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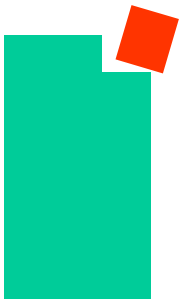
High-Tech Spin-Offs in the Nordic Countries

Summary report



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ABSTRACT

This report is a summary of results from the project "High-tech spin-offs in the Nordic countries". It is intended to be a non-technical presentation of the approach, the main results and policy conclusions of the project. It is accompanied by two larger volumes giving the full details and results of the work, the Main report and the Statistical annex. (STEP Reports 23-2003 and 24-2003).

The project addresses how it is possible to identify and classify changes in establishments and enterprises utilising administrative register data, and compares results across Sweden, Finland, Denmark and Norway. The work compares the occurrence of high-tech spin-off establishments with other new and existing firms, tracks their performance over time and tries to identify factors that seem to affect their success.

KEYWORDS	ENGLISH	NORWEGIAN
GROUP 1	Industrial Management	
GROUP 2	Innovation	
SELECTED BY AUTHOR	Spin-off, firm demography, high-tech	
	Industrial renewal	
	Researcher participation	

Foreword

The current project has its background in a request from the Nordic Industrial Fund (NI) to do a study on high-tech spin-offs. Having worked with the large datasets available in the Nordic countries matching employers and employees, I had an idea that it was possible to identify and classify spin-offs by tracking the background of the employees involved in new start-up firms. Such an approach would allow studying spin-offs within a much broader context than the common sample- and survey-based studies around. NI liked this idea and decided to support the project. The basic idea was coupled with ideas and experiences from earlier work in, in particular, Sweden and Finland that enriched and modified the original idea of the project. Valuable expertise was brought in also from Denmark. In sum it turned out to involve very interesting, but much work with many discussions and seemingly "endless" needs to recheck and rerun the data and analysis - an experience we have in common with much comparative work. Doing comparisons, on the other hand, always has a lot to give after all.

Reporting from the project is divided into a main report, a statistical annex and a summary report (the current volume). Within the research team responsibilities for writing up the texts have been as follows:
All tables according to agreed standards: Everybody
Main report:
Chapters 1, 2, 3, 4: Svein Olav Nås
Chapter 5.1 to 5.3: Jan Andersson and Björn Tegsjö
Chapter 5.4: Tore Sandven
Chapters 6 and 7: Tor Eriksson
Chapter 8: Svein Olav Nås
Over-all editing: Svein Olav Nås
Summary report: Svein Olav Nås

In addition to the above mentioned persons Olavi Lehtoranta and Markku Virtaharju have been our Finnish partners. In Sweden Gunnar Arvidson have helped compiling some of the figures, and in Norway Anders Ekeland has taken part in some meetings and discussions.

It has been an interesting and challenging work period with this project. I will take this opportunity to thank the partners for the cooperation and hope that we get a chance to carry on with this very promising approach.

We also had the great advantage of meeting with a reference group to discuss the contents and approach of the project. The group consisted of Richard B. Larsen, Danmarks Industri, Denmark Torsti Loikkanen, VTT, Finland and Paul Gunnar Larssen, SSB Norway We are grateful for the inputs and many good advices we were given. Unfortunately it has not been possible for us to follow all of them, and the reference group should not be held responsible for any of the results or conclusions presented in the final report.

Finally, and in particular, I would like to thank the Nordic Industrial Fund for financing the work, and hope that it meets at least some of their goals of contributing to developing a better Nordic innovation policy.

Oslo, 12.12.2003

Svein Olav Nås
Project leader

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Introduction

Spin-offs are often considered to be an important driving force in renewing industrial structures, as they add to or replace old establishments that decline or go out of business. In particular when combined with the birth of new firms that are considered "high-tech" in some sense, this process can be viewed as a process of modernising industry. Renewal is frequently pointed out as part of a solution to industrial challenges by policy makers. One question is, therefore, how much of the renewal that goes on within the frames of existing establishments and enterprises, and how important the newborn firms are in this process. To assess this, the size of the contribution from spin-off activities is important – compared to all the other kinds of restructuring that takes place. And in order for some kind of modernisation to take place, within this narrow category of changes, how large is the contribution of spin-offs that can be characterised as "high-tech"? Such quantitative comparisons have so far been difficult to carry out due to lack of proper data or data and definitions that are hard to compare.

In this project the creation and performance of new establishments and enterprises in the Nordic countries is studied, utilising register data compiled by the national statistical agencies on enterprises, establishments and employees (often referred to as matched employer-employee data). Among the many different aspects brought up during the study, the central theme concerns how the specific category of new establishments performs that can be identified as "high-tech spin-offs". Both of these concepts, "high-tech" and "spin-offs", can be given different interpretations as is the case in the vast but not very coherent literature – and they both need clarification. Put roughly, high-tech sectors are basically identified by industry codes giving special attention to the research sectors. Spin-offs are defined as all new establishments/ enterprises where the employees make up certain shares in the new and the old establishment.[1] For details on the methodology see Box 1 and the main report, chapter 2.

Methodologically the project has proven that spin-offs can be identified in a meaningful way by use of the matched employer-employee data. By use of reasonable criteria which we argue resemble the basic idea of being a spin-off a substantial number of cases can be identified. The spin-offs are clearly distinguishable from other kinds of changes, and the relationship between the spin-offs and establishments with other kinds of changes, or with no observable change, seems to be rather robust both over time and between the countries.

The approach allows integration of studies of corporate spin-offs with the study of research-based spin-offs, utilising the same kinds of criteria to identify the two kinds of cases. This is clearly different from the usual approaches where the two represent different strands in the literature, with large variations in definitions within both.

The analysis is limited to cover the business enterprise sector on the results side, but it is accepted that public sectors appear as delivering establishments from which new establishments spin out of. Also agriculture and forestry is left out, partly for technical reasons, but also because these industries are of limited interest when focusing high-tech spin-offs. Lastly, establishments are left out when they have only 1 employee in both the years we use to identify changes. This limits the number of observations considerably, but is necessary in order to distinguish spin-offs from any kind of new establishment. It also contributes to reducing "statistical noise" in the registers.

[1] In brief, enterprises are the legal autonomous units of the firms, comprising one or more establishments. Establishments are localised production units that produce a relatively homogenous product.

The project explicitly addresses spin-off activities that can be considered "high-tech" in some sense. The concept refers to the contents of different technologies, and is usually understood to describe technologies that are considered very advanced or complicated, or even particularly costly to bring about. One could also think of it as technologies that are aimed at solving difficult or "advanced" problems. A common association includes technologies such as information- and communication technology, biotechnology, pharmaceuticals, nano technology etc. Another common way of thinking about "high-tech" when it comes to the establishment of new firms involves the participation of or linkage to (any kind of) research.

Rarely discussions of "high-tech" activities consider how the advanced knowledge is being developed, transferred, stored or utilised – nor how that interrelates with other activities necessary for successful innovation. The point here is that many industries and firms may access and utilise advanced technologies developed elsewhere, given that they have the necessary absorptive capacity or that the technology exists in such a form that it can be easily adopted and used. One such possibility is technology embedded in machinery and equipment which may be extremely advanced and "high-tech", but where the user industry may not necessarily be classified as very advanced according to the usual criteria (see below).

As the basic approach, and as a reference to previous work and widespread use, the project applies the OECD high tech industries classification for the *target* industry. This information is available for establishments. In addition the project classifies according to *delivering* industry in those cases where it is possible to identify the delivering industry. We underscore that the solution is not completely satisfying. It facilitates comparisons with other results, but should in future research be complemented with a more sophisticated concept of high-tech activity.

It is also classified according to the occupational background of employees in the cases where at least one of the employees has background from the research system (spin-off with researcher participation). It requires information on the career and education of each employee in order to identify those that previously worked in the research sector, and in addition information about which research institution.

In what follows we firstly present the broad picture of demographic changes of various kinds going on in the four countries included. Next we identify and compare the presence of spin-offs, before the question of success factors is addressed. Finally, possible implications for policy making are taken up.

Box 1 Classifying spin-offs and other changes in establishments by means of register data

The initial step in identifying spin-offs and classifying the different kinds of changes in the population of enterprises and establishments involves utilising their formal identification numbers. Changes in identification numbers are being used as the first filter to identify the different types of changes. On the basis of this information 9 different categories of events are distinguished. Classification of changes is carried out by comparing two adjacent years.

The second step involves tracking the labour in one particular class of new establishments in order to further subdivide by their origins. This procedure is applied to the class of establishments that are new since last year, and at the same time belongs to a new enterprise. The whole process results in the following categories of enterprises that are being used throughout the work:

1. No change
An existing establishment continues within the same existing enterprise.

2. Transformation
An existing establishment continues and becomes a new independent enterprise, and the old enterprise is closed down.

3. Takeover
An existing establishment continues within another existing enterprise, and the old enterprise is closed down.

4. Move
An existing establishment continues within another existing enterprise, and the old enterprise survives.

5. Spin-out
An existing establishment continues and becomes a new independent enterprise, and the old enterprise survives.

6. New in new
A new establishment comes to existence as a new independent enterprise.

7. New in existing
A new establishment comes to existence within an existing enterprise.

8. Complete closure
An establishment is closed down and the enterprise it belongs to is also closed down.

9. Closure in survivor
An establishment is closed down but the enterprise it belongs to survives.

Subdividing category 6 New in new by labour tracking adds the following categories:

6.1 Spin-offs
A minimum of 2 employees come from the same delivering establishment. They must make up at least 30% of the new establishment and less than 50% of the delivering establishment (year 0). The delivering establishment must have at least 1 employee after the spin-off (year 1).

6.2 Greenfield births
Not more than 1 employee can come from the same delivering establishment.

6.3 Other new
All cases that are not characterised as spin-offs, Greenfield births or corrections are assigned to this residual category.

6.4 Corrections
Even if a new ID-number is assigned to an establishment, it is considered to be a continuation (not new) if 80% of employees in the new establishment is found in the same closed down establishment the year before, or if 80% of employees in a closed establishment since the previous year is found in the new establishment.

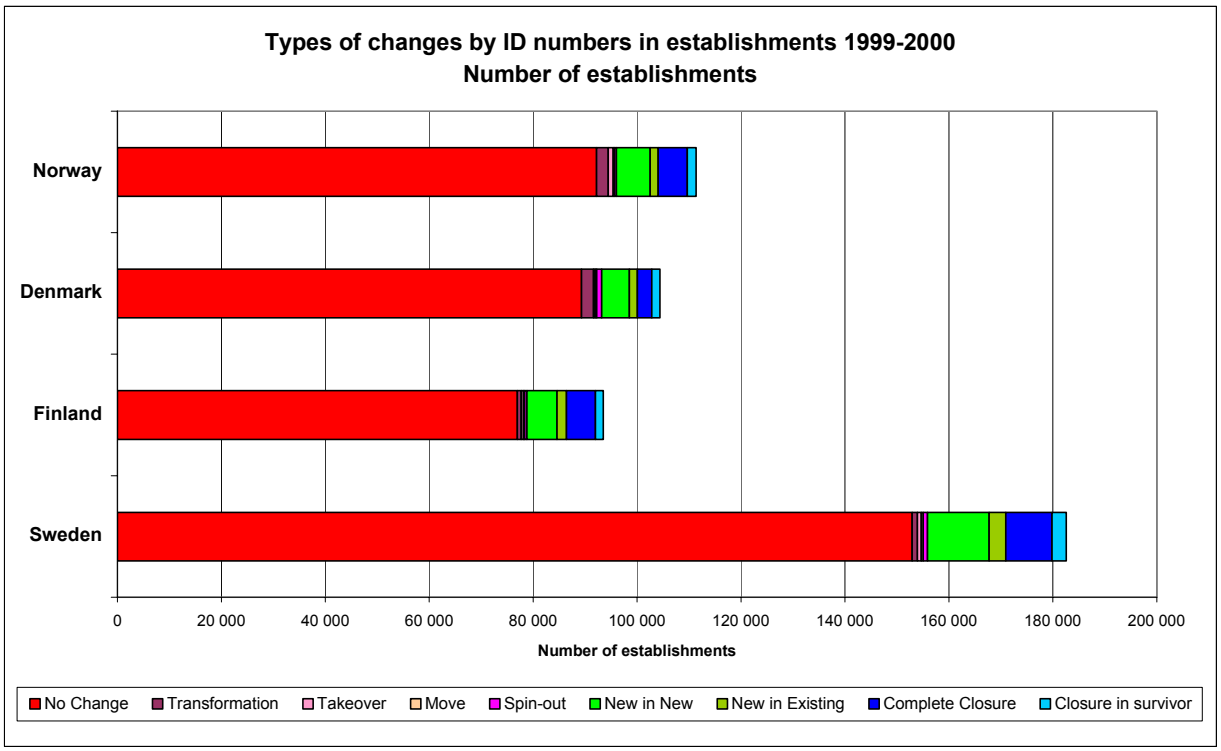
Changes within the broad picture

The first approach is simply to compare the different kinds of changes across the countries for the latest available common pair of years, as illustrated in Summary Figure 1 below. The numbers are exclusive of establishments with only 1 employee both years in the comparison. Only the private business sector is included.

The selection criteria returns a number of establishments in Norway and Denmark around 100 000, in Finland around 85 000, and in Sweden around 170 000. This broadly reflects the

differences in sizes between the countries, but with a slightly higher number than expected in Denmark and Norway when comparing to Sweden and Finland. Reasons for such discrepancies are taken up in chapter 2 above. As a consequence of the differences in levels we try to focus composition of types and developments over time rather than levels when doing comparisons between the countries.

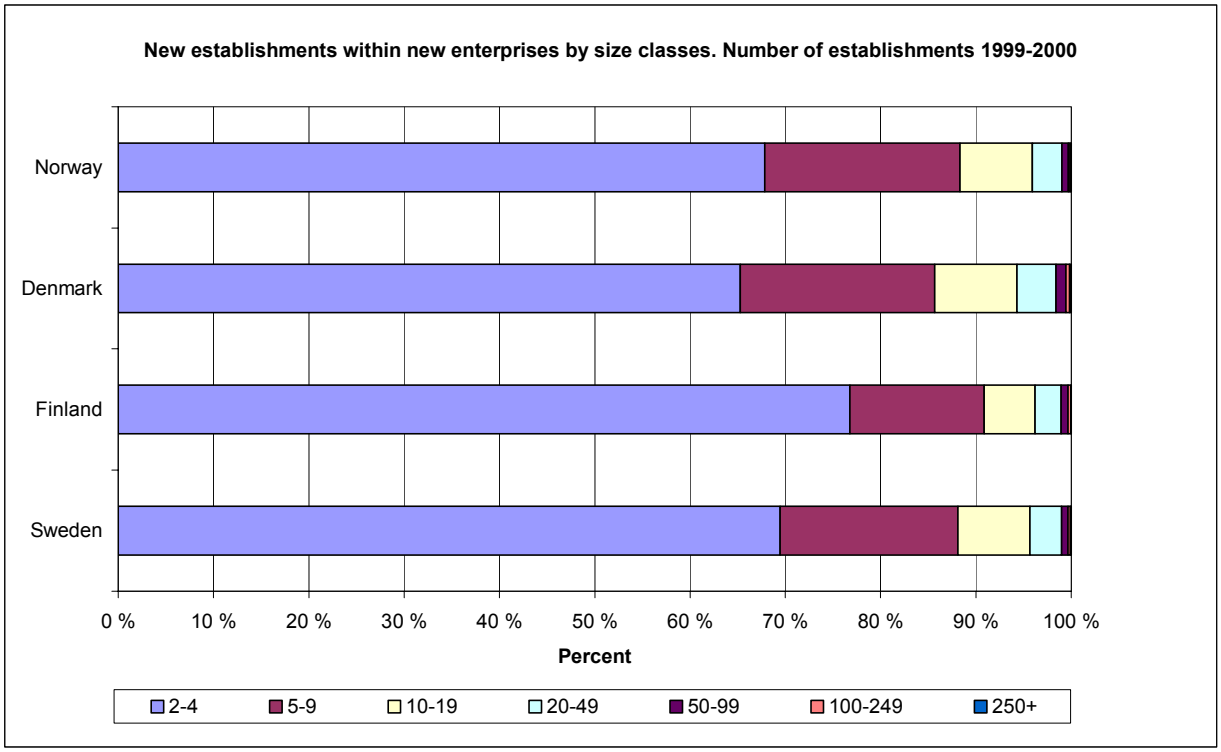
Summary Figure 1 Changes in establishments and enterprises 1999-2000. Sweden, Finland, Denmark, Norway. Number of establishments



The structures of relationships between the different categories have much in common across the countries. Unchanged establishments make up the large majorities accounting for about 90 % of the establishments in all counties. The other two large categories are complete closure (establishment and enterprise) accounting for around 3 - 6 % of the establishments that existed year 0, and the totally new establishments (new-in-new) which is the focus here and accounting for around 5 - 7 % of the number of establishments year 1.

There is a clear small firm bias in the number of new-in-new establishments (see Summary Figure 2). Bringing the number of employees into the picture clearly outweighs much of the small unit bias. Even if smaller in number of units, the larger establishments to a major degree balance out the numbers of employees in the small establishments. The situation is very similar in all the Nordic countries.

Summary Figure 2 New establishments within new enterprises by size classes.



Service sectors completely dominate in terms of numbers of new establishments and numbers of employees involved (for an overview of broad sectors, see Summary Table 1). The dominating position of the service industries is due to their large number of units and the high share of total employment. It is particularly the group of trade, hotels and restaurants that dominates with close to a third of the number of units. All in all services account for 70-80 % of the new-in-new establishments and their employment.

Summary Table 1 New establishments within new enterprises 1999-2000 by industry. Sweden, Finland, Denmark, Norway. Percent.

Industry	Sweden	Finland	Denmark	Norway
Manufacturing, mining, fish farming	8,7	10,6	8,6	8,0
Construction, utilities	10,1	16,7	12,7	9,9
Trade, hotels, restaurants	31,0	26,2	37,6	33,7
Computing services	7,1	6,9	8,7	6,2
Other business services	19,4	16,2	13,2	14,3
Other services	23,8	23,5	19,1	27,9
Total	100	100	100	100
N	9722	5763	5316	5682

To further look into how the changes affect the relative position of the different industries we have looked at the net difference between new and closing establishments by industry. Changes are relatively modest in manufacturing both in terms of numbers of establishments involved and their share of the number of existing establishments. We see the biggest changes in the larger industries, such as construction with a positive development except for Sweden, trade, hotels and restaurant with a positive development, and other business services. Also computers and related services have a generally positive development in all countries, and in this case it is because the changes make up a big share relative to the size of the industry. This is contrary to

what we find for production of office machinery, radio telecommunications and instruments, where there is a reduction in the number of employees except in Norway. In this case changes are fairly marginal to the size of the industry.

Other industries with a predominantly negative development involve printing and publishing and wood and wood products (except for Finland). There are relatively big swings also for chemicals and refining when it comes to employment, but with opposite directions as there has been growth in Denmark and Norway, and decline in Sweden and Finland. For the manufacturing sector this is generally the case for the remaining industries, so that we see a positive development for one or two of the countries where the others have a negative development. For services this is generally not the case: All countries basically have a positive development with the exception of Sweden that has a decline in transport and postal services and in research and development

To the degree these processes are more or less the same over time, a renewal of the industrial structures will result. This is, most importantly, dependent on the ability of the new establishments to survive and grow. If they are not successful in that respect, existing establishments and enterprises may expand and in effect conserve the existing industrial structure to a larger extent than one can get the impression of.

The spin-offs

Utilising labour tracking for the new-in-new group of establishments distinguishes different kinds of creation processes, of which spin-offs is one. Some basic results are found in Summary Table 2 below. The larger numbers of cases are found within Greenfield births for all the countries, characterised by having no more than one employee coming from the same previous employer. Spin-offs, characterised by at least two employees coming from the same place, account for around a fourth of the Greenfield births. Variations do exist between the countries, both when it comes to the levels and composition of demographic changes.

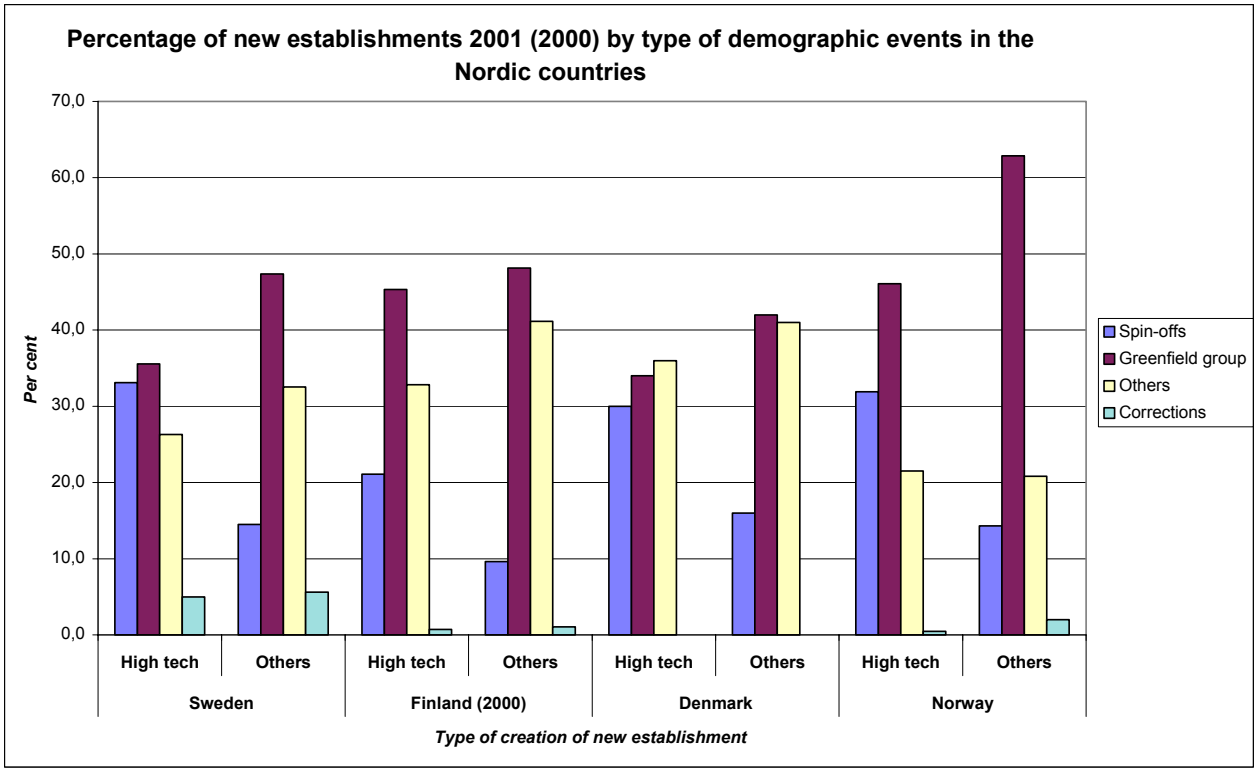
In order to capture the cases that are considered “high-tech” a condition is added for the industries where the spin-offs are created. The significance of spin-offs of the high-tech type turns out to be limited in terms of number of cases. Other kinds of changes, and unchanged establishments, dominate the picture. This is the case in all the Nordic countries, even though the numbers of high-tech spin-offs is somewhat lower in the Norwegian case. A comparison of the structure of types of new firms in all the Nordic countries is illustrated Summary Figure 3. Spin-offs are relatively more important within high-tech sectors than in other sectors for all the countries.

Summary Table 2. Number of new establishments 2001 (2000) by type of demographic events.

	Sweden		Finland (2000)		Denmark		Norway	
	High tech	Others	High tech	Others	High tech	Others	High tech	Others
Spin-offs	311	1 355	115	503	166	783	135	760
Greenfield	334	4 431	247	2 513	189	2 020	195	3338
Others	247	3 044	179	2 147	197	1 961	91	1105
Corrections	47	525	4	55			2	106
Sum	939	9 355	545	5 218	552	4 764	423	5 309

Absolute numbers.

Summary Figure 3. New establishments by type of demographic event and industry type. Sweden, Finland, Denmark, Norway 2001 (2000). Percent.



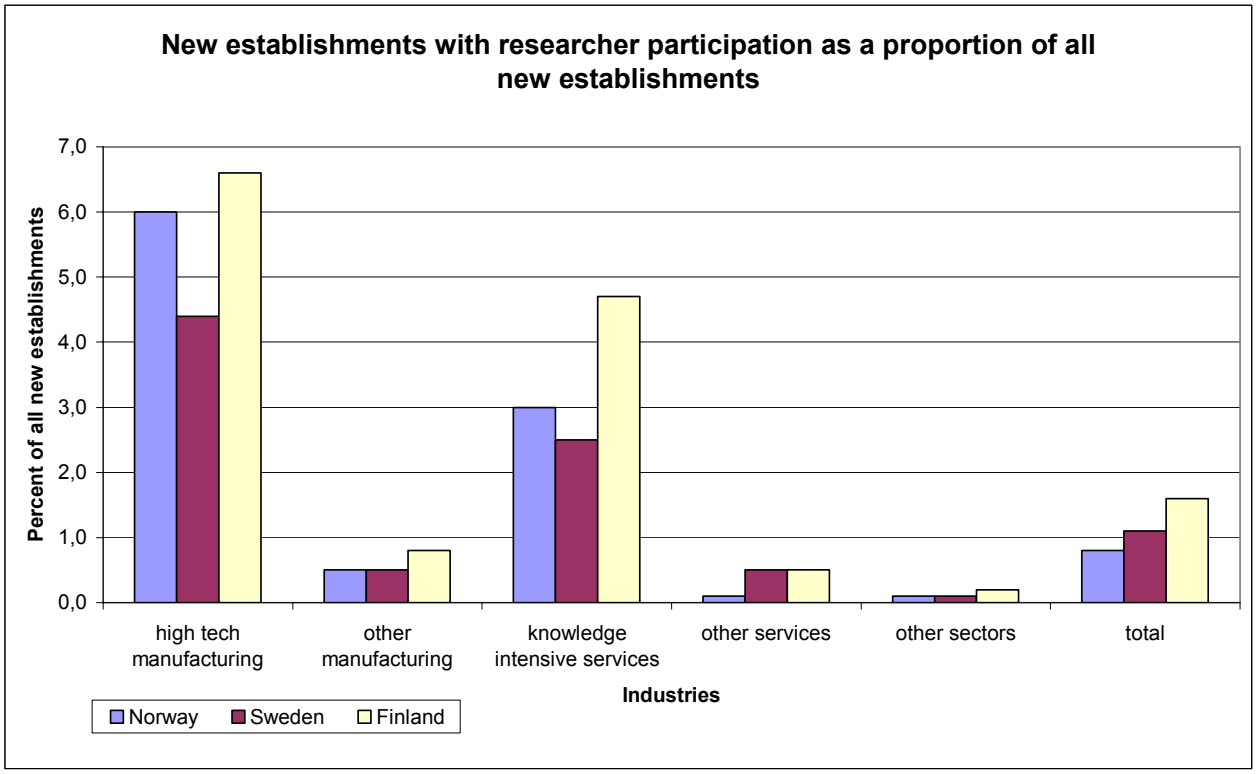
One should keep in mind that the definition of "high tech" applied here is rather restrictive, although it is the one advocated and used by the OECD. In particular, in high wage cost countries like the Nordic ones, production is likely to be high-tech also outside the industries classified as high-tech by the OECD, but high-tech in this sense is more problematic to identify, as we have argued.

Also, spin-offs are generated every year, and some of them may grow to become important firms in terms of size and economic results. Thus it is too easy to solely conclude that high-tech spin-offs have no importance. There are two major reasons for this: Firstly, the highly successful cases are probably so rare that it is difficult to identify them – and if we did, we probably would leave them out of the analysis as outliers. Secondly, it may take a long time for a new establishment to succeed. The time horizon in our present analysis of 4 to 5 years is presumably too short to capture the effect when, and if, growth takes off.

We have also focused a special case of new establishments, namely those cases where a researcher has taken part in the new firm. A “researcher” in our sense is an employee in a research institute or a higher education institution that has got higher education. The way it has been specified, results should include all cases that are usually considered to be spin-offs from the research sector, provided that the spin-off includes personnel from the mother organisation. Including researchers that has moved over the last three years results show a number of such cases around 100 for Norway and Finland, and around 500 for Sweden. The majority of the cases are very small units, and can by and large be found within knowledge intensive services. Adding other services to the list brings the share of cases over 90 percent in all the countries. However, this kind of new establishments makes up a larger proportion of all new

establishments within high-tech manufacturing than in other sectors. The structure is very similar across the countries (see Summary Figure 4).

Summary Figure 4 New establishments with researcher participation as a proportion of all new establishments, by sector, 2001. Norway, Sweden, Finland.



What is and what determines success?

Identifying spin-offs is but a first phase of the analysis. To policy-makers the interesting questions are what results the newly created firms generate compared to other firms, and if it is possible to identify some success factors that can be supported by policy measures.

The basic success factors we have focused in this study are limited by the data available in the registers. They include survival and development in employment. We have sought to explain variations in success by use of the remaining information available. Central explanatory factors in this respect are spin-offs versus other kinds of start-ups, high-tech start-ups versus start-ups in other sectors, size and industry of the firms, and characteristics of the labour force such as age, sex and education.

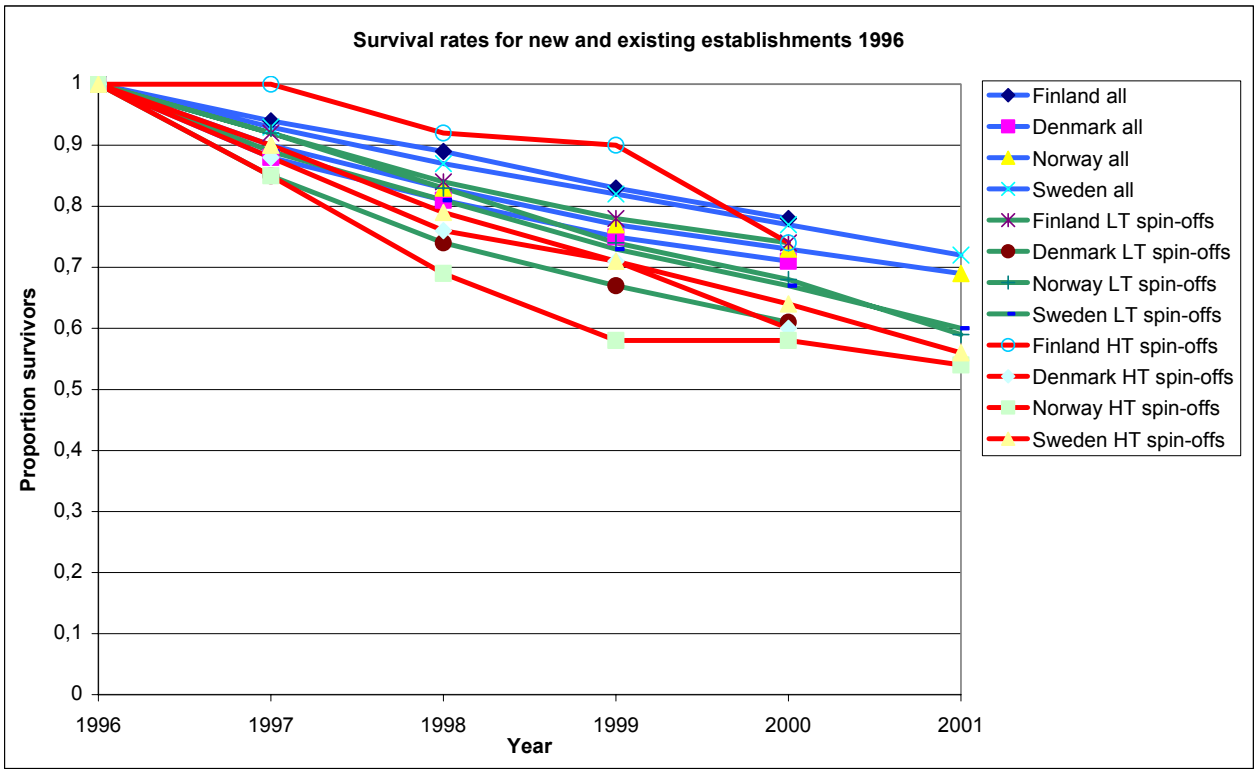
Initially we consider the survival rates of all establishments found in year 1996 (that is, existing and new). This shows the well-known fact that firm mortality is relatively high especially in the first years. Thus, for both Denmark and Norway we can observe that about a third of the establishments observed in 1996, have not survived into the fourth year. The countries fall into two groups regarding the levels of survival rates: Finland and Sweden with a higher rate of survival than Denmark and Norway that persists during the four (five) year period studied. The probability of death is highest in the first year and then declines successively during the subsequent years. In all four countries there is a similar time series development of the survival

rates with survival rates decreasing albeit at a decreasing rate. The pattern observed for the 1996 establishments is quite typical for that of other cohorts (years).

The survival rates of new establishments are, as expected, considerably lower than for all establishments existing in year 1996. After four years 50 to 60 per cent of the new establishments still exist. (The number for Finland is higher: 68 per cent.)

As for spin-offs we may note two things. Firstly, they clearly survive longer than the other new start-ups. Secondly, the patterns in survival rates differ quite a lot between the three countries. The survival rates are highest in Finland. On the other hand, there are relatively fewer Finnish spin-offs. In Denmark and Sweden low- and high-tech spin-offs have about the same survival rates, whereas in Norway low-tech spin-offs survive at a higher rate than high-tech ones. One should, however, be cautious in comparing low- and high tech spin-offs (as well as the other categories according to this dimension) as the number of the latter is relatively small: about a tenth of all spin-offs. For an illustration of survival rates for spin-offs, see Summary Figure 5.

Summary Figure 5 Survival rates for spin-off and existing establishments 1996 by country and high-tech/low-tech sectors.



"Greenfield births" is the most common form of new establishments, but also constitute the major source of the deaths of new establishments. There are relatively large differences in survival rates across countries. They are highest in Finland – about 70 per cent remain after four years – and lowest in Denmark making up slightly below 40 per cent. Norway and Sweden fall in between these extremes with survival rates of 50 and 60 per cent, respectively.

For most of the new establishment groups there does not seem to be any noteworthy differences in survival rates between high- and low-tech establishments. The only exception is spin-offs for which high-tech establishments have slightly lower survival rates than low-tech spin-offs.

It should be noted that although infant mortality is substantial among new establishments, this does not mean that employment in them is decreasing to the same extent. Many of the firms and establishments that die are small whilst the surviving firms are more likely to be growing and hence, the survival rates in terms employment are higher. In particular the proportion of employees surviving is significantly greater than the fraction of establishments surviving. Naturally, this is very important in assessing the impact of the creation of new firms.

Identifying possible success factors presupposes some definition of what constitutes success. Neither the academic nor the more applied literature comes up with a consensus view on the matter, so we have chosen to adopt a rather pragmatic approach using three alternative definitions based on survival.

The first is a very simple one, namely that the establishment still exists after four years. This is obviously not a very strong condition for success, but on the other hand, as we have seen, a rather large fraction of spin-offs and start-ups in general, die within the first years upon birth. The second definition adds the additional requirement that the establishment also has had some growth in its workforce. The third definition of success we employ is that the establishment either has survived as an independent firm or has been acquired by another firm and hence continues as part of a new firm. The latter possibility is allowed for in order to account for the cases where some of the successful start-ups are acquired by other, typically larger firms.

The three measures are applied to high- and low-tech spin-offs and other start-ups, respectively (for survival, see Summary Table 3 and for survival and growth see Summary Table 4). A first observation is that adding the acquired establishments to the establishments that have survived as independent units, affects the survival rates only marginally. In contrast, adding the requirement that the establishments should not only have survived but also have grown, does change the levels of the survival rates a lot. Thus, the success measure is typically reduced by a half or two thirds and in the case of Denmark even by more.

In Denmark and Finland there are considerable differences in success measures between spin-offs and other start-ups, whereas the differences are smaller in Norway and Sweden. In Denmark and Finland there are also differences between high- and low-tech spin-offs and among Finnish other start-ups, too. In Norway and Sweden the differences between high- and low-tech spin-offs and start-ups are smaller.

Summary Table 3 Success rates for spin-offs and other new start-ups in 1995, all countries. Criterion is survival 4 years.

	Denmark	Finland	Norway	Sweden
Spin-offs, low-tech	0.598	0.752	0.682	0.658
Spin-offs, high-tech	0.756	0.739	0.583	0.638
Start-ups, low-tech	0.338	0.622	0.536	0.571
Start-ups, high-tech	0.322	0.632	0.563	0.570

Summary Table 4 Success rates for spin-offs and other new start-ups in 1995, all countries. Criterion is survival 4 years and growth.

	Denmark	Finland	Norway	Sweden
Spin-offs, low-tech	0.090	0.371	0.204	0.315
Spin-offs, high-tech	0.200	0.435	0.188	0.276
Start-ups, low-tech	0.026	0.277	0.119	0.175
Start-ups, high-tech	0.027	0.363	0.188	0.283

Searching for possible success factors simple logistic regression analysis estimating the probability of success is utilised. Focusing the combined success requirement of both survival and growth in number of employees reveals both similarities and differences between the countries. The probability of success increases with the size of the establishment in Denmark and Norway, but decreases in Sweden and Finland. The probability of success is reduced with an increasing mean age of the workforce at the time of creation (no effect in Denmark), and the proportion of males has a positive effect in Finland and Denmark but not in Denmark and Sweden.

Worth noting is that the proportion with higher education has no significant effect in any of the countries. New establishments being in high-tech industries, compared to other industries, have a larger likeliness of success in Finland and Norway, but no effect in Denmark and Sweden.

Our particular focus on spin-offs reveals that the probability of success - in all of the countries - is higher if the new establishment is a spin-off, when compared to other forms of start-ups. The effect is relatively strong and highly significant. In Sweden there is a positive effect also from being a Greenfield birth, but this has no significance in the other three countries.

The results reported above vary with the exact specification of the success criterion. They should therefore be considered a first attempt at an empirical analysis of the determinants of the subsequent success of new start-up firms distinguishing between different forms of start-ups and focussing on spin-offs in particular. As almost always in empirical research, the analysis yields findings which in turn suggest new questions that need to be answered. We actually find quite different patterns across the four Nordic countries, but also similarities. In particular, it should be noted that spin-offs seem to be more successful than other forms of start-ups in the sense hat they are more likely to survive the first four to five years of their existence and also to expand their employment.

Finding observable characteristics of the establishments, their workforces or the team behind the spin-off, which would help in distinguishing between successful and not successful ones, turned out to be much more difficult. Spin-offs which operate in the same industry as the firm from which the founders spun off are found to be more probable to survive the first post-birth years, but otherwise it appears as if old and new firm traits as well as characteristics of the team behind the spin-off are poor predictors of the success of a spin-off.

A number of caveats should, however, be noted. The current analysis is concerned with only one cohort of start-ups. Although the pattern of subsequent developments does not differ much across cohorts, expanding the set of observations to include several cohorts may change the results. One advantage of having access to data on several cohorts is that then it is possible to carry out duration analyses, allowing for different lengths of the period of success. Another thing to notice is that the success measures used are crude and that the most used measure of businesses' success, profitability, is not one of them. Finally, our analysis lacks information about potentially important determinants of success such as the background of the spin-off team, whether the delivering firm is a single- or multi-plant firm, recent economic developments in the delivering establishments, and indicators for local conditions (for instance with respect to knowledge capital or the competition the spin-off or start-up is facing). All these avenues of further research are on our agenda and possible to overcome by integrating additional and available data.

Room for policy?

A first point is that high-tech spin-offs in many respects seem to be a rather marginal phenomenon. The number of establishments involved and the number of employees in them is quite limited each single year. The activity is to a large extent concentrated to particular parts of the business services industry, in many cases involving small consultancy firms that employ few others than the original members at the time of creation. In terms of industrial renewal this kind of change has very limited short term effects in quantitative terms, and other kinds of dynamics in the populations of business firms thus should be given greater attention. A more thorough analysis of the most influential types should be investigated utilising and building on the methodology presented here.

Even if high-tech spin-offs are not found to be of any major importance so far, that does not necessarily imply that this must continue on the same track. On the contrary one can argue that the limited activity we have had so far accentuates the need to achieve better in this respect. A rationale could be that high-tech spin-offs are presumed to be a mechanism for bringing advanced knowledge to use in new businesses. This may very well be the case, but the present work has had no means of settling such an issue – except for the fact that most spin-offs happen in industries that are not considered to be high-tech, also when originating in high-tech sectors.

Spin-offs seem to be more important in some cases than others. In particular, spin-offs are more widespread in high-tech sectors than in other sectors, and they have a higher survival rate than other new start-ups. This could indicate that the experiences that the employees bring with them when spinning out are important, and more important in high-tech sectors than in other sectors. This could be an argument for considering how to foster spin-offs in the high tech sectors if the goal is to expand such sectors presence in the economy. It should be emphasised though that we talk about small numbers, but they may be of importance for the development within small industrial niches.

The probability of succeeding is somewhat higher for spin-offs than for other start-ups, like Greenfield births – and this could perhaps be an argument for promoting this form of new establishments. On the other hand it is difficult to identify the factors influencing the probability of success. In isolation this is an argument against getting involved with policy measures, simply because we have not sufficient knowledge about the decisive - or significant - factors. In particular, variables included in the analysis that directly bears on policy, such as localisation and in particular being eligible for regional or structural support has no impact on the probability of success.

The limited explanatory power could be due to at least three different reasons. The first is that there is so much chance and uncertainty involved in establishing new businesses, particularly if research is involved, that it is extremely difficult to identify any factors that with some degree of accuracy are able to predict success or failure. Our analysis of factors influencing success of spin-offs can point in that direction, as there are no statistically significant relationship between the likeliness of success and the explanatory variables available to the analysis. If this is right, again there is little room for policy. On the other hand the variables entered into the analysis are limited, and the possibility that there are omitted explanatory factors constitute the second reason that we have so far not been able to explain variations in success rates of the spin-offs. As argued above there are several opportunities for expanding the information utilised in the analysis. Before policy action is decided upon one should make the most of these opportunities.

Thirdly, the combination of the numbers of cases identified as spin-offs, and the time horizon we have had available for analysis, have influenced the results. It may well be that some of the cases we have investigated will develop into major successes over time. So far the horizon has been limited to 4 to 5 years, and this may be too short. It is, however, difficult to figure out what is an adequate horizon. As time passes the link to the original event of being a spin-off is weakened, and other events come into play that disturb the analysis. Related to this is the relatively low number of spin-offs that form basis for the analysis. Small numbers of observation makes it statistically more demanding to establish robust relationships. Also related is the fact that we so far have been able to include only one cohort in the analysis. This cohort may not be representative and thus disturb the results. Therefore a solution could be to pool all identified spin-offs from different years. It would, in combination with bringing in additional information, contribute to making the analysis more reliable and robust. On the basis of the present experiences there is a good basis for doing this.

When making policy bureaucrats may have more detailed and nuanced information about some of the cases. On this basis it may be possible to identify cases where high-tech spin-offs seem to be a promising opportunity that could be helped to life with appropriate support systems. This essentially goes on in all countries via different support systems. Part of the problem with this kind of support that requires very detailed knowledge about each case is that the bureaucrat gets too involved and can run into problems prioritising among the candidates. And to repeat, these cases should be captured by the present analysis that show a very limited impact of the high-tech spin-offs.

An aspect that is rarely brought up in discussions of (high-tech) spin-offs relates to the cost side to spin-offs for the delivering establishment. Considering the social return on the activity one must also take the costs into account. One such case could be when researchers leave their research organisation to establish a new firm, thereby removing competence from the delivering organisation. Depending on the situation this may constitute a cost, but may also contribute positively by focusing the activity in the delivering organisation better.

There is also a cost side to policy, as resources always have alternative applications, and advantaging some actors or activities always comes at the cost of others. Assessing the sum of advantages and disadvantages usually is difficult, and we think that in the current case there is not enough margin to neither recommend nor advice against getting involved in policies to influence (high-tech) spin-off activity. On the other hand, the analysis has contributed to a much broader and more nuanced view of high-tech spin-offs, offering both a background for future policy thinking and a standing for better targeted future analyses.