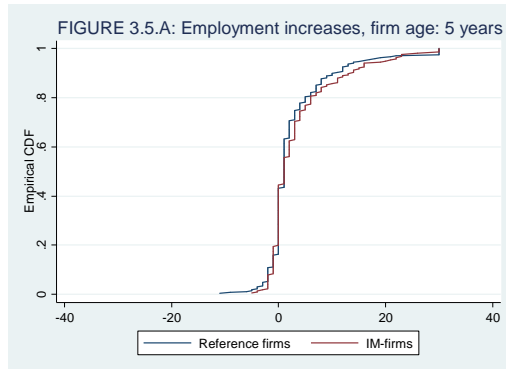


FIGURE 3.4.B: Number of employees in high-growth participant and reference firms subtracted the number of employees in year 0 (percentiles and years after year 0 on horizontal axis)



We can conclude that the average surviving IM-firm generates approximately five jobs on top of the job creation in association with firm foundation. The comparison of IM-firms with similar start-ups suggests that surviving IM-firms are creating slightly more jobs than other similar start-ups, except for (a highly reduced number of) firms above age ten years.

The distribution of job creation surviving firms is also illustrated in FIGURES 3.5.A and B. These show the cumulative empirical distributions of employment increases between firm age 0 and firm age 5 and 10 years, respectively. These distributions are more to the right for IM-firms, indicating relatively more firms creating additional jobs when compared to the selection of reference firms. But differences are small and there are a few firms in the reference group with employment growth above 25 employees that find no equivalents in the group of IM-firms.



Regressions aiming to establish statistical significance fail to detect statistically significant differences in IM-firms' and reference firms' employment growth patterns: TABLE 3.3 summarizes the results of a model that might be considered the most simple and robust to analyse job creation differences: it simply takes the most recent year in the data, which is 2011, and compares employment in 2011 on top of employment at firm age zero.

Model 2 and 3 control for firm age and Model 3 controls for a couple of firm characteristics at firm age zero. Any of the models can establish any evidence on systematic employment growth differences between surviving IM- end reference firms.

TABLE 3.3: Firm-level regressions. Dependent variable: Employment in 2011 subtracted employment at firm age zero years

Variable	Model 1		Model 2		Model 3	
	Coeff.	Ste.	Coeff.	Ste.	Coeff.	Ste.
IM-firm=1	0.21	0.75	0.43	0.51	0.47	0.52
Firm age (in years)			0.42 ***	0.14	1.92 **	0.82
(IM-firm=1)*(Firm age (in years))			0.03	0.17	0.09	0.13
Constant	2.57 ***	0.58	0.42	0.38		
N	762		762		762	
R2	0.000		0.0271		0.3339	
Conditioning variables	no		no		yes	

Notes: ***, **: statistical significance at 1 and 5 percent significance level, respectively. Heteroscedasticity-consistent standard errors.

We conclude the section on employment growth by summarising its main results:

In total, IM-firms employ approximately 1,600 individuals in 2011. The largest share of job creation takes part in association with firm start-up rather than employment growth in existing IM-firms. On aggregate, IM-firms increase employment in the first years of their existence. However, after approximately three years of firm age, the group of IM-firms is, on average, decreasing its numbers of jobs. No evidence can be established of IM-firms being characterised by sustainable job creation. Surviving IM-firms increase employment by approximately 0.5 jobs per year.

Over the entire observation period of the analysis, IM-firms cannot be shown to generate more jobs than highly similar firms selected as a point of reference for comparisons. On aggregate, IM-firms lagged behind in terms of job creation compared to firms in the reference group, however, they were able to catch up and created more jobs than reference firms in the last years of the observation period. Surviving IM-firms cannot be shown to be different from firms in the reference group in terms of job creation.

3.4 Turnover developments

Both turnover and value added, to be covered in the next subsection, are the most obvious measures of economic activity. These variables allow us to conclude whether or not any potential additional effects of the IM-programme are reflected in the bottom line results of IM-firms. In the following it needs to be kept in mind that a share of the firms in the sample can be expected to be characterised by long product development time horizons. For this reason, there might be a number of firms not performing very well in terms of turnover and value added in the first years of their existence.

For the analysis, turnover is measured by Statistics Denmark's variable GF_OMS. This variable is collected by VAT registration, and, thus, available for all registered firms above the minimum activity levels required for being sampled in the Statistics Denmark's firm databases.

Our turnover information is characterised by outliers, i.e. single firms reporting turnover figures orders of magnitude higher than the 99th percentile of the turnover distribution. There are no arguments for dropping these firms from the analysis, as they are, for example, not concentrated in the financial industry or have other common traits that would justify deleting them from the sample. Instead, the sample is divided into different subsamples with different treatments to these outliers:

- i) All IM- and reference firms.

- ii) All IM- and reference firms, except the largest five in terms of turnover in each group in any given year.

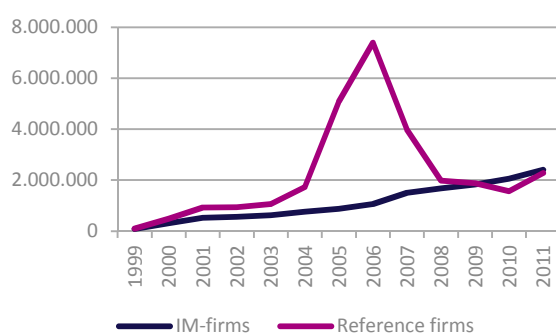
Before moving to the developments in the turnover variable, it might be noted that average turnover difference between IM-firms and reference firms at firm age zero years is $(1324/1221=1.085)$ 8.5 percentage points. Further, cf. FIGURE A.2, there is no indication of larger shares of IM-firms starting their developments in the data with zero turnover than is the case for firms in the reference group, so there is a good basis for the comparisons.³⁴

Aggregate turnover developments are summarised in FIGURES 3.6.A-B.³⁵ It is found that one or a couple of firms in the reference group are experiencing large increases in their turnover up to the financial crisis, which creates a salient peak in the turnover development figures for this group of firms.

Disregarding these very few firms (and the five highest turnover firms in the group of IM-firms) in FIGURE 3.6.C creates a picture that looks familiar from the employment analysis: reference firms experienced greater turnover than IM-firms until the financial crisis in 2008-2009, and similar turnover in the last years of the observation period.

Except for the peak in turnover in the reference group between 2004 and 2007, turnover per employee is approximately DKK 1million for both the group of IM-firms and reference firms, and, thus, is in the expected range.

FIGURE 3.6.A: Aggregate turnover all firms by year (DKK1,000)



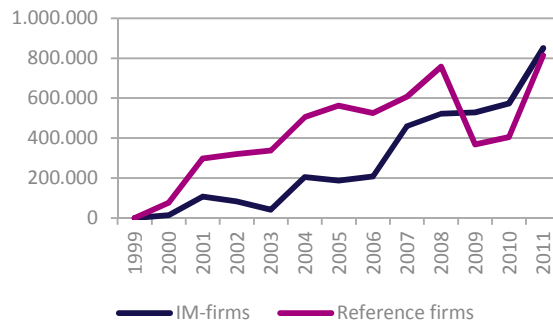
³⁴ This might be important to note, as earlier comparisons of firms receiving venture capital with other firms have been met with the criticism of venture capital being directed at firms without economic sales activity in the first years of their existence. And an earlier Danish study on venture capital fails to select firms with similar turnover levels into the reference group for comparisons (*Ernst and Young, 2010*).

³⁵ For turnover, value added and annual earnings, the report does not present any equivalents to FIGURE 3.3.C. This is because these variables are flow variables, while employment might be considered a state variable.

FIGURE 3.6.B: Aggregate turnover alle firms except for top-5 turnover firms by year (DKK1,000)



FIGURE 3.6.C: Aggregate turnover on top of turnover at firm age zero except for top-5 turnover firms by year (DKK1,000)



Turnover-statistics at the firm level are summarized in FIGURES 3.7.A and B. There is steady increase in the mean turnover for surviving IM-firms up to firm age approximately six years, after which we cannot find any positive development in mean turnover figures.

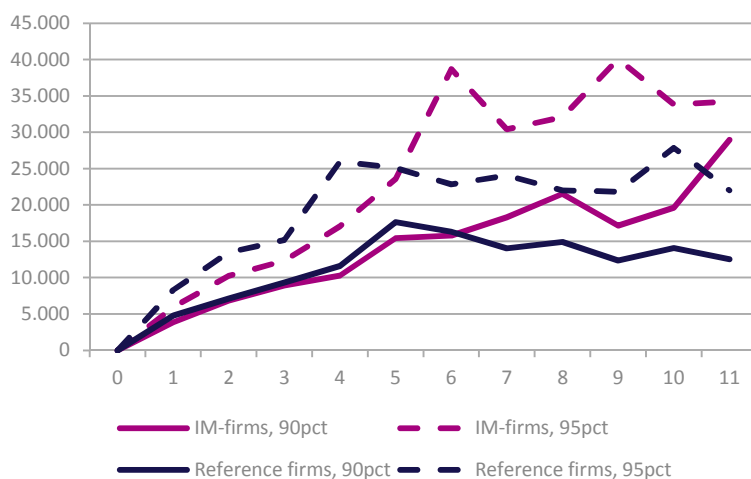
IM-firms and reference firms end up at similar mean turnover levels after seven to eight years. However, there are a couple of firms in the group of reference firms that are characterised by high turn turnover growth in their early years.

The 'erratic' movements in the mean of reference firms' turnover developments are the results of a few outliers: FIGURE 3.7.B suggests turnover developments for the largest share of firms to follow highly similar trends, with relatively more IM-firms being characterised by high turnover growth than reference firms.

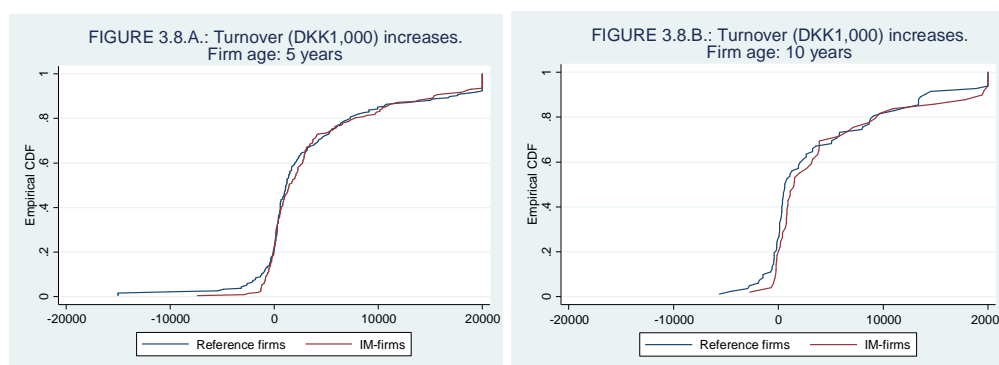
FIGURE 3.7.A: Annual turnover in IM-firms and reference firms (means) subtracted the turnover in year 0 by firm age: years after year 0 on horizontal axis



FIGURE 3.7.B: Annual turnover in high-growth IM-firms and reference firms (percentiles) subtracted the turnover in year 0 by firm age: years after year 0 on horizontal axis



Any potential difference in the distributions of turnover increases is investigated closer in FIGURES 3.8.A and B, which show the empirical cumulative distributions of turnover increases between firm age zero and firm age five and ten years. Just like for employment, we find the IM-firms' distribution being slightly to the right, and just like in FIGURES 3.7.B, there are more successful IM-firms that increase turnover by between approximately DKK12 and 20 million over a ten-year horizon. Yet, distribution differences are, in general, small after ten years and almost absent after five years, so there is little chance to detect statistically significant differences.



It is tested whether or not differences in turnover increases are statistically significantly different between IM-firms and reference firms by simple linear regressions. The results of these regressions are summarized in TABLE 3.4. As expected on the basis of the visual inspections, differences are not statistically significant from zero, and small R² statistics of the regressions of Models 1 and 2 give evidence of IM-programme participation not being able to explain any considerable share of variation in the firms' turnover developments.

TABLE 3.4: Firm-level regressions. Dependent variable: Turnover in 2011 (DKK1,000) subtracted turnover at firm age zero years

Variable	Model 1		Model 2		Model 3	
	Coeff.	Ste.	Coeff.	Ste.	Coeff.	Ste.
IM-firm=1	657	1,468	600	1,040	443	1,094
Firm age (in years)			688 ***	217	1,206	1,189
(IM-firm=1)*(Firm age (in years))			156	294	258	243
Constant	4,784 ***	931	1,264	767		
N	717		717		717	
R ²	0.0003		0.0242		0.2338	
Conditioning variables	no		no		yes	

Notes: ***: statistical significance at 1 percent significance level. Heteroscedasticity-consistent standard errors.

In sum, we find a significant share of IM-firms with a positive turnover in the first year they are registered in the data and a significant increase in turnover in IM-firms in the first years of their existence. There are a couple of highly successful IM-firms in terms of turnover growth, but, in general, IM-firms' turnover developments cannot be shown to be inherently different from other, non-participant firms that share a couple of their first-year characteristics.

3.5 Value added developments

We now turn to the second financial activity measure of the analysis. Value added has the advantage over turnover that it actually measures how much value the firm has added to its products. This is not the case for turnover, which might be generated without enhancing the products sold.

For the analysis, value added is from the Experian variable 'bruttofortjeneste/dækningsbidrag' and defined as turnover subtracted variable costs of production, these are mainly intermediate inputs.

In terms of value added no extreme or unrealistic observations are observed in the data. Just like in the previous subsections, we first take a look at the distribution of this variable at firm age zero, i.e., the first year the firm is in the data, and compare this distribution with the group of firms selected as a benchmark group for comparisons.

As a point of departure, we note, cf. FIGURE A.3, that the largest share of IM-firms have negative value added the first time they are in the data: only fifteen percent of all firms generate more value from sales than they invest into variable inputs. There is poor reporting of the value added figures in the data, which implies that the results for this variable apply only for relatively small shares of all IM-firms and reference firms.

The means of value added differ, see TABLE 3.2, by merely DKK35,000 between IM- firms and reference firms. They are not statistically significantly different from each other. But the Kolmogorov test statistic of the same table and the distribution plot of FIGURE A.3 imply that IM-firms are starting from a weaker position in terms of value added than the reference firms: there are higher shares of IM-firms that have negative value added and lower shares having positive value added in their first year than firms in the reference group.³⁶

The aggregate annual value added developments are summarized in TABLE A.5.1 and A.5.2 and FIGURE 3.9.A.

It is found that IM-firms are characterised by sluggish aggregated value added growth up to approximately 2006, after which growth picks up and ends at approximately DKK600 million at the end of the observation period. This is even slightly higher than for firms in the reference group, the aggregate value added of which increased faster in the beginning of the observation period. Both groups are characterised by low value added in young firms, such that FIGURE 3.9.A and 3.9.B almost give the same aggregate results. Thus, the largest share of value added growth is observed – in contrast to employment growth – to take place in the years after firms occur in the data for the first time.

The observation of low initial growth – to be followed by high growth – of IM-firms is also confirmed when looking at the aggregate value added growth in association with firm age in FIGURE 3.9.C: IM-firms are slow starters, when it comes to value added, but are successful later in creating aggregate value added growth. This suggests that IM-firms are characterised by longer product development time horizons than reference firms.

Furthermore, it is found that, although firm numbers are strongly decreasing in firm age, aggregate value added growth is still positive. And although relative more IM-firms leave the data than firms in the reference group, their aggregate value added increases are still higher than those of the reference group.

³⁶ Note that adding t-test statistics to treatment-control comparisons like the one in TABLE 3.2 is standard in the literature, while adding Kolmogorov-Smirnov statistics and distributional plots is not.

FIGURE 3.9.A: Aggregate value added (DKK1,000) by year



FIGURE 3.9.B: Aggregate value added net of value added at firm age zero by year



FIGURE 3.9.C: Aggregate value added developments (firm age on horizontal axis)



When we look at the development of individual surviving firms in FIGURES 3.10.A and B, we find the same pattern as for the aggregate numbers: low value added growth early on, and substantial value added growth later on.

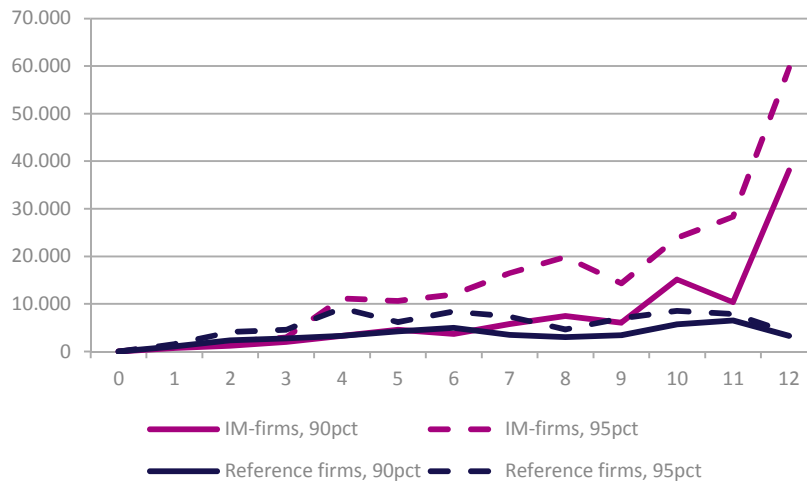
Here, it is important to note that the picture is more positive for IM-firms than suggested by FIGURE 3.10.A, that, for reasons of exposition, was truncated at 11 years of firm age: at firm age 12 years, average value added is 8.8 million DKK in IM-firms against DKK 300,000 for firms in the reference group.

Findings lend themselves to the interpretation of IM-firms following more patient business models than the firms in the reference group.

FIGURE 3.10.A: Value added (DKK1,000) in participant and reference firms (means) subtracted value added at firm age 0 (years after year 0 on horizontal axis)



FIGURE 3.10.B: Value added (DKK1,000) in participant and reference firms (percentiles) subtracted value added at firm age 0 (years after year 0 on horizontal axis)



The finding of surviving IM-firms showing more positive value added developments is further confirmed by the empirical cumulative distributions summarized by FIGURE 3.11.B. However,

Model 2 of TABLE 3.5 finds low statistical significance of this finding and Model 3 finds that statistical significance is not robust to the inclusion of control variables. So the positive results of the analysis of surviving firms still need to be interpreted as tentative.

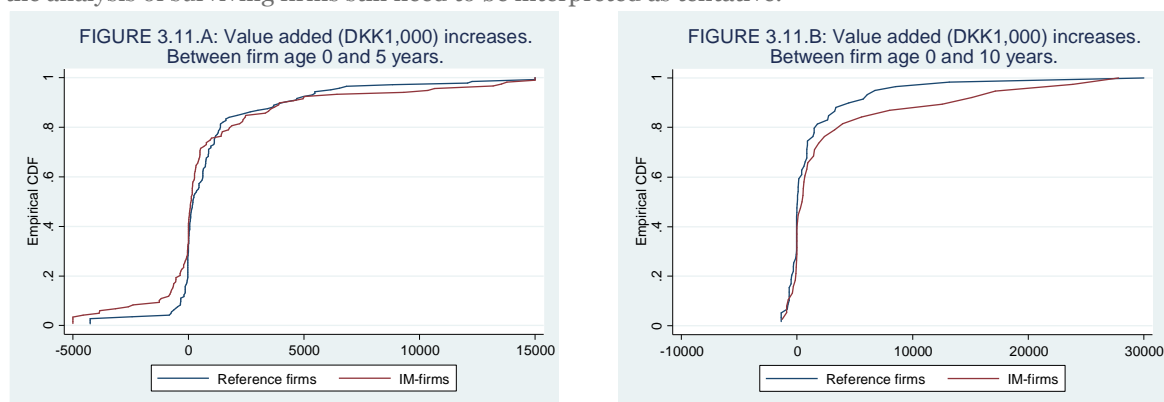


TABLE 3.5: Firm-level regressions. Dependent variable: Value added in 2012 (DKK1,000) subtracted value added at firm age zero years

Variable	Model 1		Model 2		Model 3	
	Coeff.	Ste.	Coeff.	Ste.	Coeff.	Ste.
IM-firm=1	941	770	-1,273	847	-1,041	965
Firm age (in years)			191 **	93	-476	927
(IM-firm=1)*(Firm age (in years))			409 *	244	328	261
Constant	1,247 ***	352	64	281		
N	349		349		349	
R2	0.0048		0.0639		0.2893	
Conditioning variables	no		no		yes	

*Notes: ***, **, *: statistical significance at 1, 5 and 10 percent significance level, respectively. Heteroscedasticity-consistent standard errors.*

3.6 Annual Earnings

We now turn to annual earnings. This is a measure of profitability and financial performance, and can be related to the financial returns of investors like, in this case, the IMs.

Annual earnings are measured by earnings before interest and taxes (ebit). This variable is from the Experian data. There are a couple of records in the group of IM-firms with very high earnings in certain years, but these can be confirmed as related to transactions of highly successful firms that are typically in the pharmaceutical industry.

In the first year firms are in the data average annual earnings are small in absolute value. Firms in the reference group almost perfectly match IM-firms in terms of average net income, but have, cf, FIGURE A.4 in the appendix, lower shares of low-income firms.

With the exception of 2012, which has witnessed a couple of successful business transactions of IM-firms, on average IM-firms have making negative annual earnings. See FIGURE 3.12.A and B. Over the time period 1999 to 2012, annual earnings in IM-firms add up to an accumulated loss of approximately DKK 5 billion (cf. FIGURE 3.12.C). IM-firms and reference firms accumulate similar losses in the first half of the observation period. After approximately 2005, IM-firms accumulate more losses and are thus indicated to be more cost-intensive relative to value added when compared to the firms in the comparison group.

FIGURE 3.12.A: Aggregate annual earnings (DKK1,000) by year



FIGURE 3.12.B: Aggregate annual earnings net of earnings at firm age zero by year

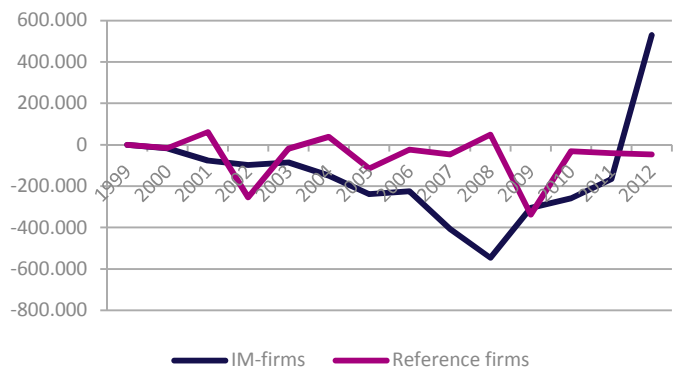
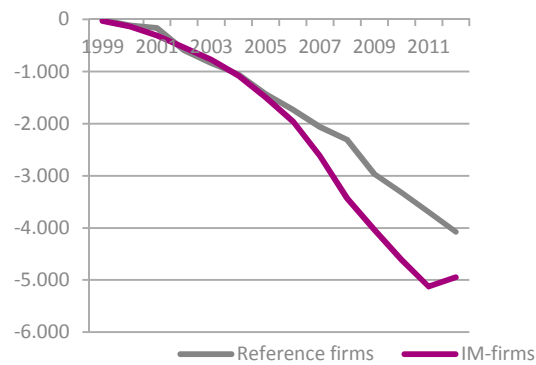


FIGURE 3.12.C: Accumulated total annual earnings (mio. DKK)



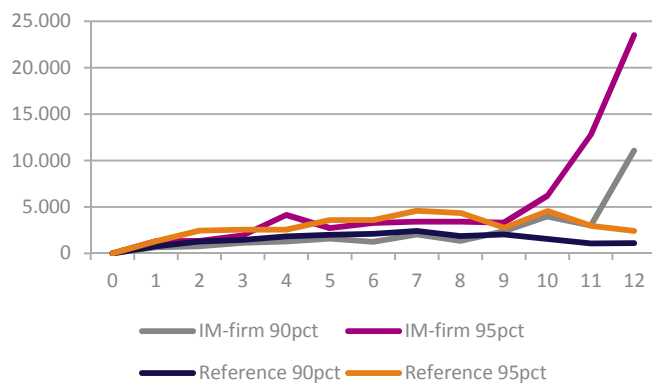
When we look only at surviving firms in FIGURE 3.13 A and B, we find that neither IM-firms nor reference firms manage to make positive earnings in the first years after start-up. Recall both IM-firms' and reference firms' average earnings are approximately minus DKK700,000 in year 0.

It is also found that there is a share of highly successful firms that have survived for more than nine years and make positive profits that find no equivalents in the group of reference firms. The highly successful IM-firms' earnings contribute to bringing average earnings (subtracted year 0 earnings) of surviving IM-firms up to a maximum of DKK 6 million for firms of age twelve years in our data. Unfortunately, only relatively few IM-firms (N=32) can be followed for 12 years in the analysis' data.³⁷

FIGURE 3.13.A: Annual earnings (DKK1,000) in IM-firms and reference firms (means) subtracted earnings in year 0 (years after year 0 on horizontal axis)



FIGURE 3.13.B: Annual earnings in IM-firms and reference firms (percentiles) subtracted annual earnings in year 0 (year after year 0 on horizontal axis)



The distributional plots of FIGURE 3.14.A and B confirm what we have seen already: that there are large shares of IM-firms with low earnings increases in the medium run at firm age 5 years, and some IM-firms being characterised by very high annual earnings after 10 years.

This finding is further confirmed by the regression results of Models 2 and 3: IM-firms decrease profits in their first years of existence, but, according to Model 2, catch up and end up with higher profit increases than firms in the reference group in the long run. Yet, just as it was

³⁷ There are 12 IM-firms that can be observed for 13 years, these have annual earnings of on average DKK1.05 million.

the case for value added, this finding is tentative, and statistical significance does not prevail after inclusion of conditioning variables into the regression of Model 3.

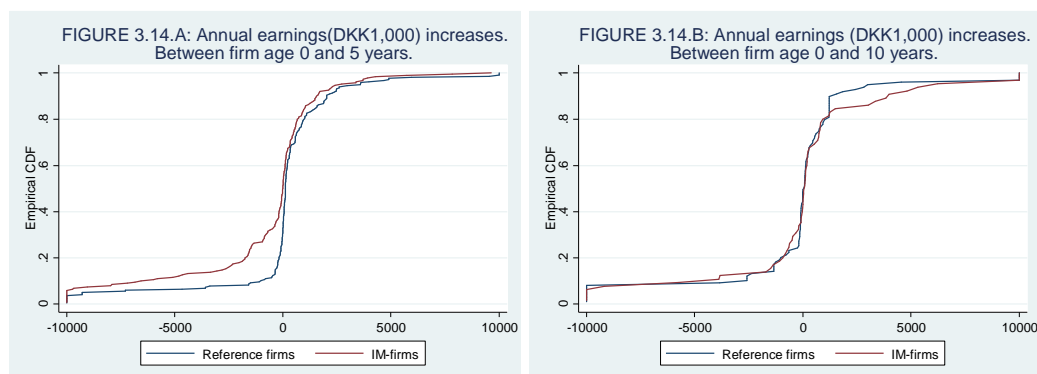


TABLE 3.6: Firm-level regressions. Dependent variable: Annual earnings in 2012 (DKK1,000) subtracted annual earnings at firm age zero years

Variable	Model 1		Model 2		Model 3	
	Coeff.	Ste.	Coeff.	Ste.	Coeff.	Ste.
IM-firm=1	3,098	2,569	-3,486 **	1,411	-3,734	2,622
Firm age (in years)			-202	196	103	1,587
(IM-firm=1)*(Firm age (in years))			1,064 *	634	1,174	838
Constant	-896	989	470	388		
N	486		486		486	
R2	0.0035		0.0036		0.0464	
Conditioning variables	no		no		yes	

Notes: **, *: statistical significance at 5 and 10 percent significance level, respectively. Heteroscedasticity-consistent standard errors.

4. Individual mobility and generation of start-ups

As a final exercise in this report, we add an individual-dimension to the analysis. Little is known about how many individuals of IM-firms start new firms, i.e., whether IM-firms act as ‘hothouses’ for additional start-up activity. It is a fact that a large share of IM-firms fail. But our view on this might change if there is a lot of new entrepreneurial activity in the wake of firms that have closed down.

4.1 Data on individuals in the Statistics Denmark Databases

Matches between individuals (i.e. workers and founders of firms) and firms are identified by the Statistics Denmark FIDA-database that samples all Danish firm-worker employment relationships and up to two firm-worker relationships per individual.

Although the FIDA-database has information on entrepreneurs it should be kept in mind that, not all entrepreneurs are in the FIDA-database. For example, approximate 25 percent of the individual-firm matches that the Statistics Denmark Entrepreneurship database sample as entrepreneurs are not in the FIDA-database. This might be due to the fact that a number of firms in the Entrepreneurship database do not survive until the FIDA-databases census date at mid-November each year.

The following section analyses the mobility of the individuals who are in the FIDA-database. However, in cases where it is possible and where it makes sense to do so, we add individual-firm matches from the Entrepreneurship database – which, according to its sampling scheme only considers individual-firm matches in the data for the first year of firm existence.

For the group of IM-firms, there are 11,488 annual records of firm-worker relationships, or jobs, in the FIDA-database over the time period 1999-2010. These records belong to 626 different IM-firms (against 683 for the time period 1999-2011 mentioned in section 2.3) and 5,042 different individuals (and 5,631 for the time period 1999-2011). The average firm stays for approximately 3.5 years in the database, and the average individual stays with the IM-firm for approximately two years in the database.

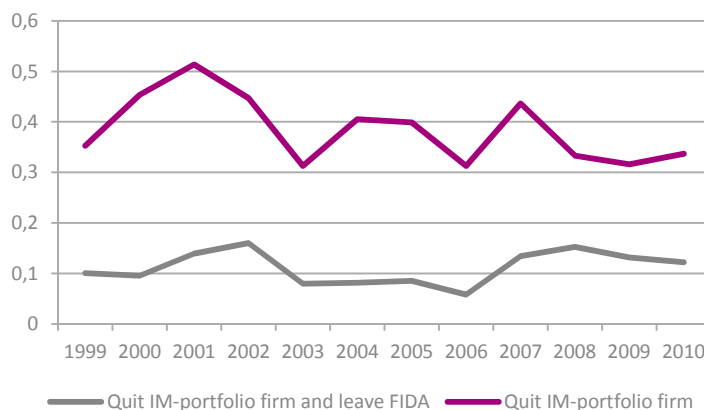
The average size of IM-firms in the FIDA database increases from 2.5 in 1999 to approximately six individuals in 2010, which is in line with what we have seen in the previous section of the report. A number of individuals in IM-firms are registered as having other jobs at other firms: for 2,716 (24 percent) of the 11,488 records, the individual has a different job somewhere else in the FIDA-database.

4.2 Job mobility and firm creation

It is found that large shares of individuals in IM-firms leave the IM-firms every year. As FIGURE 4.1 illustrates, approximately 40 percent of total (FIDA-database) staff quit IM-firms every year, and approximately 10 percent leave the FIDA database. A share of individuals leaving their firms

must be presumed to be leaving in association with firm closure; we will elaborate on this presumption further below.

FIGURE 4.1: Shares of individuals who quit IM-firms between t and t+1



Of all 3,488 (FIDA-database) individuals who quit to another firm in a given year t, 595, or 17 percent, are in firms that occur in the FIDA or in the IV database in year t+1 for the first time. And 10.9 percent move to firms started in year t.

Thus, approximately one fourth of all employees who leave IM-firms are moving to new firms or firms of age below two years. This measures the propensity of IM-firms to generate new firms. We do not know the specific roles of these individuals in the IM-firms from which they are originating or in the new firm. So we might not want to call these individuals for ‘serial entrepreneurs’.

4.3 New firm creation by the staff of IM-firms

In the combined IV-FIDA database there are a total of 537 new firms in the period 2000-2011 with individuals who were associated with IM-firms in the previous year. This number is the maximum number of potential (first-generation) spin-off firms, and might be related to the total number of 626 IM-firms present in the FIDA database.

This indicates that, on average, there is roughly one new firm started by or with IM-firm employees for each IM-firm in the FIDA-database. Of course the employees of some IM-firms are more likely to be in new firms in the following year than others, and not every IM-firm supplies individuals who are moving to new firms.

The share of IM-firms in the FIDA-database in a given year for which at least one of the firm’s employees are in a new firm in the year after is approximately 25 percent. For example, there are 197 IM-firms in the FIDA database in 2005, and 45 newly started firms in the IV-FIDA-database in 2006 with individuals that were associated with an IM-firm in the previous year. So, for 2005, $(45/197) \approx 23$ percent of all IM-firms have at least one individual in a newly started firm in FIDA in 2006.

See FIGURE 4.2.A for the absolute numbers of new firms with IM-individuals and FIGURE 4.2.B for the average number of spin-offs generated per IM-firm. The latter is calculated as the number of new firms with IM-individuals in t+1 over the number of IM-firms in year t.

FIGURE 4.2.A: Number of new firms in FIDA-database in t+1 with IM-individuals (t)



Figure 4.2.B: Number of new firms in FIDA-database in t+1 with IM-individuals (t) over number of IM-firms (t)



FIGURE 4.2.A and B illustrate non-increasing new firm generation activity in the wake of IM-firms. This is remarkable, as the number of individuals in IM-firms is increasing strongly from 139 in 1999 to 1,519 in 2010.

And indeed, the share of *individuals* in IM-firms in the FIDA-database that are in new firms in the FIDA-database in the year after is strongly decreasing over time, cf. FIGURE 4.3. So it is not the number of individuals that are related to new firm creation activity of employees, but the number of IM-firms – which indicates that it is a small share of IM-firm-staff, most probably the founders, that are engaged in entrepreneurship.³⁸

³⁸ Another indication of this is that the approximately 600 different individuals that leave IM-firms to newly started firms are filling approximately 750 different jobs (individual-firm matches) in these newly started firms over the period 2000-2011, i.e., many individuals are found in more than just one newly started firm after having left their IM-firm.

FIGURE 4.3: Share of individuals in new firms in t+1



4.4 The number of IM-firm ‘spin-offs’

To elaborate a bit further on the firm creation activity of IM-firm-individuals, we distinguish new start-ups by their shares of individuals originating from the same previous firms. This measures the organisational inheritance of established to new firms.

For example, if a large share of individuals in a new firm were previously employed in the same former firm, the new firm might be considered an “offspring”, or “spin-off” of the former firm. We follow this notion, and define a spin-off as a new firm in the IV-FIDA-data, in which more than 50 percent of staff (for two-individual start-ups: both individuals) originates from the same previous firm in the year before.

In total, there are 316 firm-records in the IV-FIDA data (corresponding to a 14 percent share of a total of 2,183 firm-records) that generate a total number of 394 spin-offs over the period 1999-2010; however, 315 (80 percent) of these spin-offs are one-individual start-ups that are spin-offs by definition. There are 41 two-individual start-ups where one individual was previously employed in an IM-firm. And there are 38 spin-offs with at least two IM-firm-individuals moving to the same new firm and constituting more than 50 percent of the staff in the new firm.

We conclude, therefore, that, except for one-individual-start-ups, only a minor share of the new firms in the combined IV-FIDA-database with previous IM-firm-individuals can be shown to have strong ties to the IM-firm in terms of worker movements.

4.5 Individual mobility in association with firm exit

The following continues on the basis of the previous subsection on spin-offs and now only considers individual mobility in association with firm exit (defined as firms leaving the FIDA-data).

This is motivated by the wish to help understanding whether an exit of IM-firms is to be interpreted as business closure, or merely organisational transitions. If, for example, large shares of individuals were to be found in the same other workplace after exit, this exit might arguably be a result of a firm sale or merger rather than business dissolution. This is related to the question of whether high closure rates are ‘real’ or an indication of the presence of closures with the purpose of getting rid of financial obligations and outside owners.

Of the 626 different firms in the FIDA-database, 420 leave FIDA before 2011. So it is found that closure rates are higher in the Statistics Denmark employer-employee database when com-

pared to the combined Experian-Statistics Denmark database employed in the first section of the report, where positive employment was not a defining condition for firm survival.

And of the 11,488 jobs in IM-firms in the FIDA-database, 1,196 are in firms that are not found in the database in the year after. So even though we observe high firm closure rates of IM-firms, 'only' 10 percent of IM-firm jobs are lost every year by firm closure. We saw earlier that almost 40 percent of IM-firm-employees leave their firm every year, and now we can conclude that approximately 10 percent of IM-firm-employees leave their firm because it is closing operation.

Of the 420 closing firms, 225, i.e., more than half of these are registered as having only one single individual associated with the firm in the last year of its existence. Of these, 166 individuals are in other (not necessarily new) firms in the combined IV-FIDA-database in the year after. It was not investigated what happened to the remaining 59 individuals that might have become unemployed, moved abroad, or died.

There are a total number of 74 firms with two employees in their last year of existence. It happens seven times that both of these two employees are moving to the same (not necessarily new) firm in the combined IV-FIDA-database in the year after. There are 121 firms with at least three employees in their last year of existence. Of these, in 29 cases more than fifty percent of employees are in the same (not necessarily new) firm in the year after closure, and in 9 cases, more than 75 percent of employees are in the same (not necessarily new) firm in the year after. FIGURE 4.4 summarizes these numbers.

In sum, the present information in the Statistics Denmark employer-employee data does not suggest that the closures of any significant share of IM-firms are due to organization transitions and not business dissolutions.

FIGURE 4.4: Number of new firms started with individuals from closed IM-firms. By employee movements in association with firm closure (number of IM-firm's last year's staff on horizontal axis)



4.6 Emigration decisions of IM-staff

We conclude the study of individual mobility staff by considering emigration decisions of the staff of IM-firms.

First, it can be noted that IM-firm employees are characterised by high international mobility, with approximately 2,000 of the 5,631 IM-employees in the FIDA-database (over the period 1999-2011), or 35 percent, occurring in the Statistics Denmark international migration database. This database samples all registered migration events from 1970 onward.

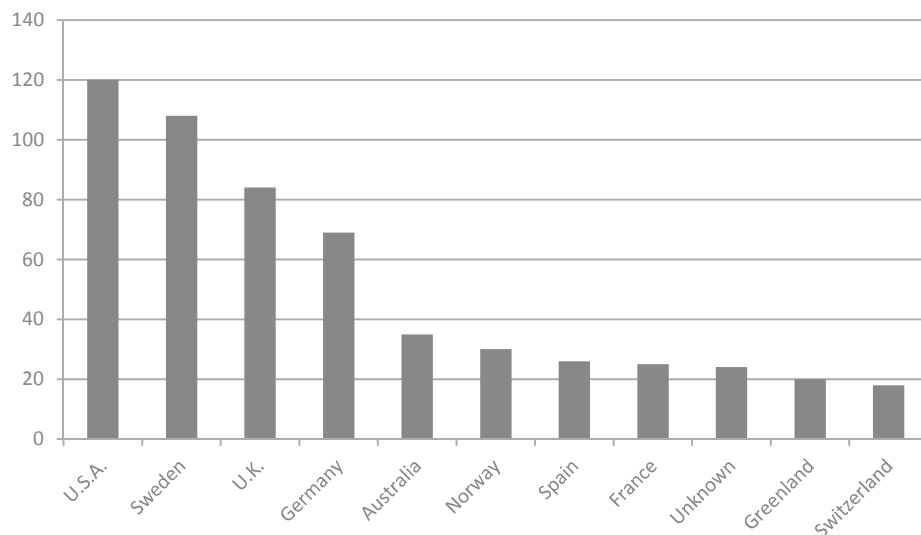
The 35-percent share might be related to an 18 percent of all FIDA-employees in 2010 being sampled in the same database. Interestingly, the largest share of migration events of IM-firm-employees is before they started becoming part of IM-firms.

Typical emigration countries of IM-firm-individuals are the U.S.A., Sweden and the U.K., see FIGURE 4.5 for latest emigration information of these individuals over the period 1999-2012.

Of the 11,520 records of IM-firm-individuals in the FIDA-data, 186, or 1.6 percent, are registered as moving abroad in the same or in the following year. So it is not emigration that lies behind the large quit rates that were registered for the IM-individuals in the FIDA-database.

Of the 1,196 records of IM-firm-individuals in the FIDA-database in firms that leave the data in the following year, 34, or 2.8 percent, are leaving Denmark in the last year of their firm's existence in the FIDA-database or the year after. So there is also no indication of any significant share of firm closures in Denmark being motivated by simply moving activity abroad.

FIGURE 4.5: Destination countries of emigrating IM-firm individuals



4.7 Short summary of the analysis of individual mobility

In short, we find high mobility of IM-firms staff, with approximately 40 percent of individuals leaving IM-firms every year. Approximately 10 percent are leaving their IM-firm to move to jobs in other newly started firms, and approximately 10 percent of them are leaving because their IM-firm it is closing down.

The analysis finds that, on average, roughly one new firm is started by or with IM-firm employees for each IM-firm in the FIDA-database and that approximately 25 percent of IM-firms in the FIDA-database in a given year, have at least one of the firm's employees in a new firm in the following year. There are only few new firms in the data that inherit groups of individuals from IM-firms and which may be considered 'spin-offs'.

It happens rarely that individuals of closed-down IM-firms are found in the same new firm in the year after, or migrate outside Denmark in association with firm exit.

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6. Appendix

TABLE A.1: Logit model estimation results. Selected coefficients

	Coefficient		Standard error
Number of employees==1	0.2622661	**	0.1272261
Number of employees==2	1.222483	***	0.147239
Number of employees==(3,4)	1.01227	***	0.1683967
Number of employees==(5,7)	1.081062	***	0.2248791
Number of employees==(8,10)	0.3204484		0.3034104
Number of employees==11+	-0.489454		0.4269707
Average age	-0.0421354		0.0280739
(Average age^2)/100	0.0316906		0.033697
Share female	-1.515709	***	0.1931771
Share of tertiary-level educated	1.170964	***	0.1175994
Share of PhDs	1.802984	***	0.2194382
Turnover (DKK 1,000)	-0.00000808		0.00000237
Value added (DKK 1,000)	-0.0001053	***	0.0000388
(Value added (DKK 1,000,000))^2	0.0089117	***	0.0033751
Earnings (DKK 1,000)	-0.0000949	**	0.0000421
(Earnings >0) x (Earnings (DKK 1,000,000))^2	-0.0883739		0.0872207
(Earnings <0) x (Earnings (DKK 1,000,000))^2	-0.001083		0.0010552
Total assets; balance (DKK 1,000)	-0.0001342	***	0.0000218
Equity (DKK 1,000)	0.0001171	***	0.0000219

Notes: *, **, ***: statistically significant at 10, 5 and 1 percent level. Additional coefficients: year dummies (15), industry dummies (53), constant term, dummy variables for missing observations for all above-shown explanatory variables.

TABLE A.2.1: Firm closures by year and firm age

Year	Number of firms that are in Experian and/or DST data		Number of firms that are in Experian and/or DST data for the last time (exits)		Number of firms that are in Experian and/or DST data for the last time and registered as closures		Number of firms that are in Experian and/or DST data for the last time and registered as bankruptcies	
	Reference firms	IM-firms	Reference firms	IM-firms	Reference firms	IM-firms	Reference firms	IM-firms
	A	B	C	D	E	F	G	H
1999	73	73	5	1	1	1	0	1
2000	218	223	18	21	7	8	0	1
2001	293	302	33	36	14	18	1	2
2002	322	335	40	64	28	63	11	23
2003	349	335	29	44	18	44	3	15
2004	370	338	34	29	23	29	9	8
2005	385	357	22	43	13	43	3	18
2006	418	369	30	34	17	34	2	12
2007	439	386	30	50	17	48	7	16
2008	436	372	31	36	24	36	9	14
2009	478	400	34	20	21	20	10	9
2010	510	443	56	31	34	31	18	14
Total			362	409	217	375	73	133
Firm age								
0	823	823	67	29	29	18	2	5
1	674	731	80	90	43	72	19	22
2	546	581	63	86	43	83	10	22
3	461	461	31	57	22	56	8	19
4	393	365	25	51	19	51	6	29
5	340	277	27	32	17	32	9	10
6	293	221	17	23	12	23	3	9
7	250	173	10	19	7	19	3	9
8	208	134	16	11	10	10	2	3
9	162	93	19	7	13	7	11	3
10	101	56	3	2	1	2	0	1
11	40	18	4	2	1	2	0	1
Total			362	409	217	375	73	133

TABLE A.2.2: Discrete time hazard (logit) model estimation results. Sample: active firms present in either Experian or Statistics data, 1999-2010, maximum firm age 10 years

	Dependent variable: The firm becomes inactive (exit)				Dependent variable: firm becomes inactive as closure				Dependent variable: firm becomes inactive as bankruptcy			
	Model 1		Model 2		Model 1		Model 2		Model 1		Model 2	
	Coefficients	Standard errors	Coefficients	Standard errors	Coefficients	Standard errors	Coefficients	Standard errors	Coefficients	Standard errors	Coefficients	Standard errors
Firm age=0 (omitted category)												
Firm age=1	0.341 **	0.173	1.058 ***	0.216	0.551 **	0.245	0.486 **	0.246	2.408 ***	0.745	2.343 ***	0.745
Firm age=2	0.303 *	0.184	1.018 ***	0.224	0.770 ***	0.246	0.695 ***	0.247	1.962 **	0.777	1.898 **	0.777
Firm age=3	-0.269	0.225	0.448 *	0.258	0.253	0.288	0.178	0.289	1.920 **	0.793	1.860 **	0.793
Firm age=4	-0.341	0.242	0.376	0.274	0.253	0.301	0.182	0.301	1.777 **	0.819	1.724 **	0.819
Firm age=5	-0.104	0.236	0.617 **	0.269	0.289	0.312	0.226	0.312	2.338 ***	0.784	2.289 ***	0.784
Firm age=6	-0.454	0.279	0.265	0.307	0.065	0.349	-0.003	0.350	1.358	0.915	1.312	0.915
Firm age=7	-0.848 **	0.346	-0.126	0.369	-0.332	0.427	-0.401	0.427	1.513 *	0.915	1.469	0.916
Firm age=8	-0.235	0.288	0.486	0.315	0.154	0.374	0.090	0.374	1.219	1.003	1.181	1.003
Firm age=9	0.167	0.272	0.891 ***	0.301	0.640 *	0.343	0.584 *	0.344	3.169 ***	0.773	3.145 ***	0.773
Firm age=10	-1.543 **	0.596	-0.815	0.610	-1.771 *	1.020	-1.829 *	1.021	-11.777	574.450	-11.777	598.772
IM-firm x Firm age=0	-0.883 ***	0.228	-0.172	0.261	-0.490	0.304	-0.547 *	0.304	0.920	0.838	0.860	0.838
IM-firm x Firm age=1	0.022	0.162	0.016	0.162	0.448 **	0.199	0.458 **	0.200	0.050	0.317	0.055	0.317
IM-firm x Firm age=2	0.242	0.176	0.238	0.176	0.618 ***	0.197	0.634 ***	0.197	0.708 *	0.385	0.714 *	0.386
IM-firm x Firm age=3	0.609 ***	0.232	0.602 ***	0.232	0.950 ***	0.259	0.965 ***	0.260	0.837 **	0.426	0.836 *	0.426
IM-firm x Firm age=4	0.815 ***	0.254	0.810 ***	0.254	1.104 ***	0.278	1.107 ***	0.278	1.666 ***	0.454	1.660 ***	0.454
IM-firm x Firm age=5	0.313	0.272	0.305	0.272	0.803 **	0.310	0.797 **	0.310	0.230	0.465	0.216	0.466
IM-firm x Firm age=6	0.542	0.330	0.536	0.331	0.906 **	0.366	0.892 **	0.366	1.328 **	0.672	1.312 *	0.672
IM-firm x Firm age=7	0.975 **	0.401	0.965 **	0.401	1.342 ***	0.451	1.332 ***	0.452	1.408 **	0.673	1.391 **	0.673
IM-firm x Firm age=8	0.009	0.404	-0.002	0.404	0.402	0.458	0.384	0.459	0.798	0.918	0.783	0.918
IM-firm x Firm age=9	-0.628	0.456	-0.646	0.456	-0.218	0.482	-0.249	0.483	-0.918	0.660	-0.959	0.661
IM-firm x Firm age=10	0.006	0.921	-0.012	0.921	1.116	1.231	1.092	1.231	13.127	574.451	13.072	598.773
Constant	-2.506 ***	0.127			-3.388 ***	0.189			-6.094 ***	0.708		
Conditioning variables:	no		yes		no		yes		No		yes	
N	9,702		9,648		9,702		9,648		9,702		9,648	

Notes: ***, **, *: statistically significant at the 1, 5, and 10 percent significance level. Conditioning variables (all at firm age 0 years): Number of employees, value added, annual earnings, turnover and equity.

TABLE A.3.1: Employment in the combined Statistics Denmark-Experian database. IM-firms and reference firms. By entry cohort and year

	Entry cohort:													First-year employment	Accumulated first-year employment	Total employment	Total employment minus accumulated first-year employment	
	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011					
Reference firms:																		
Year: 1999	104														104	104	104	0
2000	161	237													237	341	398	57
2001	170	394	197												197	538	761	223
2002	122	370	256	79											79	617	827	210
2003	115	308	307	110	119										119	736	959	223
2004	138	277	370	143	119	64									64	800	1,111	311
2005	127	257	456	148	109	111	67								67	867	1,275	408
2006	107	232	491	182	126	122	105	55							55	922	1,420	498
2007	112	257	529	203	138	123	127	108	68						68	990	1,665	675
2008	105	225	484	217	114	71	112	133	69	37					37	1,027	1,567	540
2009	96	204	363	212	104	68	107	141	53	24	70				70	1,097	1,442	345
2010	100	213	306	189	66	48	86	209	45	32	90	74			74	1,171	1,458	287
2011	96	211	348	178	78	84	103	233	67	35	95	87	60		60	1,231	1,675	444
Total	1,553	3,185	4,107	1,661	973	691	707	879	302	128	255	161	60		1,231		14,662	4,221
IM-firms:																		
Year: 1999	111														111	111	111	0
2000	214	197													197	308	411	103
2001	219	313	110												110	418	642	224
2002	162	230	160	93											93	511	645	134
2003	110	196	149	121	98										98	609	674	65
2004	122	179	185	109	272	57									57	666	924	258
2005	112	163	129	126	354	84	71								71	737	1,039	302
2006	122	183	144	118	289	105	122	107							107	844	1,190	346
2007	115	162	151	151	326	123	183	149	77						77	921	1,437	516
2008	109	123	113	172	239	106	216	116	97	41					41	962	1,332	370
2009	93	119	104	143	211	107	233	120	135	57	75				75	1,037	1,397	360
2010	90	122	90	130	177	123	246	117	115	89	112	93			93	1,130	1,504	374
2011	75	118	73	100	149	134	271	109	121	97	152	117	128		128	1,258	1,644	386
Total	1,654	2,105	1,408	1,263	2,115	839	1,342	718	545	284	339	210	128		1,654		12,950	3,438

TABLE A.3.2: Employment in the combined Statistics Denmark-Experian database. IM-firms and reference firms. By entry cohort and firm age

	Entry cohort:													Aggregate employment, up to 2010	Aggregate employment, up to 2011	Employment growth, by firm age
	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011			
Reference firms:																
Accumulated first-year employment:	104	341	538	617	736	800	867	922	990	1027	1097	1171	1231			
Firm age:																
0	104	237	197	79	119	64	67	55	68	37	70	74	60	1,171	1,231	1.395388557
1	161	394	256	110	119	111	105	108	69	24	90	87		1,547	1,634	1.073691015
2	170	370	307	143	109	122	127	133	53	32	95			1,566	1,661	0.977011494
3	122	308	370	148	126	123	112	141	45	35				1,495	1,530	1.084949833
4	115	277	456	182	138	71	107	209	67					1,555	1,622	1.022508039
5	138	257	491	203	114	68	86	233						1,357	1,590	1.002210759
6	127	232	529	217	104	48	103							1,257	1,360	0.962609387
7	107	257	484	212	66	84								1,126	1,210	0.858792185
8	112	225	363	189	78									889	967	0.892013498
9	105	204	306	178										615	793	1.068292683
10	96	213	348											309	657	1.006472492
11	100	211												100	311	0.96
12	96														96	
Total	1,553	3,185	4,107	1,661	973	691	707	879	302	128	255	161	60	12,987	14,662	
IM-firms:																
Accumulated first-year employment:	111	308	418	511	609	666	737	844	921	962	1037	1130	1258			
Firm age:																
0	111	197	110	93	98	57	71	107	77	41	75	93	128	1,130	1,258	1.608849558
1	214	313	160	121	272	84	122	149	97	57	112	117		1,701	1,818	1.082304527
2	219	230	149	109	354	105	183	116	135	89	152			1,689	1,841	0.964476021
3	162	196	185	126	289	123	216	120	115	97				1,532	1,629	0.939295039
4	110	179	129	118	326	106	233	117	121					1,318	1,439	0.971927162
5	122	163	144	151	239	107	246	109						1,172	1,281	1.043515358
6	112	183	151	172	211	123	271							952	1,223	0.893907563
7	122	162	113	143	177	134								717	851	0.866108787

8	115	123	104	130	149										472	621	0.88559322
9	109	119	90	100											318	418	0.905660377
10	93	122	73												215	288	0.96744186
11	90	118													90	208	0.833333333
12	75															75	
Total	1,654	2,105	1,408	1,263	2,115	839	1,342	718	545	284	339	210	128		11,306	12,950	

TABLE A.4.1: Turnover. IM-firms and reference firms. By entry cohort and year

	Entry cohort:													First-year turnover	Accumulated first-year turnover	Total turnover	Total turnover minus accumulated first-year turnover	
	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011					
Reference firms:																		
Year:																		
1999	97,873.7														97,873.67	97,873.67	97,873.67	0
2000	143,117	339,086													339,086.3	436,960	482,202.8	45,242.83
2001	158,406	629,950	139,279												139,279	576,239	927,635.2	351,396.2
2002	133,320	472,046	278,548	56,420.1											56,420.09	632,659.1	940,333.7	307,674.6
2003	122,406	417,114	331,092	120,941	68,523.5										68,523.48	701,182.5	1,060,076	358,893.9
2004	136,477	512,719	698,359	199,041	133,008	49,080.7									49,080.66	750,263.2	1,728,685	978,422.1
2005	143,609	300,783	1,387,364	229,672	139,706	2,839,337	33,685.4								33,685.4	783,948.6	5,074,156	4,290,208
2006	125,510	272,703	2,062,969	115,453	126,359	4,572,259	72,387.8	39,480.5							39,480.45	823,429.1	7,387,121	6,563,692
2007	133,731	242,346	2,877,128	216,767	153,872	125,025	102,969	81,528.2	58,186.4						58,186.39	881,615.4	3,991,553	3,109,938
2008	161,883	283,037	548,453	325,708	195,780	135,002	120,075	83,686.7	104,778	26,285.7					26,285.71	907,901.2	1,984,688	1,076,787
2009	120,039	257,448	819,368	117,059	143,495	88,955	106,600	87,044.5	85,662	23,707	33,468				33,468	941,369.2	1,882,846	941,477
2010	120,516	264,195	339,197	168,914	97,151.3	102,981	121,178	110,523	84,666.4	33,731.4	63,717.7	61,688.2			61,688.23	1,003,057	1,568,459	565,401.3
2011	140,795	333,508	460,998	223,520	197,159	131,416	145,390	211,433	789,07.7	42,505.8	96,323.1	191,900	33,515.4		33,515.39	1,036,573	2,287,371	1,250,798
Total	1,737,681	4,324,935	9,942,755	1,773,496	1,255,054	8,044,056	702,286	613,695	412,200	126,230	193,509	253,588	33,515.4		1,036,573		29,413,001	19,839,930
IM-firms:																		
Year:																		
1999	85,764.3														85,764.3	85,764.3	85,764.3	0
2000	147,446	155,921													155,921	241,685.3	303,366.8	61,681.53
2001	214,466	220,239	84,706.4												84,706.4	326,391.7	519,410.5	193,018.8

2002	140,526	228,835	118,728	71,829.9											71,829.9	398,221.6	559,919	161,697.4
2003	110,335	248,046	99,375.8	98,221.5	70,845.6										70,845.6	469,067.3	626,823.4	157,756.1
2004	112,673	160,207	171,378	82,277.4	188,070	44,186.8									44,186.8	513,254	758,791.1	245,537.1
2005	102,197	154,309	136,135	103,112	234,821	71,079.4	67,512.3								67,512.3	580,766.3	869,164.8	288,398.5
2006	140,565	133,083	107,135	131,441	277,075	116,598	104,473	49,935							49,935	630,701.3	1,060,305	429,603.8
2007	107,603	166,238	145,932	196,720	396,255	91,881.1	207,485	129,050	63,832.5						63,832.5	694,533.7	1,504,997	810,463.3
2008	95,916.9	222,985	118,614	197,333	367,885	100,181	298,631	113,395	111,215	46,821.7					46,821.7	741,355.4	1,672,978	931,622.2
2009	101,293	217,125	132,919	159,111	295,766	129,370	402,273	117,091	177,472	46,319	48,126				48,126	789,481.4	1,826,866	1,037,385
2010	133,359	177,514	129,657	143,825	369,461	89,225.5	481,739	113,218	178,834	79,531.4	106,469	49,672.6			49,672.6	839,154	2,052,503	1,213,349
2011	128,497	186,489	97,158.7	149,401	244,239	98,214.4	513,183	171,849	253,417	118,590	182,785	151,708	109,481	109,480.8	948,634.8	2,405,011	1,456,376	
Total	1620,640	2,270,989	1,341,739	1,333,272	2,444,417	740,737	2,075,295	694,538	784,770	291,262	337,379	201,380	109,481	162,0640		14,245,899	6,986,888	

TABLE A.4.2: Turnover. IM-firms and reference firms. By entry cohort and firm age

	Entry cohort:													Total turnover, up to 2010	Total turnover, up to 2011	Turnover growth, by firm age
	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011			
Reference firms:																
Aggregate first-year turnover:	97873,7	436960	576239	632659	701183	750263	783949	823429	881615	907901	941369	1003057	1036573			
Firm age:																
0	97,873.7	339,086	139,279	56,420.1	68,523.5	49,080.7	33,685.4	39,480.5	58,186.4	26,285.7	33,468	61,688.2	33,515.39	1,003,057	1,036,573	4.668645
1	143,117	629,950	278,548	120,941	133,008	2,839,337	72,387.8	81,528.2	104,778	23,707	63,717.7	191,900		4,491,019	4,682,919	1.397216
2	158,406	472,046	331,092	199,041	139,706	4,572,259	102,969	83,686.7	85,662	33,731.4	96,323.1			6,178,599	6,274,922	0.334079
3	133,320	417,114	698,359	229,672	126,359	125,025	120,075	87,044.5	84,666.4	42,505.8				2,021,635	2,064,141	1.346854
4	122,406	512,719	1,387,364	115,453	153,872	135,002	106,600	110,523	78,907.7					2,643,939	2,722,847	1.261127
5	136,477	300,783	2,062,969	216,767	195,780	88,955	121,178	211,433						3,122,910	3,334,342	1.284384
6	143,609	272,703	2,877,128	325,708	143,495	102,981	145,390							3,865,625	4,011,015	0.326451
7	125,510	242,346	548,453	117,059	9715,1,3	131,416								1,130,519	1,261,935	1.417233
8	133,731	283,037	819,368	168,914	197,159									1,405,050	1,602,209	0.698942
9	161,883	257,448	339,197	223,520										758,527.5	982,047.7	1.114307
10	120,039	264,195	460,998											384,234.1	845,232.2	1.181632
11	120,516	333,508												120,515.7	454,023.4	1.168273
12	140,795														140,795.2	

Total	1,737,681	4,324,935	9,942,755	1,773,496	1,255,054	8,044,056	702,286	613,695	412,200	126,230	193,509	253,588	33,515.39	27,125,630	29,413,001	
IM-firms:																
Aggregate first-year turnover:	85,764.3	241,685	326,392	398,222	469,067	513,254	580,766	630,701	694,534	741,355	789,481	839,154	948,635	Total turnover, up to 2010	Total turnover, up to 2011	Turnover growth, by firm age
Firm age																
0	85,764.3	155,921	84,706.4	71,829.9	70,845.6	44,186.8	67,512.3	49,935	63,832.5	46,821.7	48,126	49,672.6	109,481	839,154	948,634.8	1.779192
1	147,446	220,239	118,728	98,221.5	188,070	71,079.4	104,473	129,050	111,215	46,319	106,469	151,708		1,341,308	1,493,016	1.295034
2	214,466	228,835	99,375.8	82,277.4	234,821	116,598	207,485	113,395	177,472	79,531.4	182,785			1,554,255	1,737,040	1.12283
3	140,526	248,046	171,378	103,112	277,075	91,881.1	298,631	117,091	178,834	118,590				1,626,573	1,745,163	1.10875
4	110,335	160,207	136,135	131,441	396,255	100,181	402,273	113,218	253,417					1,550,045	1,803,462	1.11073
5	112,673	154,309	107,135	196,720	367,885	129,370	481,739	171,849						1,549,832	1,721,681	0.952825
6	102,197	133,083	145,932	197,333	295,766	89,225.5	513,183							963,536.8	1,476,719	1.092022
7	140,565	166,238	118,614	159,111	369,461	98,214.4								953,988.7	1,052,203	0.892641
8	107,603	222,985	132,919	143,825	244,239									607,331.4	851,569.9	0.97492
9	95,916.9	217,125	129,657	149,401										442,698.8	592,099.8	0.849258
10	101,293	177,514	97,158.7											278,806.7	375,965.4	1.147201
11	133,359	186,489												133,358.8	319,847.3	0.963544
12	128,497														128,497.1	
Total	1,620,640	2,270,989	1,341,739	1,333,272	2,444,417	740,737	2,075,295	694,538	784,770	291,262	337,379	201,380	109,481	11,840,889	14,245,899	

TABLE A.4.3: Turnover. IM-firms and reference firms, except for largest 5 in terms of turnover in each group of firms in each year. By entry cohort and year

Entry cohort:	Year												First-year turnover	Accumulated first-year turnover	Total turnover	Total turnover minus accumulated first-year turnover			
	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010					2011		
Reference firms:																			
Year:																			
1999	65,778.6															65,778.61	65,778.61	65,778.61	0
2000	143,117	155,257														155,257.3	221,035.91	298,373.8	77,337.89
2001	158,406	360,028	139,279													139,279	360,314.91	657,712.4	297,397.49
2002	133,320	306,029	241,458	56,420.1												56,420.09	416,735	737,226.29	320,491.29
2003	122,406	276,868	234,109	120,941	68,523.5											68,523.48	485,258.48	822,847.18	337,588.7

2004	136,477	267,230	253,655	199,041	133,008	49,081									49,080.66	534,339.14	1,038,492	504,152.82
2005	143,609	300,783	275,203	115,331	139,706	122,665	33,685								33,685.4	568,024.54	1,130,981.7	562,957.16
2006	125,510	219,965	272,845	115,453	126,359	160,280	72,388	39,480							39,480.45	607,504.99	1,132,280.2	524,775.21
2007	133,731	188,257	280,807	149,013	153,872	125,025	102,969	81,528	58,186						58,186.39	665,691.38	1,273,389.4	607,697.97
2008	161,883	230,990	280,624	153,345	195,780	135,002	76,498	83,687	104,778	26,286					26,285.71	691,977.09	1,448,872.1	756,894.98
2009	120,039	168,820	194,294	74,356.4	143,495	88,955	73,878	87,045	85,662	23,707	33,468				33,468	725,445.09	1,093,719.1	368,274.03
2010	120,516	158,913	173,379	114,811	97,151.3	102,981	70,439	110,523	84,666	33,731	63,718	61,688			61,688.23	787,133.32	1,192,516.5	405,383.14
2011	140,795	333,508	208,447	223,520	92,424	131,416	74,274	85,563	78,908	42,506	96,323	93,146	33,515		33,515.39	820,648.71	1,634,346.1	813,697.43
Total	1,705,586	2,966,647	2,554,101	1,322,233	1,150,319	915,405	504,131	487,826	412,200	126,230	193,509	154,834	33,515		820,648.71		12,526,535	5,576,648.1

IM-firms:

Year:																		
1999	70,121.1														70,121.05	70,121.05	70,121.05	0
2000	84,078.7	130,179													130,179.4	200,300.45	214,258.13	13,957.68
2001	114,285	192,853	84,706.4												84,706.43	285,006.88	391,844.43	106,837.55
2002	114,530	135,813	118,728	53,024											53,023.97	338,030.85	422,094.77	84,063.92
2003	72,908.3	109,575	99,375.8	98,221.5	53,265.1										53,265.1	391,295.95	433,345.59	42,049.64
2004	92,217.7	118,565	171,378	82,277.4	132,030	44,187									44,186.79	435,482.74	640,654.12	205,171.38
2005	58,846.9	125,553	105,124	103,112	159,633	71,079	67,512								67,512.27	502,995.01	690,859.91	187,864.9
2006	110,275	107,952	107,135	80,939.2	131,076	68,943	104,473	49,935							49,934.97	552,929.98	760,728.26	207,798.28
2007	107,603	166,238	145,932	109,500	150,037	91,881	112,193	129,050	63,832						63,832.45	616,762.43	1,076,265.2	459,502.78
2008	95,916.9	176,020	118,614	139,961	172,073	100,181	110,854	113,395	111,215	46,822					46,821.68	663,584.11	1,185,051.7	521,467.59
2009	101,293	160,276	132,919	159,111	139,204	129,370	126,199	117,091	80,412	46,319	48,126				48,126	711,710.11	1,240,321.2	528,611.09
2010	133,359	177,514	129,657	91,916.7	101,263	89,225	164,283	113,218	98,759	79,531	106,469	49,673			49,672.55	761,382.66	1,334,866	573,483.31
2011	128,497	186,489	97,158.7	90,115	133,138	98,214	179,642	100,976	144,460	118,590	182,785	151,708	109,481		109,480.8	870,863.46	1,721,250.1	850,386.62
Total	1,283,932	1,787,025	1,310,728	1,008,174	1,171,718	693,082	865,156	623,665	498,677	291,262	337,379	201,380	109,481		1,283,931.8		10,181,660	3,781,194.7

TABLE A.4.4: Turnover. IM-firms and reference firms, except for largest 5 in terms of turnover in each group of firms in each year. By entry cohort and firm age

	Entry cohort:													Total turnover, up to 2010	Total turnover, up to 2011	Turnover growth, by firm age
	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011			
Reference firms:																
Aggregate first-year turnover:	65,778.6	221,036	360,315	416,735	485,258	534,339	568,025	607,505	665,691	691,977	725,445	787,133	820,649			

0	65,778.6	155,257	139,279	56,420.1	68,523.5	49,081	33,685	39,480	58,186	26,286	33,468	61,688	33,515	787,133.32	820,648.71	1.9824848	
1	143,117	360,028	241,458	120,941	133,008	122,665	72,388	81,528	104,778	23,707	63,718	93,146		1,467,333.7	1,560,479.8	1.0903743	
2	158,406	306,029	234,109	199,041	139,706	160,280	102,969	83,687	85,662	33,731	96,323			1,503,619.8	1,599,942.9	0.8787276	
3	133,320	276,868	253,655	115,331	126,359	125,025	76,498	87,045	84,666	42,506				1,278,766.4	1,321,272.2	1.0419997	
4	122,406	267,230	275,203	115,453	153,872	135,002	73,878	110,523	78,908					1,253,566.6	1,332,474.3	1.036926	
5	136,477	300,783	272,845	149,013	195,780	88,955	70,439	85,563						1,214,292.4	1,299,855.8	0.9210941	
6	143,609	219,965	280,807	153,345	143,495	102,981	74,274							1,044,203.5	1,118,477.5	0.859329	
7	125,510	188,257	280,624	74,356.4	97,151.3	131,416								765,898.05	897,314.35	1.0004597	
8	133,731	230,990	194,294	114,811	92,424									673,826.1	766,250.14	1.0798068	
9	161,883	168,820	173,379	223,520										504,081.8	727,602	0.9669044	
10	120,039	158,913	208,447											278,951.8	4873,98.9	1.6276052	
11	120,516	333,508												120,515.7	454,023.4	1.1682727	
12	140,795														140,795.2		
Total	1,705,586	2,966,647	2,554,101	1,322,233	1,150,319	915,405	504,131	487,826	412,200	126,230	193,509	154,834	33,515	10,892,189	12,526,535		
IM-firms:																	
Aggregate first-year turnover:	70,121.1	200,300	285,007	338,031	391,296	435,483	502,995	552,930	616,762	663,584	711,710	761,383	870,863	Aggregate turnover, up to 2010	Aggregate turnover, up to 2011	Turnover growth, by firm age	
Firm age																	
0	70,121.1	130,179	84,706.4	53,024	53,265.1	44,187	67,512	49,935	63,832	46,822	48,126	49,673	109,481	761,382.66	870,863.46	1.7681295	
1	84,078.7	192,853	118,728	98,221.5	132,030	71,079	104,473	129,050	111,215	46,319	106,469	151,708		1,194,515.4	1,346,223.1	1.0285704	
2	114,285	135,813	99,375.8	82,277.4	159,633	68,943	112,193	113,395	80,412	79,531	182,785			1,045,858.6	1,228,643.2	1.1156821	
3	114,530	109,575	171,378	103,112	131,076	91,881	110,854	117,091	98,759	118,590				1,048,255.4	1,166,845.8	0.9650611	
4	72,908.3	118,565	105,124	80,939.2	150,037	100,181	126,199	113,218	144,460					867,170.9	1,011,630.5	1.1544519	
5	92,217.7	125,553	107,135	109,500	172,073	129,370	164,283	100,976						900,131.08	1,001,107.1	0.9562646	
6	58,846.9	107,952	145,932	139,961	139,204	89,225	179,642							681,121.17	860,763.47	1.1065801	
7	110,275	166,238	118,614	159,111	101,263	98,214								655,500.7	753,715.12	0.9787885	
8	107,603	176,020	132,919	91,916.7	133,138									508,459.06	641,596.56	0.9360878	
9	95,916.9	160,276	129,657	90,112.5										385,849.82	475,962.32	0.9743826	
10	101,293	177,514	97,158.7											278,806.7	375,965.36	1.1472009	
11	133,359	186,489												133,358.8	319,847.3	0.9635442	
12	128,497														128,497.1		
Total	1,283,932	1,787,025	1,310,728	1,008,174	1,171,718	693,082	865,156	623,665	498,677	291,262	337,379	201,380	109,481	8,460,410.3	10,181,660		

TABLE A.5.1: Value added. IM-firms and reference firms. By entry cohort and year

	Entry cohort:													First-year value added	Aggregate first-year value added	Total value added	Total value added minus aggregate first-year value added		
	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011						
Reference firms:																			
Year:																			
1999	-1,443.21															-1,443.21	-1,443.21	-1,443.21	0
2000	18,979.66	-18,669.9														-18,669.86	-20,113.07	309.8	20,422.87
2001	19,842.11	94,824.56	-2,375.44													-2,375.44	-22,488.508	112,291.23	134,779.74
2002	22,531.96	127,313.9	44,399.54	-231.74												-231.74	-22,720.243	194,013.66	216,733.91
2003	26,540.27	101,583.9	58,083.89	16,927.29	-17,529.1											-17,529.08	-40,249.323	185,606.27	225,855.59
2004	34,988.95	101,688.4	29,720.44	26,674.03	32,976.8	-2,826.52										-2,826.52	-43,075.843	223,222.1	266,297.94
2005	43,052.12	33,474.48	72,459.28	26,168.29	35,623.23	9,642.779	-2,232.36									-2,232.36	-45,308.199	218,187.82	263,496.02
2006	44,618.34	47,780.38	178,993.6	28,794.24	42,043.71	16,824.09	11,159.91	-9,805.97								-9,805.97	-55,114.169	360,408.3	415,522.47
2007	51,867.02	45,749.74	163,022	33,676.44	54,428.27	24,007.33	28,738.22	6,857.59	3,103.67							3,103.67	-52,010.504	411,450.28	463,460.78
2008	55,471.13	39,449.85	58,459.8	51,710.23	66,548.13	30,581.56	38,413.37	12,494.3	18,500.51	541.03						54.03	-51,469.471	372,170.22	423,639.69
2009	47,014	48,013	26,950	46,094	68,525	22,031	28,880	27,923	17,611	2,984	-7,487					-7,487	-58,956.471	328,538	387,494.47
2010	40,939.21	54,066.67	21,127.45	61,958.82	28,466.67	19,452.94	34,940.2	38,961.77	14,006.86	3,477.45	997.06	-1,639.22				-1,639.216	-60,595.687	316,755.88	377,351.57
2011	30,247.12	57,364.42	91,040.38	57,815.39	28,500.96	35,760.58	43,112.5	34,044.23	25,168.27	21,818.27	-1,940.39	7,570.19	-1,387.5			-1,387.5	-61,983.187	429,114.43	491,097.61
2012	47,677.36	57,436.79	124,194.3	32,240.57	25,457.55	46,517.93	40,026.41	45,636.79	23,595.28	10,492.45	-5,109.43	16,028.3	32,602.83			0	-61,983.187	496,797.13	558,780.31
Total	482,326	790,076.2	866,075.4	381,827.6	365,041.2	201,991.7	223,038.3	156,111.8	101,985.6	39,313.2	-13,539.8	21,959.28	31,215.33			-61,983.19		3,647,421.9	4,244,933
IM-firms:																			
Year:																			
1999	886.4199															886.4199	886.4199	886.4199	0
2000	3,648325	-9,038.28														-9,038.277	-8,151.8571	-5,389.952	2,761.9051
2001	11,805.85	-12,581.3	-2,367.25													-2,367.251	-10,519.108	-3,142.691	7,376.4171
2002	3,829.909	1,111.872	-2,227.17	-425.799												-425.7991	-10,944.907	2,288.8129	13,233.72
2003	27,816.55	17,416.11	13,829.98	-8,927.29	-2,407.16											-2,407.159	-13,352.066	47,728.188	61,080.254
2004	20,476.24	42,498.34	18,202.21	2,532.597	-4,222.1	-4,847.51										-4,847.514	-18,199.58	7,4639.774	92,839.354
2005	33,356.14	38,747.02	16,966.34	8,574.376	6,900.109	-14,187.8	-5,906.62									-5,906.623	-24,106.203	84,449.522	108,555.73
2006	47,071.43	28,380.6	-56,054.4	17,188.7	13,081.02	-21,342.2	-7,018.12	-5,427.51								-5,427.505	-29,533.708	15,879.531	45,413.239

0	886.4199	-9,038.28	-2,367.25	-425.799	-2,407.16	-4,847.51	-5,906.62	-5,427.51	-8,579.06	-4,224.92	-6,482	-8,768.63	-14,084.6	-71,672.937	-71,672.937	-98,991.582	
1	3,648.325	-12,581.3	-2,227.17	-8,927.29	-4,222.1	-14,187.8	-7,018.12	-18,227.2	-34,866.3	-9,308	-8,147.06	-33,276	-21,324.5	-149,339.99	-170,664.52	107,886.26	
2	11,805.85	1,111.872	13,829.98	2,532.597	6,900.109	-21,342.2	21,306.8	1,276.596	-33,481	-1,297.06	-26,803.9	-17,293.4		-24,160.325	-41,453.725	72,192.06	
3	3,829.909	17,416.11	18,202.21	8,574.376	13,081.02	-27,738.2	44,219.86	-1,410	-36,557.8	31,608.65	-23,194.3			71,226.075	48,031.735	339,305.41	
4	27,816.55	42,498.34	16,966.34	17,188.7	132,572.8	-16,958.5	108,682	16,596.08	13,814.42	51,354.71				359,176.77	410,531.48	-79,415.53	
5	20,476.24	38,747.02	-56,054.4	22,324.61	61,588.65	-6,231	135,197.1	29,588.46	34,124.53					245,636.71	279,761.24	85,991.433	
6	33,356.14	28,380.6	1,1516.23	12,433.64	68,931	-7,891.18	173,488.5	11,413.21						320,214.93	331,628.14	37,137.317	
7	47,071.43	45,877.49	14,472.14	10,922	90,964.7	-12,442.3	160,486.8							196,865.45	357,352.25	89,619.278	
8	24,072.25	19,446.81	119,777	27,026.47	86,796.16	9,366.038								277,118.69	286,484.73	-60,003.2	
9	13,879.43	41,997	33,459.8	19,350.96	108,428.3									108,687.19	217,115.49	94,289.35	
10	41,222	93,307.84	25,275	43,171.7										159,804.84	202,976.54	6,611.02	
11	62,934.31	79,772.12	23,709.43											142,706.43	166,415.86	90,646.61	
12	67,611.54	165,741.5												67,611.54	233,353.04	-19,254.93	
13	48,356.61														48,356.61		
Total	406,967	552,677.1	216,559.3	154,172	562,633.5	-102,273	630,456.3	33,809.62	-65,545.2	68,133.38	-64,627.2	-59,338	-35409.2	1,703,875.4	2,298,215.9		

TABLE A.6.1: Annual earnings (DKK1,000). IM-firms and reference firms. By entry cohort and year

Entry cohort:		1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	First-year annual earnings	Accumulated first-year annual earnings	Total annual earnings	Total annual earnings minus accumulated first-year annual earnings
Reference firms:																		
Year:																		
	1999	-12,142													-12,142	-12,142	-12,142	0
	2000	-28,327	-71,673												-71,673	-83,815	-100,000	-16,185
	2001	-11,916	-11,358	-30,356											-30,356	-114,171	-53,629	60,542
	2002	-16,733	-175,816	-175,975	-56,595										-56,595	-170,766	-425,119	-254,353
	2003	-4,540	-126,312	-33,482	-25,798	-58,473									-58,473	-229,239	-248,605	-19,366
	2004	-4,124	-41,786	-77,572	-56,397	-12,012	-24,242								-24,242	-253,481	-216,133	37,348
	2005	-58,911	-66,291	-83,641	-117,199	-14,067	-27,934	-7,485							-7,485	-260,966	-375,528	-114,561
	2006	-17,665	-43,470	5,516	-175,985	-972	-28,922	-22,882	-14,077						-14,077	-275,043	-298,457	-23,414

2007	-57,038	-15,364	-39,372	-166,584	-566	-25,753	-11,215	-6,831	-8,369				-8,369	-283,412	-331,092	-47,681	
2008	-54,185	-25,854	38,536	-155,589	3,470	-27,520	-6,575	-3,446	-3,316	-12,507			-12,507	-295,918	-246,986	48,932	
2009	-64,588	-56,784	-159,352	-276,576	-2,535	-52,722	-4,857	1,748	-15,494	-2,822	-21,228		-21,228	-317,146	-655,210	-338,064	
2010	-61,927	46,906	-15,016	-263,983	8,588	-30,081	951	5,800	-1,424	-4,903	-34,148	-8,451	-8,451	-325,597	-357,688	-32,091	
2011	-11,300	-34,069	-28,916	-256,619	706	-11,650	7,570	-11,562	19,520	9,964	-45,504	-3,896	-10,553	-10,553	-336,150	-376,309	-40,159
2012	47,677	57,437	124,194	32,241	25,458	46,518	40,026	45,637	23,595	10,492	-5,109	16,028	32,603	0	-336,150	-382,533	-46,383
Total	-408,712	-662,484	-589,044	-1,826,621	-79,844	-240,568	-56,378	-29,317	-7,301	-10,387	-139,331	-19,166	-10,277	-336,150		-4,079,431	-785,435

IM-firms:

Year:																	
1999	-27,141													-27,141	-27,141	-27,141	0
2000	-45,413	-61,078												-61,078	-88,218	-106,490	-18,272
2001	-58,626	-106,027	-15,202											-15,202	-103,421	-179,855	-76,434
2002	-52,631	-92,304	-56,793	-20,990										-20,990	-124,411	-222,718	-98,307
2003	-33,714	-77,262	-49,537	-49,015	-23,280									-23,280	-147,690	-232,806	-85,116
2004	-32,172	-77,608	-52,683	-38,772	-95,232	-13,449								-13,449	-161,139	-309,916	-148,777
2005	-55,125	-76,337	-37,028	-49,200	-133,448	-48,571	-15,534							-15,534	-176,673	-415,243	-238,570
2006	-55,552	199,291	-125,037	-78,382	-204,182	-75,865	-61,629	-61,175						-61,175	-237,848	-462,531	-224,683
2007	-35,638	-80,676	-122,835	-105,426	-79,429	-69,476	-64,214	-87,508	-17,137					-17,137	-254,985	-662,339	-407,354
2008	-73,035	-85,113	-84,383	-143,416	-137,443	-62,949	-86,787	-46,282	-82,015	-9,077				-9,077	-264,062	-810,502	-546,440
2009	-36,745	-54,273	65,044	-125,104	-103,396	-68,229	-57,327	-60,447	-101,933	-26,873	-32,342			-32,342	-296,404	-601,625	-305,221
2010	-8,585	15,754	-75,845	-83,511	-37,613	-78,476	-57,520	-42,930	-104,664	-25,876	-55,744	-26,085		-26,085	-322,489	-581,096	-258,607
2011	13,548	-1,004	-34,413	-62,840	-10,071	-95,349	-33,990	-32,716	-41,955	-22,804	-91,041	-75,462	-27,240	-27,240	-349,730	-515,338	-165,609
2012	48,357	165,742	23,709	43,172	108,428	9,366	160,487	11,413	34,125	51,355	-23,194	-17,293	-21,325	0	-349,730	179,586	529,315
Total	-492,160	-407,222	-608,475	-269,857	-824,861	-558,234	-376,550	-380,986	-375,761	-99,890	-282,170	-174,966	-96,884	-349,730		-4,948,015	-2,044,075

TABLE A.6.2: Annual earnings. IM-firms and reference firms. By entry cohort and firm age

	Entry cohort:												
	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Reference firms:													
Aggregate first-year annual earnings:	-12,142	-83,815	-114,171	-170,766	-229,239	-253,481	-260,966	-275,043	-283,412	-295,918	-317,146	-325,597	-336,150

Firm age:														Total annual earnings, up to 2011	Total annual earnings, up to 2012	Annual earnings increase, by firm age
0	-12,142	-71,673	-30,356	-56,595	-58,473	-24,242	-7,485	-14,077	-8,369	-12,507	-21,228	-8,451	-10,553	-336,150	-336,150	-18,873
1	-28,327	-11,358	-175,975	-25,798	-12,012	-27,934	-22,882	-6,831	-3,316	-2,822	-34,148	-3,896	275	-355,298	-355,023	-52,682
2	-11,916	-175,816	-33,482	-56,397	-14,067	-28,922	-11,215	-3,446	-15,494	-4,903	-45,504	-6,819		-401,162	-407,980	1,883
3	-16,733	-126,312	-77,572	-117,199	-972	-25,753	-6,575	1,748	-1,424	9,964	-38,451			-360,828	-399,279	47,133
4	-4,540	-41,786	-83,641	-175,985	-566	-27,520	-4,857	5,800	19,520	-120				-313,575	-313,694	24,010
5	-4,124	-66,291	5,516	-166,584	3,470	-52,722	951	-11,562	1,781					-291,345	-289,564	-31,991
6	-58,911	-43,470	-39,372	-155,589	-2,535	-30,081	7,570	-949						-322,388	-323,337	36,371
7	-17,665	-15,364	38,536	-276,576	8,588	-11,650	-11,885							-274,131	-286,016	-243,134
8	-57,038	-25,854	-159,352	-263,983	706	-11,744								-505,521	-517,266	118,935
9	-54,185	-56,784	-15,016	-256,619	-3,982									-382,604	-386,586	60,709
10	-64,588	46,906	-28,916	-275,297										-46,598	-321,896	-38,813
11	-61,927	-34,069	10,585											-95,997	-85,412	44,085
12	-11,300	-40,611												-11,300	-51,911	5,984
13	-5,316													0	-5,316	
Total	-403,396	-662,484	-589,044	-1,826,621	-79,844	-240,568	-56,378	-29,317	-7,301	-10,387	-139,331	-19,166	-10,277	-3,696,898	-4,079,431	
IM-firms:																
Aggregate first-year annual earnings:	-27,141	-88,218	-103,421	-124,411	-147,690	-161,139	-176,673	-237,848	-254,985	-264,062	-296,404	-322,489	-349,730	Total annual earnings, up to 2011	Total annual earnings, up to 2012	Annual earnings increase, by firm age
Firm age																
0	-27,141	-61,078	-15,202	-20,990	-23,280	-13,449	-15,534	-61,175	-17,137	-9,077	-32,342	-26,085	-27,240	-349,730	-349,730	-510,195
1	-45,413	-106,027	-56,793	-49,015	-95,232	-48,571	-61,629	-87,508	-82,015	-26,873	-55,744	-75,462	-69,643	-790,281	-859,925	-61,035
2	-58,626	-92,304	-49,537	-38,772	-133,448	-75,865	-64,214	-46,282	-101,933	-25,876	-91,041	-73,419		-777,898	-851,317	-105,281
3	-52,631	-77,262	-52,683	-49,200	-204,182	-69,476	-86,787	-60,447	-104,664	-22,804	-103,043			-780,136	-883,179	253,555
4	-33,714	-77,608	-37,028	-78,382	-79,429	-62,949	-57,327	-42,930	-41,955	-15,259				-511,322	-526,582	-151,616
5	-32,172	-76,337	-125,037	-105,426	-137,443	-68,229	-57,520	-32,716	-28,058					-634,880	-662,938	247,004
6	-55,125	199,291	-122,835	-143,416	-103,396	-78,476	-33,990	-49,928						-337,948	-387,876	-140,279
7	-55,552	-80,676	-84,383	-125,104	-37,613	-95,349	451							-478,677	-478,227	283,519
8	-35,638	-85,113	65,044	-83,511	-10,071	-45,869								-149,289	-195,158	-117,472
9	-73,035	-54,273	-75,845	-62,840	-767									-265,994	-266,761	697,388
10	-36,745	15,754	-34,413	486,799										-55,405	431,394	26,054
11	-8,585	-1,004	-19,761											-9,589	-29,350	112,551
12	13,548	89,414												13,548	102,962	-4,879

Total	-492,160	-407,222	-608,475	-269,857	-824,861	-558,234	-376,550	-380,986	-375,761	-99,890	-282,170	-174,966	-96,884	-5,127,601	-4,948,015
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