

**WORLD CLASS
ECOSYSTEMS AND
COMPETITIVE
BUSINESS
ENVIRONMENT**

IMPACT STUDY

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FOREWORD

Finnish wellbeing is mainly based on the wealth and jobs created by the success of Finnish companies on the global market. Investment in research and innovations as well as adoption of radical innovations and new technological solutions for building new competitive advantages in both existing and new industries are needed to enhance competitiveness in the global market.

It has been agreed between Business Finland and the Ministry of Economic Affairs and Employment (TEM) that Business Finland's impact and the achievement of objectives will primarily be monitored through impact analyses and studies of strategic target areas. Impact studies implemented in each target area and impact studies presenting their results comprise the actual and official method for monitoring Business Finland's success and impact. A target area in this impact study was called as "World-class Ecosystems and Competitive Business Environment".

Attracting foreign direct investment is essential for Finland's competitive business environment for several reasons. First, activities of multinational enterprises contribute to strengthening manufacturing production and enhancing market. Second, activities of multinational enterprises are also important for competing in global knowledge production and the generation of new technological competences, which entails attracting global foreign R&D-intensive companies.

When considering world-class ecosystems, investment in R&D and innovation should be increased but with a new approach that is aimed more at the development and adoption of radical innovation and new technological solutions for building new competitive advantages in both existing and new industries. This should also include the pursuit of technologies and business models that enable companies to upgrade business and shift from existing activities to new, related ones.

In this impact study, the purpose was to produce both ex-post and forward-looking impact economic analysis and answer to the two main questions. Firstly, how Business Finland's invest-in activities have succeeded to attract foreign investments that increase renewal of companies in the Finnish business environment and will do so in the future? Secondly, How Business Finland's funding and services have succeeded to build trial platforms and ecosystems in Finland will do so in the future?

This impact study was carried out by the economist team from Copenhagen Economics AS. Business Finland wishes to thank the writers for their broad and systematic approach. Business Finland expresses its gratitude to steering group and all others that have contributed to the study.

Helsinki, March 2019

Business Finland

EXECUTIVE SUMMARY

Finland has a need to revitalise its traditional industries and build a competitive business environment. Business Finland has as its strategy to support the transformation by attracting FDI into Finland and developing world class ecosystems. In this study, Business Finland has asked Copenhagen Economics to address the following two main questions:

1. To which extent have Business Finland's invest-in services attracted FDI that has benefited Finnish firms, and what can be done to improve the invest-in services?
2. To which extent have Business Finland's funding and services helped developing ecosystems in Finland, and what can be done to improve the initiatives?

The two questions are closely interrelated. Ecosystems are one of the key drivers of FDI in advanced open economies such as the Finnish. Likewise, the presence of foreign firms within an ecosystem helps local firms in the ecosystem grow and become more innovative. Going forward, it is therefore important that Business Finland continues to seek synergies between investment promotion and ecosystem development activities.

The main conclusions of the study are summarised below. In Chapter 1, we provide an overview of Business Finland's operating environment and the underlying rationale for the services offered by Business Finland. In Chapter 2, we combine insights from qualitative and quantitative analyses to analyse the extent to which Business Finland has helped attract FDI into Finland. In Chapter 3, we have developed a methodology to assess the extent to which Business Finland's funding and services have helped developing world-class ecosystems in Finland. We will use the analyses to provide recommendation that may help Business Finland meet its strategy to support the revitalisation of the Finnish economy.

ATTRACTING FDI INTO FINLAND

FINLAND HAS A RELATIVELY POOR FDI PERFORMANCE

Finland has been historically less successful in attracting FDI relative to other EU Member States. Finland's FDI stock relative to GDP is 35 per cent compared to an

EU average of 65 per cent. Taking the economic size of the countries into consideration, Finland's FDI stock is also low relative to other small open economies such as Sweden, Denmark and the Netherlands. During 1990-2000 and 2000-2007, the Finnish FDI stock caught up and grew more than the EU average, but the growth in the FDI stock since the crisis has been below the EU average and even negative.

Using very detailed information about global FDI transactions, we find that Finland has attracted an increasing number of FDI projects compared to other small open economies. During 2008-2015, Finland attracted 1,611 investments up from 787 during 2003-2007. While the number of investments into Finland has increased after the crisis, the average deal value has dropped by 58 per cent. During 2008-2015, the average size of investments into Finland (EUR 33 million) was far below investments into the other small open economies included in the study. It is thus a low size rather than a low number of investments that seems to be driving Finland's poor FDI performance. The drop in the average size of investments reflects underlying shifts in the composition of FDI towards Finland.

First, Finland has attracted a large and increasing number of greenfield investments, which tend to be smaller than mergers & acquisitions (M&As). In addition to this, the average size of the M&As that have been placed in Finland has declined after the crisis. The poor M&A performance means that Finland misses out on foreign capital and knowledge that can help revitalise the Finnish economy. This may also be a concern for Finn-

ish policy makers if it indicates an underlying inability of Finland to grow firms and make them attractive for foreign takeover, or if start-ups are sold earlier in Finland compared to other countries, e.g. due to taxation structures, lack of domestic capital, IPO systems, etc. We recommend a closer analysis of Finland's M&A performance.

Second, the average size of investments during 2008-2015 compared to 2003-2007 has dropped for both the manufacturing and services sectors, but the drop has been larger for services. As Finland has attracted far more projects in the services sector relative to manufacturing after the crisis, the shift towards services has pulled down the overall value of FDI towards Finland. As services are closely related to key growth drivers (such as digitalisation, automatization and AI), the lower value of FDI may again not be associated with lower benefits to the Finnish economy.

Third, intra-EU FDI has increased more than extra-EU FDI. As the average size of intra-EU FDI after the crisis has dropped significantly and is below the average size of extra-EU FDI, the shift in origin of FDI into Finland has had a negative impact on the overall value FDI into Finland.

Attracting many foreign investments with large deal values improves Finland's FDI performance, but eventually it is the quality of the foreign investments and the socio-economic benefits that are the main concern for policy makers.

As part of this study, we have adjusted the Copenhagen Economics FDI impact assessment model to the

Finnish context and trained Business Finland staff in using the model. The model is a flexible tool that can be used to assess both the impacts of FDI within a given year and to track impacts of the portfolio of investments that Business Finland has helped bring to Finland during a given period. Going forward, we recommend Business Finland to use this tool to build KPIs, evaluate the efficiency of their invest-in activities and analyse patterns in impacts of FDI on the Finnish economy.

ACCELERATED FDI INFLOWS CAN HELP REVITALISE THE FINNISH ECONOMY

The presence of foreign firms can generate new economic activity in Finland and support job creation within the firm itself and in the broader Finnish economy through:

- **Direct impacts:** Direct impacts arise when the foreign investment creates new economic activity or retains economic activity within Finland. The contribution to the Finnish economy stems from the value added (salaries and profits) created in the foreign firm. The larger the number of jobs and the higher the value added per job, the larger the direct impact.
- **Indirect impacts:** Indirect impacts arise through the foreign firm's purchases from local suppliers in Finland. Via these purchases, the foreign firms create economic activity that supports jobs within Finnish firms and contributes to GDP. The more the foreign firm integrates into local supply chains, the larger the indirect impact.

- **Induced impacts:** Induced impacts arise when wages, paid out to the directly and indirectly employed workers, are spent within Finland. The demand generated via this channel, supports jobs in most sectors from the general consumption pattern in the economy. The larger the number of jobs and the higher the wages paid, the larger the induced impacts.

Besides these directly observable impacts, there are also broader dynamic impacts through which foreign firms may impact Finnish firms. Such impacts may, for example, arise from:

- **Knowledge spillovers:** The presence of foreign firms may enhance the productivity of local firms.
- **Signalling and branding:** The entry of foreign firms may trigger investments by local or new foreign firms.
- **Market development:** Increased competition, improved infrastructure or new technology may enhance the productivity of local firms.
- **Market size:** New establishments may increase the size of the local market in Finland, which can give rise to scale economies and attract new foreign investments.

THE RATIONALE FOR INVESTMENT PROMOTION

Finland's poor FDI performance may offer a rationale for new public intervention to accelerate FDI inflows into Finland. The rationale for public investment promotion is based on two underlying arguments that in combination may result in a so-called market failure.

Firstly, foreign investors do not take their economic contribution to the host economy into consideration when they decide where to locate their investment and the size of their investment in a specific location. The socio-economic value of foreign investments is likely to be larger in countries with low economic activity, and the rationale for investment promotion may therefore be stronger. Foreign investors, for example, do not take their contribution to revitalising the Finnish economy into consideration and will therefore tend to ‘underinvest’ seen from a Finnish perspective.

Secondly, it is costly to gather information about investment opportunities in foreign markets, and investors will therefore tend to invest more at home (home bias) or in well-known places abroad (signalling and agglomeration). For a small country like Finland where local market opportunities are likely to be more limited compared to larger countries, it may be costly for foreign investors to gather enough information to assess the attractiveness of Finland as an investment location. Once this information is obtained, it may be easily disseminated to other firms. This suggests that information spillovers exist, which again may be associated with a risk of underinvestment.

Like most other countries, Finland therefore has an investment promotion agency, Invest in Finland hosted by Business Finland, which disseminates information about Finland to reduce the uncertainty about investing in Finland and making more investors aware of the business opportunities offered by Finland. By offering services free of charge, Business Finland has as main

purpose to help new foreign firms establish themselves in Finland and support the expansion of foreign firms already located in Finland.

It should be kept in mind that there is a risk that public intervention crowds out private sector intermediaries or simply replace in-house information gathering of the foreign firms themselves (low additionality). Also, a net positive impact of FDI into Finland cannot be taken for granted because there is a risk that foreign firms crowd-out local firms. Crowding out can take place both in the final goods market if a foreign firm outcompetes a local Finnish firm and in the factor market if the presence of foreign firms creates bottlenecks in the market for key production factors, drives up prices and limits growth prospects for local Finnish firms.

The literature survey conducted as part of this study suggests that the risk of underinvestment will be particularly large for certain groups of investors:

- Investors from countries that are physically, culturally and institutionally far away from Finland. This could be an argument for paying special attention to non-European investors who may not be so familiar with Finnish strongholds as indicated by the low extra-EU FDI flows into Finland after the crisis.
- Foreign investors with an interest in existing Finnish strengths, such as sector-specific knowledge, skills, technology or some other key driver of the competitiveness of the firm. High costs of gathering the required information about Finnish strongholds could be an argument for offering more sector-specific and firm-specific information to foreign investors in ad-

dition to the more general information about Finland as an investment location. As it is also costly for Business Finland to gathering and updating very specific information for many sectors, this speaks in favour of smart specialisation and a place-based approach to investment promotion that takes existing needs and strengths of Finnish firms as a starting point.

- Investors from that are already well represented in Finland. This could be an argument for targeted investment promotion activities in countries where Finland already has a strong brand.

It is therefore important to assess the role of Business Finland in attracting FDI to Finland and the socio-economics impacts of these investments. It is also important to pay attention to the synergies and interdependencies between the funding of investment promotion and ecosystem development. If local firms do not innovate and invest in R&D, Finland will become less attractive for foreign investors. This can lead to a negative spiral where Finland is unable to attract foreign investments that can help revitalise the Finnish economy. Coordinating initiatives within Business Finland is thus important to harvest the full benefits of the funding.

THE ROLE OF BUSINESS FINLAND IN ATTRACTING FDI TOWARDS FINLAND

Business Finland offers a range of invest-in services to foreign firms. Thereby, Business Finland uses its access

to detailed information about Finland as an investment location to help foreign firms find the location with the best potential for their business operations more easily (e.g. through data collection and location management services). This information is also being used to bring down the transaction costs and perceived uncertainty of entering the Finnish market (e.g. services related to setting up a business). In addition to this, Business Finland uses its established network to arrange site visits and to facilitate meetings with local suppliers, clients, the public sector and educational institutions (e.g. matchmaking services, opportunity analysis and site visits).

We have analysed the portfolio of investments supported by Business Finland and conducted interviews with 10 foreign investors in Finland that received invest-in services from Business Finland. We have used the insights gained in the analysis to assess whether the invest-in services offered by Business Finland have helped accelerate the expansion of foreign firms in Finland. Business Finland has offered invest-in services to 32 foreign firms that have decided to invest in Finland during 2016. Of the 32 investments, 22 were establishments of new businesses, 3 were expansions of existing foreign firms in Finland and 7 were foreign takeovers of Finnish firms.

Overall, we find indications that the invest-in services have helped bringing new FDI to Finland, but we also find that there is room for improvement. *Firstly*, we find that the services offered by Business Finland are relevant and generally targeted towards foreign firms that may not otherwise have invested in Finland

because lack of information about the investment climate caused uncertainty and higher entry costs compared to alternative locations. This is particularly the case for extra-EU investors and smaller investors/investment projects:

- Around 40 per cent were intra-EU investments, and Business Finland therefore seems to have focus on attracting extra-EU FDI, which is also where the home bias (see above) should be expected to be larger.
- The average deal values of projects supported by Business Finland are below the average deal values of all investments into Finland after the crisis, and the services offered by Business Finland therefore seem to be more directed towards smaller investors and/or smaller investments by larger investors.

However, the FDI projects appear to be spread across many sub-sectors with only a few projects in each, which again indicates that there could be a potential for Business Finland to focus the investment promotion more towards Finnish strongholds.

Secondly, the services provided by Business Finland played a role in helping some of the firms to select Finland over other locations and to justify the choice of Finland to their management. In other cases, the services from Business Finland enabled the project to commence earlier than planned, which means that the benefits to the Finnish economy also commenced earlier. Business Finland's support also contributed to the implementation of firms' investment projects, in some cases allowing firms to set up their investments more quickly and

even at a larger scale (i.e. with more employees) than originally planned.

All the firms interviewed were satisfied with the support received from Business Finland as well as other government agencies in the country. While this may reflect a positive bias in the way that the firms were selected, we also find that the services provided were balanced between general information and more specific information depending on the investors' needs. We also find that some of the investors received both invest-in services and funding services, which indicate that Business Finland is aware of and proactively pursuing synergies to support the transformation of the Finnish economy.

None of the 10 firms were proactively contacted by Business Finland. While it is positive that foreign investors contact Business Finland themselves, there could also be a risk that Finland is missing out on potential investments by not being proactive enough. With intense competition for FDI, it is of utmost importance that Business Finland capitalises on existing strengths, and that investor advisors prioritise resources towards industries (and even specific firms) that promise the largest benefits to the Finnish economy.

SOCIO-ECONOMIC IMPACTS OF THE FDI SUPPORTED BY BUSINESS FINLAND

We have also analysed the sectoral composition of the portfolio of investments supported by Business Finland and used the Copenhagen Economics FDI Impact Assessment Model to assess the socio-economic impacts

of the 32 investments supported by Business Finland in 2016. We have used case studies to find example of broader impacts of FDI to local firms and validate our conclusions.

According to Business Finland's FDI database, the 32 foreign firms employed 502 workers. The jobs supported by investments in 2016 give only a snapshot picture of the total footprint of the new FDI projects in the Finnish economy. All the firms that were interviewed as part of this study state that they have recently expanded or have plans to continue growing in the country. Over time, the impact of the new FDI projects in Finland during 2016 should therefore be expected to grow.

Looking at the sectoral composition of the investments supported by Business Finland and the average productivity in these sectors, we find relatively mixed results. While some of the investments were undertaken in high-productivity sectors where Finland has initial strengths but currently faces challenges, others were in low-productivity sectors with a relatively low socio-economic contribution to the Finnish economy. If Business Finland was more proactively pursuing investments within sectors of key Finnish interest, the contribution to revitalising the Finnish economy is likely to be larger.

We find that the 32 foreign firms support around 1,600 jobs within Finland. The foreign firms support around 600 jobs among its local suppliers and their suppliers within Finland (indirect impact). Furthermore, the wages paid to workers directly in the firm and among suppliers throughout the value chain support an additional 500 jobs across a broad range of industries

within Finland. We find that the economic activity supported by the 32 foreign firms has added more than EUR 200 million to Finland's GDP in 2016. EUR 57 million of these are created directly in the foreign firms, whereas the remaining GDP contribution accrue through Finnish firms of which EUR 45 million come from spillovers from foreign to local firms. We therefore conclude that the investments supported by Business Finland have created new economic activity and helped support the revitalisation of the Finnish economy.

IMPROVING FINLAND'S FDI PERFORMANCE GOING FORWARD

A wide range of factors go into the decision of investing abroad, and firms will balance pros and cons to make their investment in the location that promises the highest long-term profit. Some factors are difficult for Finnish policy makers and actors working with investment promotion to influence, but other factors can be influenced by EU, national and regional policies.

Measured by the FDI Attraction Scoreboard, Finland is the most attractive EU Member State. It therefore appears that other factors than the FDI policy indicators used in the scoreboard pull down Finland's overall attractiveness, such as the peripheral location of Finland in the EU, the tense relations between the EU and Russia, the Finnish language and the small size of the local market. The implication is that Finland must be even more attractive measured in terms of the key FDI policy drivers that can be influenced in the short to medium term.

It is particularly important that Finland maintains its position in terms of knowledge and innovation capacity, which investors in Finland bring forward as one of the key drivers of FDI into Finland. While the quality of scientific research appears to have improved relative to other countries, Finland receives a lower score on cluster development in 2016 compared to 2009. Along with a relatively low share of the population with a tertiary education, weak cluster development is one of the factors that weakens Finland's knowledge and innovation capacity. Over time, Business Finland's funding of ecosystem development may help improve Finland's attractiveness in this dimension.

The need for Business Finland to capitalise on existing strengths and prioritise resources towards industries (and even specific firms) that promise the largest benefits to the Finnish economy come out clearly in the report. This speaks in favour of 'smart specialisation' or a so-called 'place-based approach' to investment promotion.

The starting point of such an approach would be to understand the main needs of the Finnish economy, i.e. the economic structures, comparative advantages as well as growth drivers and restraints that underline Finland's growth strategies at the national and regional levels. Understanding drivers of FDI across industries, types of investments and origins of investments can then help Business Finland develop high-impact FDI promotion initiatives and benchmark its FDI attractiveness against peers to assess the chance of winning. Steering toward

investments that capitalise on synergies between Finland's needs and opportunities will help Business Finland prioritise high-quality investments. Going forward, it will be important to ensure that the performance of Business Finland is measured in terms of the total socio-economic impact and not on sub-indicators alone (e.g. the number of investments and the number of direct jobs disregarding the quality of the investments).

DEVELOPING WORLD CLASS ECOSYSTEMS IN FINLAND

Ecosystems are a key element in Business Finland's strategy towards building a world class competitive business environment in Finland. The intention is to underpin global growth for companies located in Finland via research and innovation initiatives around several ecosystems. Business Finland supports the development of ecosystems through research funding, grants, loans and support in terms of so-called orchestrators of the individual ecosystems.

Copenhagen Economics has been asked to assess the evidence based on the economic impacts of the support granted to ecosystems. Our assessment is based on existing impact studies of the relevant types of funding and on an assessment of four selected ecosystems, to whom research funding alone is around EUR 30-50 million per year.

In the analysis, we assess:

- How Business Finland's funding and services towards ecosystems have contributed to developing the ecosystems in Finland
- The evidence-base for claiming a social-economic impact in Finland from funding ecosystems
- The social rate of return on the use of public funding in this area

We have also analysed data on the actual funding and business level data for the funded firms, and we have also collected insights on the functioning of the eco-systems via interviews with stakeholders in the four selected ecosystems.

FOUR SELECTED ECOSYSTEMS

We have been asked to review four selected Finnish ecosystems.

- **Traffic – incl. Mobility as a Service (MaaS)**
The Traffic ecosystem around *Mobility as a Service* is part of a larger effort under the heading “Smart mobility”. The ambition of MaaS is to create a smooth door-to-door urban transport system where digital platform solutions bring together different types of transport providers (busses, trains, taxis and sharing cars) with transport users. Finland aims to provide a test-bed for this new approach to solving transport and climate problems.
- **Mobile games – Gaming apps on mobile devices**
Finland is home to many of the world's most suc-

cessful mobile games developers. Homegrown spearheads in the global gaming industry such as Rovio (known for e.g. Angry Birds) and Supercell (e.g. Hay Day and Clash Royale) each employ hundreds of high paid game developers in Finland. Global game and tech giants AMD, Nvidia, EA, Ubisoft and Unity are all present in Finland. Business Finland (and before that, Tekes) has been funding firms within mobile games development for decades.

- **Marine – One Sea and autonomous ships**
Finland is already having an industrial stronghold in the global maritime equipment industry with a focus on cutting edge ships, engines, propellers and other equipment for the maritime industry. The One Sea ecosystem was founded in 2016. The ambition is to lead in the field of autonomous ships. The One Sea – Autonomous Maritime Ecosystem includes global leaders in the maritime and leading digital firms from Finland such as: ABB, Cargotec (MacGregor and Kalmar), Ericsson, Meyer Turku, Rolls Royce, Tieto and Wärtsilä. The association of Finnish Marine Industries supports the work, and Business Finland (and before that Tekes) has invested in the ecosystem. The leader of One Sea is DIMECC.
- **Health – Smart ICT solutions in the health care sector**
The Health ecosystem seeks to facilitate open collaboration and to accelerate innovation by bringing together experts from wireless information technologies and life science. The goal is to introduce smart ICT solutions for delivering advanced, personalised,

and connected health service solutions. Large historic investments have resulted in acknowledged Finnish research and treatment for such specialist areas as cancer, brain diseases, orthopedics, and genetics research. Finland has several health care regulatory initiatives. The Health ecosystem comprises several stakeholders from academia, the public sector, and the private sector and span the areas of Diagnostics & Analytics, Digital Health, Pharmaceuticals, Wellness & Care, and Medical Devices & Imaging.

The *traffic ecosystem* includes around 60 core companies employing more than 2,000 persons in 2017, and 50 of these firms have received some form of direct funding from Business Finland. Several of the firms in the Traffic ecosystem are also having activities outside the field of smart urban mobility.

The *marine ecosystem* has around 15 core companies with a combined employment of around 18,000 persons in 2017. We have identified 10 core firms within the ecosystem having received some form of funding from Business Finland.

The *mobile games ecosystem* consists of around 300 core firms with a total of employment of 4,000 – 5,000 persons in 2017. Of these firms, less than half (125 firms) have received funding from Business Finland since 2001.

The *health ecosystem* has around 140 core companies with a combined employment of 6,000-12,000 persons in 2017. The large interval reflects the presence of Nokia

in the ecosystem. Of these firms, around 100 have received funding from Business Finland.

The firms in the ecosystems vary in size and maturity. Traffic and Mobile Games firms are typically younger, born digital and on average smaller. Still firms in both ecosystems can demonstrably grow to considerable size. The Marine ecosystem includes large and mature firms such as Wärtsilä with more than 18,000 jobs globally and around 3,600 in Finland, and other large firms such as Meyer and Rolls Royce.

THE RATIONALE FOR FUNDING OF ECOSYSTEM DEVELOPMENT

Research and innovation are key drivers of productivity and economic growth. Firms and economies achieve large and significant returns on these investments, which also create new and better jobs. Research and innovation investments are also crucial for addressing key societal challenges and improve well-being. They contribute to improving health outcomes, combat climate change, and build more inclusive and resilient societies. Therefore, a full understanding of the impacts of research and innovation funding needs to consider both the economic impacts and the social impacts that support higher levels of well-being.

Several market failures are directly linked to investment decisions in research and innovation. Research and innovation bring benefits to other firms than the firms doing the concrete research or innovation. Other

firms can also benefit from these innovations, and there is a positive spillover that each individual firm does not fully consider when deciding their level of investment in research and innovation. In addition, there are high risks, sunk costs, market uncertainty and an inability to fully control results, which all lead to underinvestment in research and innovation below what is socially desirable.

These positive spillovers (also called positive *externalities*) mean that the society at large would gain from funding that increases the level of research and innovation beyond the level that would occur, if the decision was based only on the benefits accruing to the individual firm. Funding can thus increase investments in research and innovation towards the level that would maximise the spillovers to the society at large. The funding should equate the size of the spillover. While this result is simple and clear in theory, it can be very challenging to assess whether the level and quality of funding are appropriate in practice.

The four selected ecosystems received funding worth EUR 36.6 million in 2017. The funding for the Traffic and Mobile Games ecosystems has been relatively stable within recent years. Between 2012 and 2017, the Finnish game companies attracted around EUR 100 million in private funding and EUR 75 million in public research funding, grants and loans. The Marine ecosystem, and its focus on autonomous ships, is new, and funding of the ecosystem has only been provided in 2016 and 2017.

EXISTING FINDINGS ON THE IMPACT OF ECOSYSTEM FUNDING

Many evaluations have assessed a broad spectrum of outputs, outcomes and impacts of funding and support from Business Finland. We focus on the impacts of funding on two indicators: Employment and productivity.

RESULTS ON EMPLOYMENT IMPACTS

Funding from Business Finland has been shown to have a positive and significant effect on employment and turnover in the SMEs and start-ups receiving the funding. Funding from Business Finland for SMEs increases employment by around three employees in the average supported firm.

The size of the employment effect seems to increase over time for the funding of research projects (i.e. the type of funding previously provided by Tekes). One year after the research-type of funding, the funded firm employs one additional employee. Six years after the funding the funded firm employs close to eight more employees, and the rate of growth increases from year five to six indicating longer lasting effects.

The size of the employment effect from the type of support formerly provided by Finpro seems to appear faster, but also to be fading after approximately five years indicating short time span of the intervention of this type of funding. To assess the impacts of the ecosystem funding, we use the proportion of spending

across the two types to assess the expected time profile and duration of impacts.

RESULTS ON PRODUCTIVITY

Another key impact of R&D funding is that it improves productivity in the participating firms. Increased productivity leads to higher competitiveness and allows the firm to expand – both domestically and on foreign markets. However, none of the evaluations document any significant and measurable impact on productivity for the participating firms.

It is important to stress that this does not necessarily mean that the funding does not have an impact on productivity. There are several reasons why this impact can be difficult to capture, e.g. that the effect is expected to take time to materialise and the productivity effect might occur through different channels that are difficult to measure empirically. Furthermore, Business Finland is careful in choosing the firms they fund and are selecting the best firms to receive the funding.

The recipients of funding from Business Finland report increased investments in R&D, innovation and higher productivity. In particular, around half of the supported firms report a positive impact on productivity, with SMEs reporting slightly higher impacts than large firms. However, no causal effects are found, and the effects of the funding on productivity are interpreted as indicative.

BUSINESS FINLAND'S CONTRIBUTION TO DEVELOPING ECOSYSTEMS

Having reviewed the programs and combined firm-level data for the participating firms, and after having reviewed the existing evaluations, data and insights collected via interviews with stakeholders, we reach the following conclusions:

- Business Finland's funding and services towards ecosystems have contributed to develop ecosystems in Finland. Evaluations show that the participating firms grow faster than they would have done without the funding. More qualitative studies also support the conclusion that innovation and collaboration activities are strengthened and expanded through the support from Business Finland.
- The evidence-base shows a positive economic impact for Finland from funding ecosystems. In 2017, the Traffic and Mobile Games ecosystems received funding worth EUR 16.5 million. This funding is expected to create 230-290 full-time equivalent jobs annually in the more productive ecosystem firms and increase value added by EUR 2.3-2.9 million annually.
- It is estimated that the investment programmes have a payback time between seven and nine years. This depends on the productivity growth in the ecosystems and the future employment impacts from the Business Finland funding.

Our analysis provides a conservative estimate of the impacts. Our assessments are constrained by the availability of impact studies of several aspects of the ecosystem approach. While many high-quality impact studies are available, our analysis is based on available econometric impact studies and is therefore only able to quantify the impacts of funding provided to SMEs. However, this does not mean that there are no effects on other dimensions and the effects from Business Finland funding can potentially be larger than estimated. Potential impacts that cannot be assessed on the basis of existing impact studies include:

- **The impacts of the funding on large firms.**
- **The intra-ecosystem spillover effects.** Impacts on other firms in an ecosystem from funding a firm in the ecosystem.
- **The extra-ecosystem spillover effects.** Impact on firms outside the ecosystem from funding to the ecosystem.
- **The potential direct impact on productivity for SMEs.** It has not been finally established that funding improves productivity in the supported firms, but the effect might still exist.
- **Impacts of orchestration funding.** This is provided to smooth the cooperation within ecosystems.

We recommend that these impacts are explored further going forward.

1 BUSINESS FINLAND'S OPERATING ENVIRONMENT AND SERVICES

Finland has a need to revitalise its traditional industries and build a competitive business environment. Business Finland has as its strategy to support the transformation by:

1. Attracting FDI into Finland, and
2. Developing world class ecosystems in Finland.

Business Finland offers a range of invest-in services to foreign firms free of charge with the underlying expectation that accelerating the expansion of foreign firms in Finland will support the transformation of the Finnish economy. It is within this context that Copenhagen Economics has been asked to assess the FDI projects supported by Business Finland and their contribution to the Finnish economy.

ATTRACTING FDI INTO FINLAND

Main question: To which extent have Business Finland's invest-in services attracted FDI that has benefited Finnish firms, and what can be done to improve the invest-in services?

Business Finland also offers funding of research projects, grants and loans with the intention to underpin global growth for companies located in Finland via research and innovation initiatives around several ecosystems. It is within this context that Copenhagen Economics has been asked to assess selected ecosystems supported by Business Finland and their contribution to the Finnish economy.

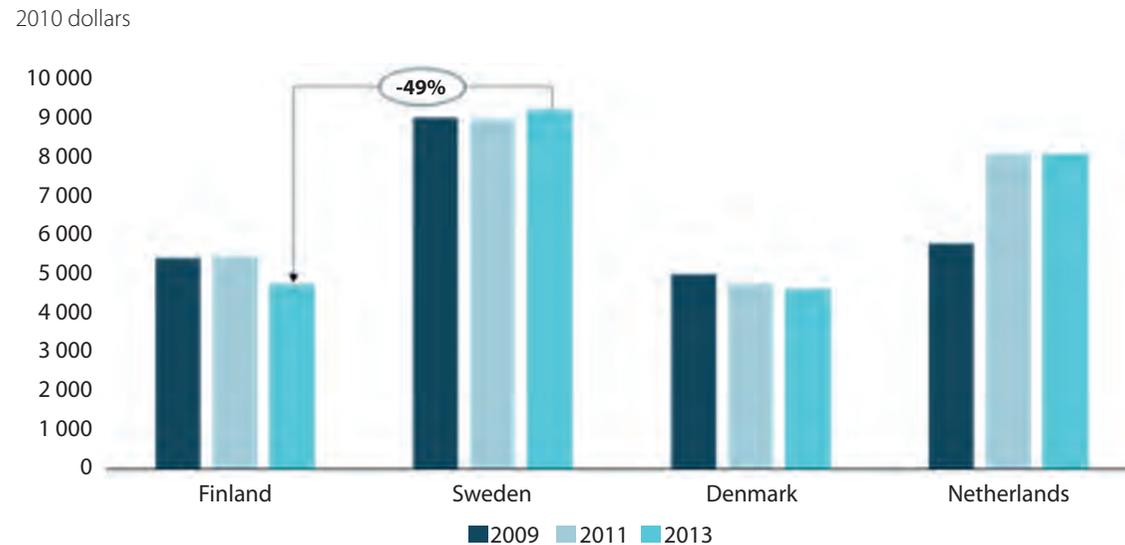
DEVELOPING WORLD CLASS ECOSYSTEMS IN FINLAND

Main question: To which extent have Business Finland's funding and services helped developing ecosystems in Finland, and what can be done to improve the initiatives?

The two parts are closely interrelated. Ecosystems are one of the key drivers of FDI in advanced open economies such as the Finnish. Likewise, the presence of foreign firms within an ecosystem helps local firms in the ecosystem grow and become more innovative.

In this chapter, we provide an overview of the Finnish context and Business Finland’s main activities to attract FDI and develop world class ecosystems in Finland. In Section 1.1, we illustrate how a poor FDI performance and low private R&D expenditures pose a challenge to the Finnish economy. In Section 1.2, we explain the rationale for offering invest-in services free of charge, and we provide an overview of how we have assessed the FDI projects supported by Business Finland. In Section 1.3, we explain how public funding can support ecosystems, and we provide an overview of our approach to assessing the ecosystems supported by Business Finland.

FIGURE 1. Business enterprise R&D expenditure, 2009-2013



Note: Data on R&D expenditure are in constant prices and PPP.

Source: OECD Stat on business enterprise R&D expenditure by size class and by source of funds

1.1 THE NEED TO ACCELERATE FDI INFLOWS AND INNOVATION IN FINLAND

According to the European Commission’s innovation scoreboard, Finland has long been among the leaders in European innovation.¹ In the 2018 assessment of the Finnish economy, the OECD (2018) found that this position is threatened and that there is a need for new instruments to revitalise the Finnish industry and enhance innovation. The OECD furthermore finds that Finland has good opportunities to 1) restructure production in new high-productivity sectors, and 2) attract foreign investors.

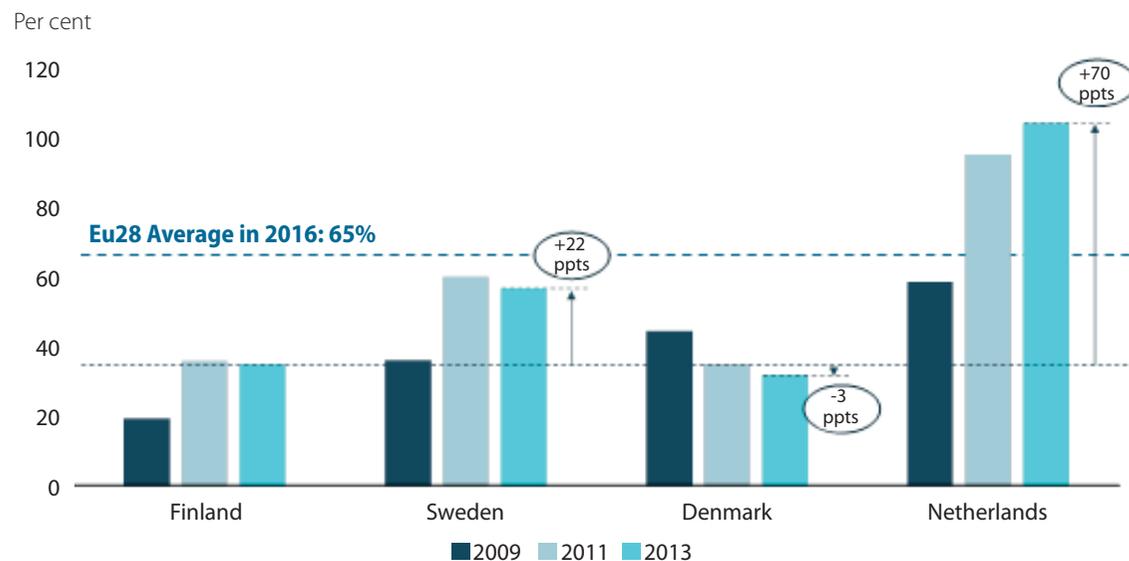
According to the OECD, the transformation of traditional Finnish industries will require Finland to engage more in “radical innovation” and become more effective in utilising its knowledge capabilities and transforming them into globally competitive innovation. It is therefore a concern that private R&D expenditures in Finland are low relative to its neighbouring countries. In 2013, private R&D expenditure in Finland were at the same level as Denmark but only half the size of that in Sweden, cf. Figure 1. Furthermore, private R&D expenditures have

¹ The European Innovation Scoreboard provides a comparative analysis of innovation performance in EU countries, other European countries and regional neighbours. It assesses relative strengths and weaknesses of national innovation systems and helps countries identify areas they need to address. The scoreboard goes back to 2007 and is updated annually by DG Internal Market, Industry, Entrepreneurship and SMEs.

been declining in Finland during 2009-2013, whereas the benchmark countries included in this study have either seen relatively stable (Denmark and Sweden) or even increasing expenditures (the Netherlands).²

It is also a concern that Finland has been historically less successful in attracting FDI relative to other Member States, including other small open economies such as Sweden, Denmark and the Netherlands.³ Finland's FDI stock relative to GDP is 22 percentage points below the Swedish (57 per cent in Sweden compared to 35 per cent in Finland). The Netherlands with an FDI stock relative to GDP of 105 per cent is the only of these small economies that lies above the EU average of 65 per cent.

FIGURE 2. FDI stock relative to GDP in selected small economies, 2000-2016



Note: The EU28 is calculated as the simple average.
 Source: Copenhagen Economics based on FDI data from UNCTAD

During 1990-2000 and 2000-2007, the Finnish FDI stock caught up and grew more than the EU average, but the growth in the FDI stock since the crisis has been below the EU average and even negative, cf. Figure 3. The same is the case for Denmark and Sweden, whereas the Netherlands has continued to experience growth rates in the FDI stock.

Finland has attracted an increasing number of FDI projects compared to other small open economies. During 2008-2015, Finland attracted 1,611 investments up from 787 during 2003-2007, cf. Figure 4. This is an increase of 105 per cent, which is higher than Sweden (+40 per cent), Denmark (+44 per cent) but lower than the Netherlands (+117 per cent). The number of investments into Finland in the period after the crisis is thus above Denmark (1,534 investments) but below Sweden (2,442 investments) and the Netherlands (4,423 investments).

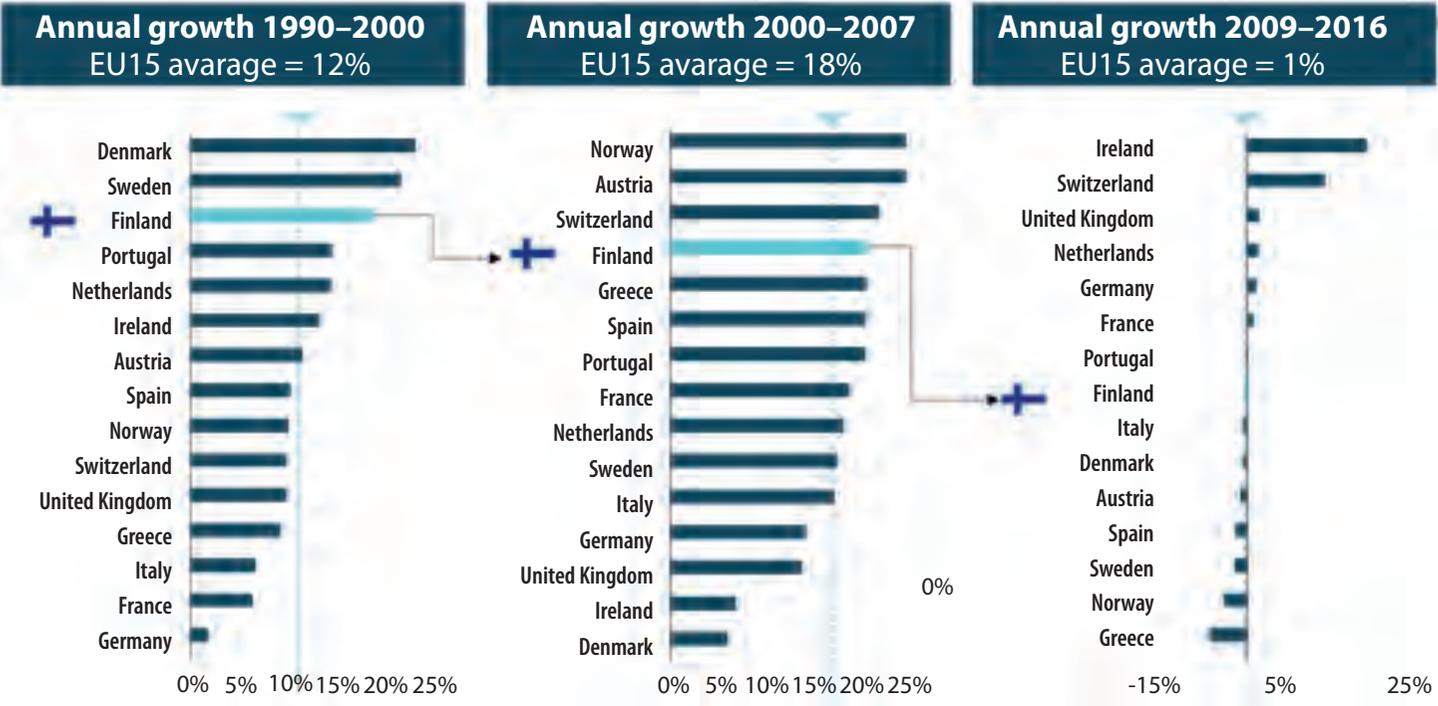
While the number of investments into Finland has increased after the crisis, the average deal value has dropped by 58 per cent. The average size of an investment was EUR 79 million before the crisis but only EUR 33 million after the crisis. The drop in the average deal value of FDI into Denmark and the Netherlands was significantly lower (by -15 and -28 per cent, respectively),

² Throughout the study, we compare Finland against Sweden, Denmark and the Netherlands. These countries are all small, open Northern European economies like the Finnish, and they may therefore serve as inspiration for Finland.

³ We follow the UNCTAD definition of FDI as being cross-border investments by a foreign firm with a minimum 10 per cent ownership share, cf. UNCTAD (2007). The different types of FDI are described in Appendix A.

FIGURE 3. Average annual growth in FDI stocks, 1990-2016

Per cent



Note: EU15 average is calculated as a simple average.
 Source: Copenhagen Economics, based on UNCTAD and WIR

whereas the average deal value of FDI into Sweden even increased by 23 per cent after the crisis. During 2008-2015, the average size of investments into Finland (EUR 33 million) was far below investments into the other small open economies included in the study. It is thus a low size rather than a low number of investments that seems to be driving Finland's poor FDI performance.

Attracting many foreign investments with large deal values improves Finland's FDI performance, but policy makers' interest in FDI relate more to the benefits these investments create for local firms and citizens. As described in Chapter 2, the quality of investments is therefore of key importance. A poor FDI performance may, however, indicate that Finland has a poor investment

climate that will make it less attractive for both foreign and local firms to expand businesses in Finland. It is therefore important to get a better understanding of why the value of FDI into Finland is low relative to peers.

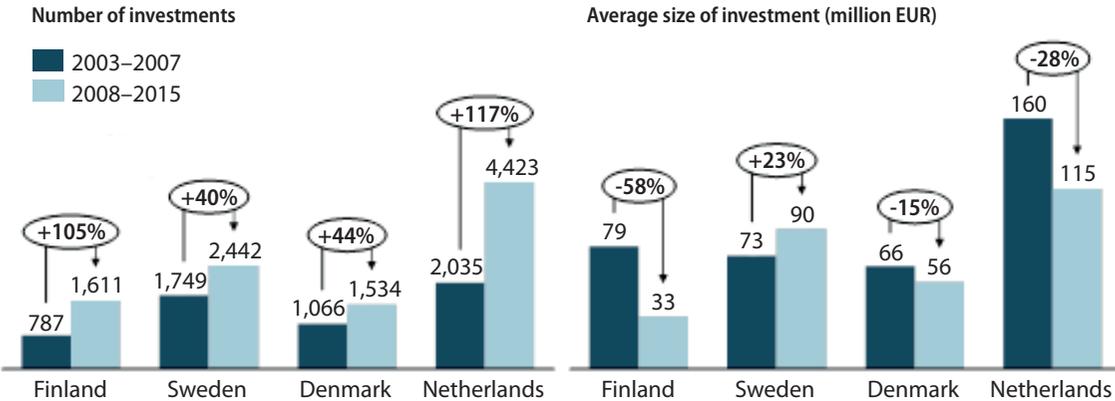
Overall, we find that the drop in the average size of investments reflects underlying shifts in the composition of FDI towards Finland, cf. Table 1. *Firstly*, Finland attracts a large and increasing number of greenfield investments, which tend to be smaller than mergers & acquisitions (M&As). In addition to this, the average size of the M&As that have been placed in Finland has declined after the crisis.

Secondly, the average size of investments during 2008-2015 compared to 2003-2007 has dropped for both the manufacturing and services sectors, but the drop has been larger for services (-60 per cent for services and -35 per cent for manufacturing). As Finland has attracted far more projects in the services sector relative to manufacturing after the crisis (946 projects in services and 587 in manufacturing), the drop has pulled down the overall value of FDI towards Finland.

Thirdly, the average size of investments during 2008-2015 compared to 2003-2007 has dropped irrespective of the origin of investments. The number of investments from other EU Member States (intra-EU FDI) has increased more than investments from non-EU Member States (7 per cent for intra-EU FDI compared to 5 per cent for extra-EU FDI). As the average size of intra-EU FDI after the crisis (close to EUR 27 million) has dropped significantly and is below the average size of extra-EU FDI (above EUR 43 million) the contribution to the overall value of FDI is more limited.

Each of these observations are detailed further below where we also benchmark Finland's FDI performance against other small open economies along these dimensions.

FIGURE 4. Overall FDI into Finland and selected small open economies, 2003-2015



Note: The average size of investments is calculated using data where information about deal value was available. The number of investments includes all registered FDI.

Source: Copenhagen Economics based on FDI data from the Financial Times and BvD databases

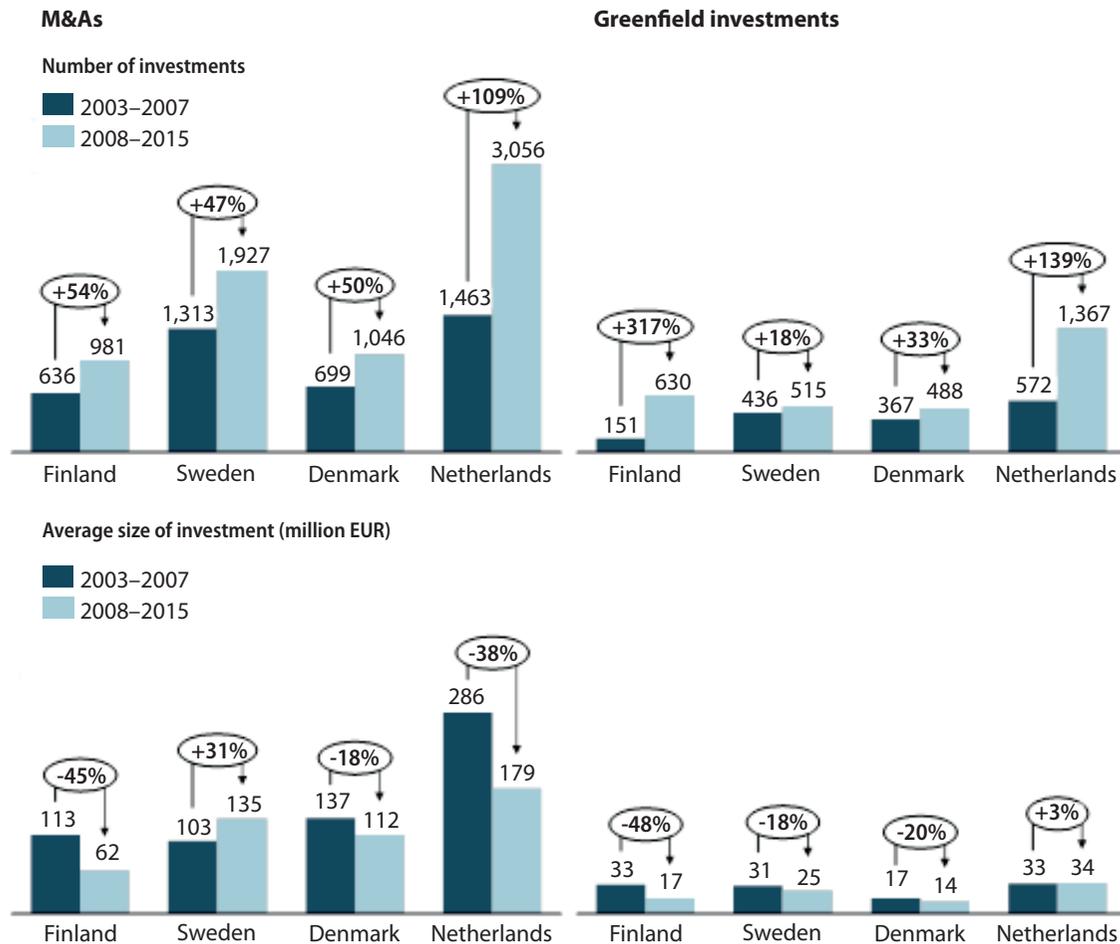
TABLE 1. Decomposition of FDI into Finland, 2003-2015

	Number of investments into Finland			Average size of investments into Finland (million eur)		
	2003-2007	2008-2015	Average annual change	2003-2007	2008-2015	Average annual change
TYPE						
Greenfield	151	630	10%	33	17	-13%
M&As	636	981	4%	113	62	-49%
SECTOR						
Services	440	946	7%	71	23	-60%
Manufacturing	304	587	6%	91	49	-35%
Others	39	78	-6%	72	33	-44%*
ORIGIN						
Intra-EU	482	1005	7%	88	27	-48%
Extra-EU	305	606	5%	65	43	-83%

Note: The average size of investments is calculated using data where information about deal value was available. The number of investments includes all registered FDI. *Due to the low number of investment projects, the average annual change for the category "Others" is very sensitive to outliers. For this reason, 2003-2004 were excluded. If kept in, the average annual change would be 840 per cent.

Source: Copenhagen Economics based on FDI data from the Financial Times and BvD databases

FIGURE 5. FDI into Finland and selected small open economies by type of investment, 2003-2015



Note: The average size of investments is calculated using data where information about deal value was available. The number of investments includes all registered FDI.

Source: Copenhagen Economics based on FDI data from the Financial Times and BvD databases

FDI ACROSS DIFFERENT TYPES OF INVESTMENTS

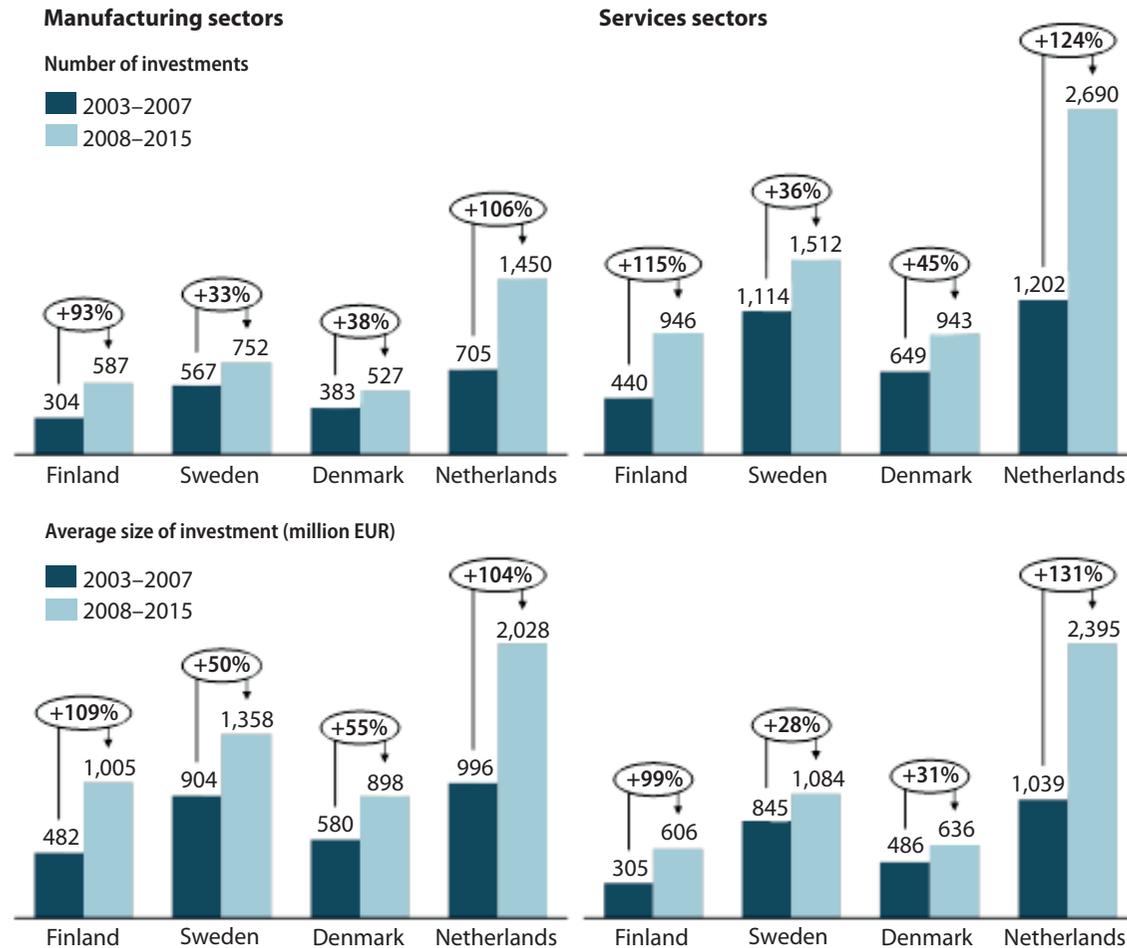
The increase in the number of investments after the crisis was driven by a large increase in the number of greenfield investments.⁴ During 2008-2015, Finland has been successful in attracting 630 greenfield projects compared to 151 greenfield projects during 2003-2007. Greenfield investments expand the production capacity in Finland, and these investments are thus likely to support new jobs and economic activity in Finland. Newly established firms may also grow other time.

While the number of greenfield investments has increased more for Finland after the crisis than some of the other open economies, the average deal size has dropped more. The average size during 2008-2015 of EUR 17 million was slightly above Denmark (EUR 14 million) but below Sweden (EUR 25 million) and the Netherlands (EUR 34 million).

The low number of M&As could also be a concern for Finland. *First*, Finland is missing out on foreign capital and knowledge that can help revitalise the Finnish economy. *Second*, the poor M&A performance may indicate an underlying inability of Finland to grow firms and make them attractive for foreign takeover. The small size of the M&As that Finland does attract is another concern.

⁴ See Appendix A for a description of the different types of investments and their expected impact on the Finnish economy.

FIGURE 6. FDI into Finland and selected small open economies by sector, 2003-2015



Note: The average size of investments is calculated using data where information about deal value was available. The number of investments includes all registered FDI.

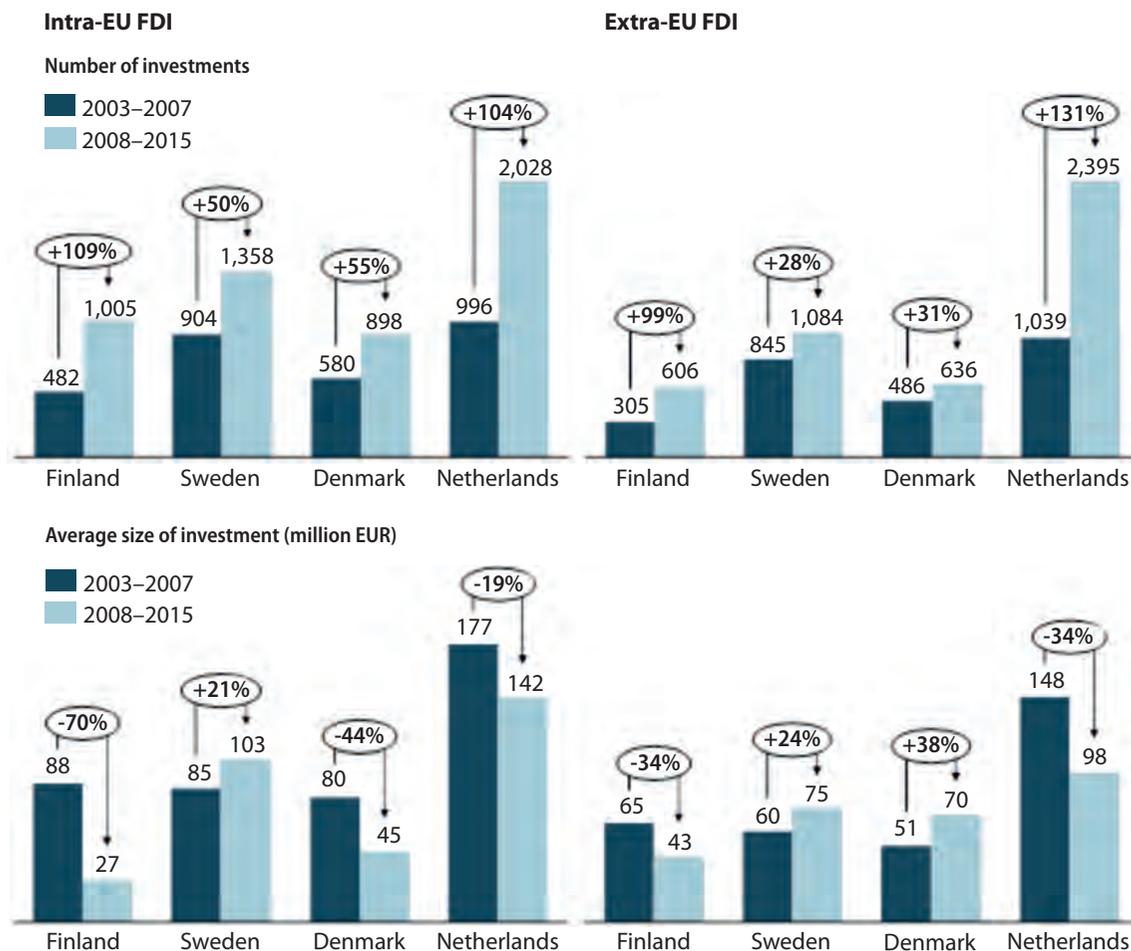
Source: Copenhagen Economics based on FDI data from the Financial Times and BvD databases

THE SECTORAL COMPOSITION OF FDI INTO FINLAND

The number of investments after the crisis has increased for both the manufacturing and services sectors in Finland, cf. Figure 6. The increase was larger for services (115 per cent) compared to manufacturing (93 per cent), and the manufacturing sector thus accounted for a declining share of the total number of investments. As the average deal size for services has dropped more than for manufacturing and lies below the average deal size in the manufacturing sector, the shift in the sectoral composition is part of the explanation of Finland's poor FDI performance after the crisis.

While Finland and the Netherlands have also seen a reduction in the average deal size for investments in the manufacturing sector, the size of investments has increased for Sweden and Denmark. Consequently, average deal values for Finland lie below the other small open economies. Likewise, the drop in average deal values within services has been larger for Finland than for the benchmark countries.

FIGURE 7. FDI into Finland and selected small open economies by origin, 2003-2015



Note: The average size of investments is calculated using data where information about deal value was available. The number of investments includes all registered FDI.

Source: Copenhagen Economics based on FDI data from the Financial Times and BvD databases

THE ORIGIN OF FDI INTO FINLAND

The number of investments from both within the EU (intra-EU FDI) and from outside the EU (extra-EU FDI) have increased after the crisis, whereas the average deal value has dropped for all origins, cf. Figure 7. The drop in the size of both intra-EU and extra-EU FDI has been larger for Finland than for the benchmark countries. Intra-EU investments are on average smaller than extra-EU investments (EUR 27 million compared to EUR 43 million for extra-EU investments during 2008-2015), and these deal values have dropped more. Finland receives a higher share of its investments from other EU Member States (62 per cent intra-EU FDI compared to 56 per cent for Sweden, 59 per cent for Denmark and 46 per cent for the Netherlands), and the shift in the origin of FDI into Finland therefore tends to have a negative impact on Finland's overall FDI performance.

1.2 ATTRACTING FDI INTO FINLAND

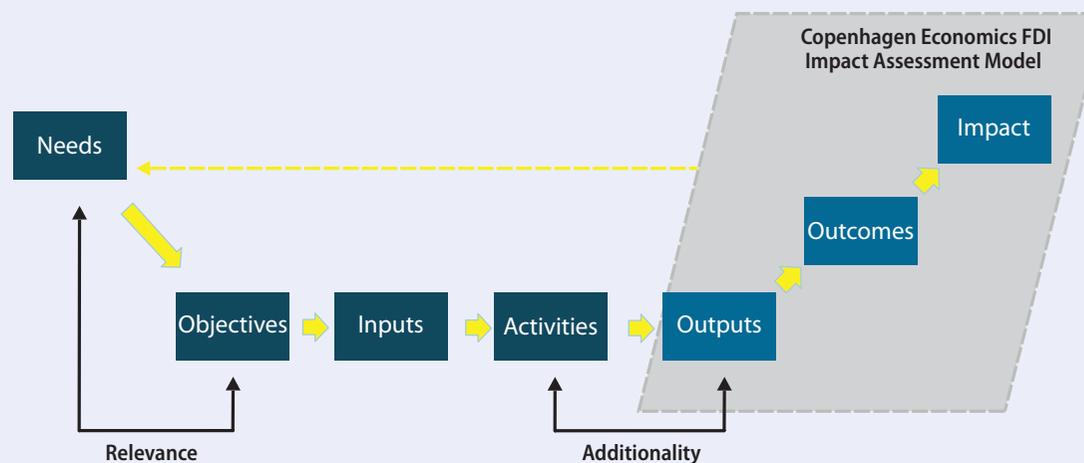
The expansion of foreign firms can generate new economic activity in Finland and benefit local firms through various spillovers. Finland's poor FDI performance may therefore

offer a rationale for new public intervention to accelerate the expansion of foreign firms in Finland. The intervention logic of investment promotion is illustrated in Box 1.

BOX 1. THE INTERVENTION LOGIC OF INVESTMENT PROMOTION

The intervention logic of investment promotion takes the need to revitalise the Finnish economy as a starting point. The objective is to accelerate the expansion of foreign firms in Finland by offering invest-in services to foreign firms free of charge. The expansion of foreign firms is expected to stimulate new economic activity that would not have taken place without the intervention of Business Finland.

- **Needs:** Revitalise the Finnish economy.
- **Objective:** Accelerate the expansion of foreign firms in Finland.
- **Inputs:** Financial, human, material, organisational or regulatory resources.
- **Activities:** Concrete invest-in services.
- **Output:** Foreign investments, e.g. greenfield investments, headquarters, R&D units, etc.
- **Outcomes:** Direct and immediate outcomes, e.g. jobs, value added, R&D expenditures, etc.
- **Impacts:** Broader impacts, e.g. increased demand, productivity spillovers, crowding out, etc.



Business Finland hosts Invest in Finland, the official investment promotion agency for Finland, which connects foreign firms to opportunities in Finland and helps them succeed. In this chapter, we explain how invest-in services offered free of charge can help accelerate the expansion of foreign firms in Finland and benefit the Finnish economy (i.e. the *relevance* of investment promotion). In Chapter 2, we will assess the extent to which the services have contributed to accelerating the expansion of foreign firms in Finland (*additionality*). We base this assessment on the portfolio of foreign investments that Business Finland has supported during 2016 and on interviews with foreign firms located in Finland.

In Chapter 2, we also use the Copenhagen Economics FDI Impact Assessment Model to assess the FDI projects that have received services from Business Finland in terms of:

- The number and characteristics of the FDI projects (*outputs*)
- The number of jobs and the GDP contribution supported by the FDI projects (*outcomes*)
- The productivity spillovers to local Finnish firms supported by the FDI projects (*impacts*)

It is outside the scope of the analysis to assess the resources used by Business Finland (inputs) and conducting a full cost-benefit analysis of Business Finland's investment promotion activities.

THE RATIONALE OF INVESTMENT PROMOTION FOR THE FINNISH ECONOMY

By offering services free of charge, Business Finland has as main purpose to help new foreign firms establish themselves in Finland and support the expansion of foreign firms already located in Finland. By stimulating economic activity in Finland, Business Finland can support job creation within the firm itself and in the broader Finnish economy through:

- **Direct impacts:** Direct impacts arise when the foreign investment creates new economic activity or retains economic activity within Finland. The contribution to the Finnish economy stems from the value added (salaries and profits) created in the foreign firm. The larger the number of jobs and the higher the value added per job, the larger the direct impact.
- **Indirect impacts:** Indirect impacts arise through the foreign firm's purchases from local suppliers in Finland. Via these purchases, the foreign firms create economic activity that supports jobs within Finnish firms and contributes to GDP. The more the foreign firm integrates into local supply chains, the larger the indirect impact.
- **Induced impacts:** Induced impacts arise when wages, paid out to the directly and indirectly employed workers, are spent within Finland. The demand generated via this channel, supports jobs in most sectors from the general consumption pattern in the economy. The larger the number of jobs and the higher the wages paid, the larger the induced impacts.

Besides these directly observable impacts, there are also broader dynamic impacts through which foreign firms may impact Finnish firms. Such impacts may, for example, arise from:

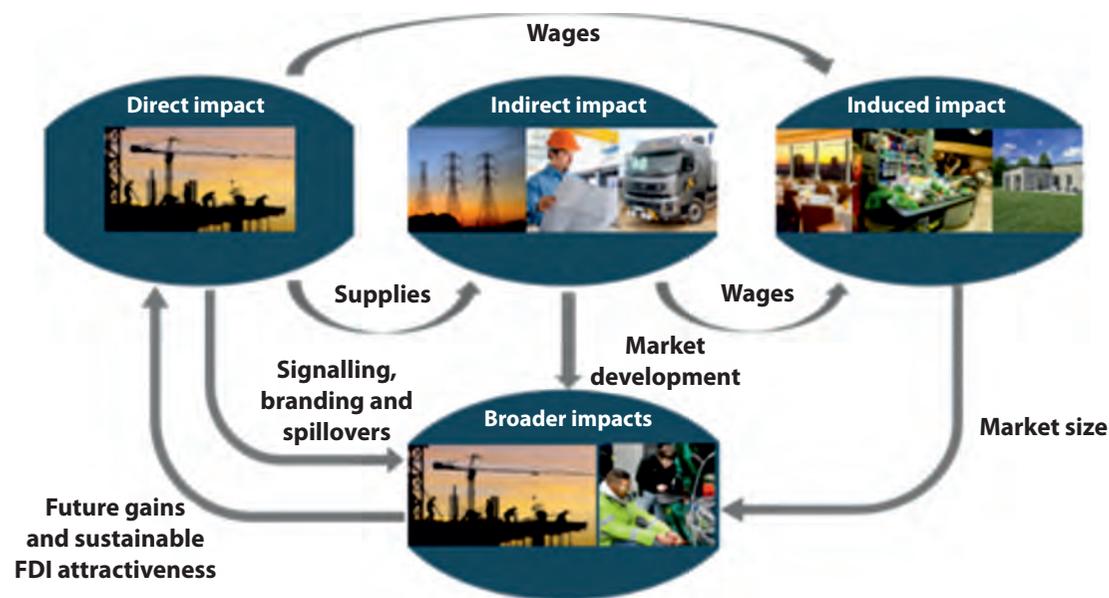
- **Knowledge spillovers:** The presence of foreign firms may enhance the productivity of local firms.
- **Signalling and branding:** The entry of foreign firms may trigger investments by local or new foreign firms.
- **Market development:** Increased competition, improved infrastructure or new technology may enhance the productivity of local firms.

- **Market size:** New establishments may increase the size of the local market in Finland, which can give rise to scale economies and attract new foreign investments.

These transmission channels from foreign investments into benefits to the Finnish economy are illustrated in Figure 8. Each of these transmission channels are described in more details in Appendix A. It should be kept in mind that there is also a risk that foreign firms crowd-out local firms and that a net positive impact of FDI cannot be taken for granted. *Firstly*, crowding out can take place both in the final goods market if a foreign firm outcompetes a local Finnish firm. This type of crowding out will make a positive net contribution to the Finnish economy because the overall productivity in the Finnish economy improves when highly productive firms gain market share and when local firms benefit from dynamic impacts of FDI.

Secondly, crowding out can take place in the factor market if the presence of foreign firms creates bottlenecks in the market for key production factors, drives up prices and limits growth prospects for local Finnish firms. Foreign firms will therefore be more likely to create new jobs in recessions compared to booms. The risk of this type of crowding out can be reduced through structural reforms that increase the labour supply, education policies targeted skills that are in short supply, attracting foreign talent with the required competences, etc.

FIGURE 8. Transmission channels from FDI into economic impacts



Source: Copenhagen Economics based on in-depth literature survey

The main argument for offering services to foreign firms free of charge is based on so-called market failures (externalities and asymmetric information).

Foreign investors do not take the economic contribution to the Finnish economy into consideration and

BOX 2. RECENT FINDINGS ON HOME BIAS, AGGLOMERATION AND SIGNALLING

There is an extensive literature on the drivers of FDI that can guide policy makers on how to improve the investment climate (see Appendix B for an in-depth literature survey). Besides this, there are also some patterns in the behaviour of foreign investors that should be taken into consideration:

- **Home bias.** Home bias is the tendency for investors to invest at home, despite the potential benefits of diversifying into foreign markets. This bias may arise because of the extra difficulties and uncertainties associated with investing abroad. A recent empirical study finds strong empirical evidence of persistent home bias in FDI outflows (see Lewis et al. (2015) and references therein). The study furthermore finds that not only physical distance but also cultural and institutional similarities between host and source countries remain decisive factors in foreign investment decisions of multinational enterprises.
- **Agglomeration and signalling.** Agglomeration economies are defined as the benefits that arise when firms and individuals locate near one another. A recent meta study based on 73 empirical studies finds that it is agglomeration economies measured by domestic activity that have the strongest impact on FDI location – not agglomeration economies generated by foreign firms. Agglomeration economies are found to be easier to obtain from domestic firms and when domestic firms possess location-specific advantages that are important to the foreign investors. Agglomeration economies generated by foreign activity only have a significant impact on FDI location when these are linked to the home country of the foreign investor. The signalling effect from foreign investors is thus strengthened by home-country linkages and relationships.

Source: Copenhagen Economics based on Lewis et al. (2015), Jones (2016) and references therein

will therefore tend to ‘underinvest’ seen from a Finnish perspective. In addition to this, investing abroad is uncertain. Which means that firms will tend to invest in their home market (home bias) or in well-known markets (signalling and agglomeration), cf. Box 2. It is costly to gather information about the attractiveness of Finland as an investment location, e.g. concerning market opportunities, how to access distribution networks, how to find suitable suppliers, how to deal with local governments, rules and regulations, etc. Once this information is obtained, it may be easily disseminated, and firms can learn from each other simply by watching what their competitors do. This suggests that information spillovers exist, which again may be associated with a risk of underinvestment.

Recent literature on home bias, agglomeration and signalling suggest that the risk of underinvestment will be particularly large for investors, whose home countries are physically, culturally and institutionally far away from Finland. The low inflow of extra-EU FDI after the crisis could be an indication of this. Furthermore, investment promotion is most likely to be more successful if it is centred around existing strengths of the Finnish economy and if targeted towards investors from countries that are already well represented in Finland. If local firms do not innovate and invest in R&D, the less attractive Finland will be as an investment location. This can lead to a negative spiral where Finland is unable to attract foreign investments that can help revitalise the Finnish economy. The public funding of FDI promotion and innovation in Finland are therefore closely interlinked.

BOX 3. INFORMATION THAT CAN SUPPORT THE LOCATION DECISION OF FOREIGN INVESTORS

It is useful to distinguish between four different types of information:

- 1.** General information, such as that regarding potential market opportunities or how to do business in Finland, that would be useful to many firms within an industry. The public good aspect of this type of information suggests that either public provision or subsidization may be justified.
- 2.** Information which accumulates via experimentation and experience, such as learning which products or marketing strategies will work in new markets. The benefits of exploring different ways of approaching foreign markets will not be fully captured by those firms doing the exploration. This will result in insufficient investment in learning about how to succeed in Finland. In very uncertain markets, this argument can be used to justify the use of subsidies and other financial instruments. These services could involve both general information and firm-specific services.
- 3.** Information which is very firm-specific, such as finding a good local partner or supplier for a specific firm or dealing with a firm-specific regulatory issue. Because these types of information needs are more firm-specific than those discussed above, the information spillover problem is less compelling.
- 4.** Information about Finnish firms and products that needs to be disseminated to foreign customers, such as for example information regarding product quality and/or a firm's service provision capabilities.

In general, the case for government intervention to provide firm-specific support is weaker because there is a risk that it crowds out private sector intermediaries. In addition, the argument for support is stronger for smaller investors, where easier access to information about Finland as an investment location can bring down the fixed costs of investing in Finland.

Source: Copenhagen Economics based on Copeland (2007)

It should be kept in mind that there is a risk that public intervention crowds out private sector intermediaries or simply replace in-house information gathering of the foreign firms themselves (low additionality). The argument for Business Finland to offer general information about Finland as an investment location is therefore stronger than the argument for offering very firm-specific information, cf. Box 3 for a more detailed description of the types of information that potential investors may request. Offering firm-specific information can in some cases be justified for a small country like Finland where the costs of assessing the FDI attractiveness can be relatively large compared to the investment size. Similar arguments can be used to justify offering services to smaller investors.

1.3 DEVELOPING ECOSYSTEMS IN FINLAND

Business Finland also creates new growth by supporting Finnish firms to go global, as well as funding innovations. Experts at Business Finland identifies business opportunities around the world and help transform them into global success stories. This part of Business Finland is a fresh organisation, formed through the merger of Tekes and Finpro. In particular, Business Finland's services can support Finnish firms during the different stages of internationalisation:

- **Funding:** Business Finland offers funding for research, product development, and many kinds of business development needs.
- **Building network:** Services offered by Business Finland aim to boost innovation-based export growth, accelerate internationalisation, and provide help in networking.
- **Discover opportunities:** Business Finland's experts help discover and test the possibilities of Finnish business on the international markets with the help of its services.
- **Innovate:** Business Finland helps Finnish firms develop a competitive advantage and innovation-based exports.
- **Go to market:** Business Finland helps Finnish firms find new partners, experts and networks all around the world.

- **Scale businesses:** The services offered by Business Finland aims to bring down the boundaries of growth for Finnish business and broaden the scope of their operations.

Developing ecosystems is a new part of Finland's industrial and innovation policy.⁵ Ecosystems are a key element in Business Finland's strategy towards building a world class competitive business environment in Finland. The intention is to underpin global growth for companies located in Finland via research and innovation initiatives around a number of ecosystems.

An industrial ecosystem is a collaboration between businesses or a collaboration between businesses and research institutions. The goal is to share knowledge and increase innovation and growth rates of existing or new promising industries. The ecosystem can include any combination of private firms, public research institutions and Public-Private Partnerships (PPPs). An ecosystem often combines competences from multiple industries and both the private and public sector.

Business Finland has set the goal that Finnish ecosystems should generate EUR 1 billion in turnover from new businesses, exports and foreign investments in Finland. At the same time, the Ministry of Economic and

⁵ According to the Ministry of Economic Affairs, platforms and ecosystems of various sectors are crucial for innovation activities and for harnessing the potential of digitalisation. The ministry defines ecosystems as: *"interdependent networks between enterprises, entrepreneurs, researchers, public administration and third-sector operators"*, cf. <https://tem.fi/en/ecosystems>.

Foreign Affairs and Employment of Finland states that the “...vision is that Finland will be the most attractive and competent environment for experimentation and innovation by 2030”. To achieve these ambitious goals, it is of outmost importance that the ecosystems have optimal conditions and that public funding is provided where it generates the highest benefits to the ecosystems and to the Finnish society.

Research and innovation are key drivers of productivity and economic growth. Firms and economies achieve large and significant returns on these investments, which also create new and better jobs. Research and innovation investments are also crucial to address key societal challenges and improve well-being. They contribute to improving health outcomes, combat climate change, and build more inclusive and resilient societies. Therefore, a full understanding of the impacts of research and innovation funding needs to consider both the economic impacts and the social impacts that support higher levels of well-being.

Several market failures are directly linked to investment decisions in research and innovation.⁶ Research and innovation bring benefits to other firms than the firms doing the concrete research or innovation. Other firms can also benefit from these innovations and there

is a positive spillover that each individual firm does not fully consider when deciding their level of investment in research and innovation.⁷ In addition, there are high risks, sunk costs, market uncertainty and inability to fully control results, which all lead to underinvestment in research and innovation below what is socially desirable.

These positive spillovers (also called positive *externalities*) mean that society at large would gain from funding that increases the level of research and innovation from the level that would occur, if the research and innovation activity was only decided on the basis on the benefits for the individual firm investing in the activity towards the level that would maximise the spillovers to the society at large. The creation and diffusion of knowledge generates positive spillovers, and for that reason the right amount and quality of public funding for these activities are needed to maximise societal welfare. The funding should equate the size of the spillover. While this result is simple and clear in theory, it can be very challenging to assess whether the level and quality of funding is appropriate in practice. The support of ecosystems can generate additional value in Finland via the spillover effects to the benefit of the firms in the ecosystems and the Finnish society.⁸ The intervention logic of ecosystem support is outlined in Box 4.

⁶ Arrow (1962) discusses market failures in relation to R&D investments.

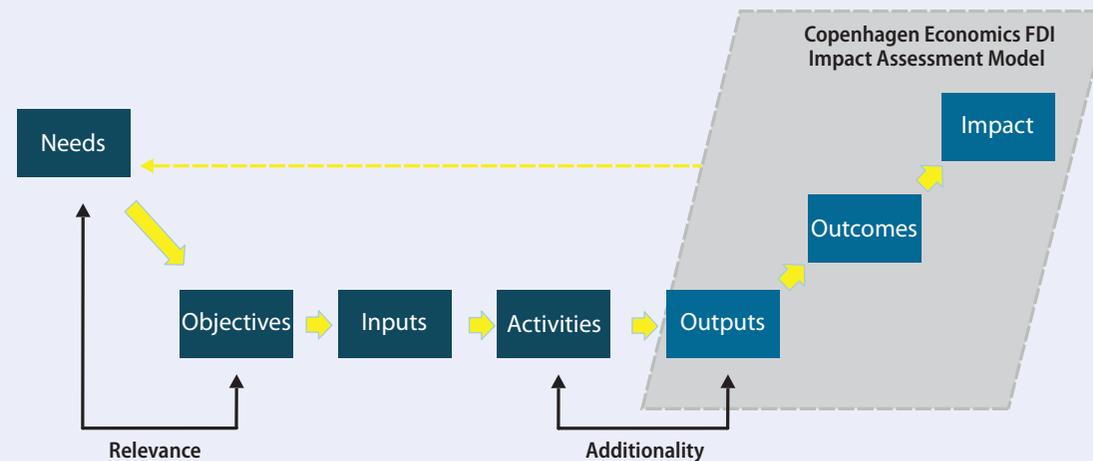
⁷ Katz (1986) shows that industry collaborations is socially beneficial in the presence of R&D spillovers. This is further discussed by Kaiser and Kuhn (2011) who analyse the long-run effects of public-private research joint ventures.

⁸ Metcalfe (1995) discusses the concept of ecosystems and argue that the focus of attention ceases to be “market failure per se and instead becomes the enhancement of competitive performance and the promotion of structural change”.

BOX 4. THE INTERVENTION LOGIC OF SUPPORTING ECOSYSTEMS

The intervention logic of supporting ecosystems has the objective of accelerating innovation and growth of firms in the ecosystems. The support helps the firms in the ecosystems to e.g. export, attract foreign investments, strengthen innovative collaborations with public research institutions, and improve sharing of experiences between firms in the ecosystems. The expansion of the ecosystems is expected to stimulate new economic activity that would not have taken place without the support of Business Finland.

- **Needs:** Revitalise the Finnish economy.
- **Objective:** Accelerate the innovation and growth of firms in ecosystems.
- **Inputs:** Financial, human, material, organisational or regulatory resources.
- **Activities:** Provision of loans and grants, facilitate sharing of research and experience.
- **Output:** Ecosystem firms engaging in new activities with other firms and research institutions.
- **Outcomes:** Effects experienced by the supported firms, e.g. jobs, turnover, productivity, etc.
- **Impacts:** Statistically significant effects on supported firms, research institutions, and indirect impacts on unsupported firms affected by various spillover effects.



The two main arguments for public support of ecosystems are:

- **Allow SMEs and start-ups to grow faster:** Small firms are often struggling with obtaining finance, knowledge of foreign markets, insights into key sectoral knowledge, etc. The support from Business Finland can speed up the process for small firms and allow them to commence on their rapid growth pattern sooner than they would have without the support.
- **Improve collaboration between and amongst private partners and amongst public research institutions:** Firms lack the incentive to share knowledge and experiences. Many of these come from costly investments the firm has made, and it will not gain from sharing the information. However, if all firms in an ecosystem shared their knowledge, the common knowledge pool would grow to the benefit of all firms and the Finnish society. Public research institutions have an incentive to obtain new knowledge, but to a lesser degree to share it with private companies that could potentially commercialise the research findings. In addition, firms might ask new questions that the researchers have not thought of or knows the answer to.

The funding for the ecosystem has the potential to align incentives for both firms and research institutions alike, to the greater benefit of the Finnish economy. Creating strong ecosystems will help attract foreign investments, skilled labour, and improve the performance of all firms

in the ecosystem. It is within this context that Business Finland has asked us to evaluate three specific ecosystems.

In Chapter 3, we analyse four selected ecosystems and the funding provided for these ecosystems. We assess:

- How Business Finland's funding and services towards ecosystems have contributed to developing the ecosystems in Finland.
- The evidence-base for claiming a social-economic impact in Finland from funding ecosystems.
- The social rate of return on the use of public funding in this area.

1.4 CONCLUDING REMARKS AND THE WAY FORWARD

By offering invest-in services and funding Business Finland attempts to attract FDI into Finland and develop world class ecosystems. Over time, Business Finland's services can help revitalise Finland's traditional industries and build a competitive business environment.

While Finland has been successful in attracting many foreign investments, the size of these investments is low and decreasing over time, which can help explain Finland's poor FDI performance relative to other small open economies. The decline in the average size of investments reflects underlying shifts in the composition of FDI towards Finland.

First, Finland has attracted a large and increasing number of greenfield investments, which tend to be smaller than M&As. As greenfield investments expand the production capacity in Finland, these investments are more likely to support new jobs and economic activity in Finland compared to M&As. In this case, a lower value of FDI inflows may not be associated with lower benefits to the Finnish economy. However, the poor M&A performance may reflect underlying problems in the Finnish economy and may be a concern to Finnish policy makers. The poor M&A performance may, for example, indicate an underlying inability of Finland to grow firms and make them attractive for foreign takeover. It may also be the case that start-ups are sold earlier in Finland compared to other countries, e.g. due to taxation structures, lack of domestic capital, IPO systems, etc.

Second, the average size of investments during 2008-2015 compared to 2003-2007 has dropped for both the manufacturing and services sectors, but the drop has been larger for services. As Finland has attracted far more projects in the services sector relative to manufacturing after the crisis, the shift towards services has pulled down the overall value of FDI towards Finland. As services are closely related to key growth drivers (such as digitalisation, automatization and AI), the lower value of FDI may again not be associated with lower benefits to the Finnish economy.

Third, intra-EU FDI has increased more than extra-EU FDI. As the average size of intra-EU FDI after the crisis has dropped significantly and is below the average size of extra-EU FDI, the shift in origin of FDI into Finland has had a negative impact on the overall value FDI into Finland.

In Chapter 2, we assess how FDI inflows have impacted the Finnish economy and the role of Business Finland in accelerating the investment decision of foreign firms. In Chapter 3, we assess how Business Finland's funding has helped develop ecosystems in Finland. The two parts are closely interrelated. Ecosystems are one of the key drivers of FDI in advanced open economies such as the Finnish. Likewise, the presence of foreign firms within an ecosystem helps local firms in the ecosystem grow and become more innovative. Going forward, it is therefore important that Business Finland continues to seek synergies between investment promotion and ecosystem development activities.

2 ATTRACTING FDI TO FINLAND

During 2016, 32 foreign firms that have received invest-in services from Business Finland decided to invest in Finland. We find that the 32 firms supported around 1,600 jobs in Finland and added more than EUR 208 million to GDP in 2016. Interviews with 10 foreign firms in Finland indicate that most firms grow after their initial investment, and these figures should be considered as conservative estimates of the annual contribution to the Finnish economy from these foreign investments going forward.

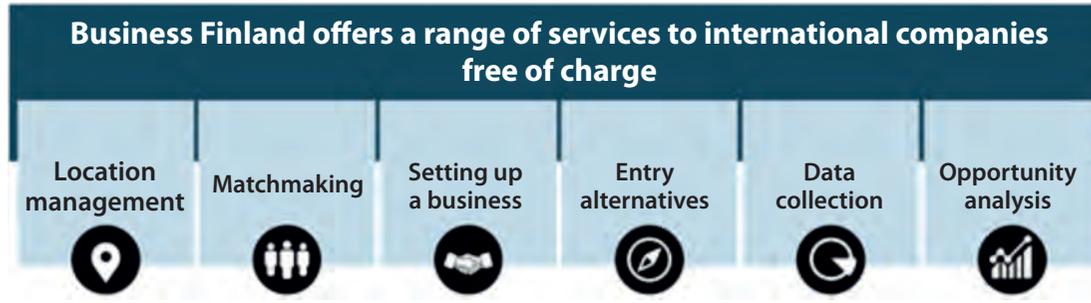
In this chapter, we have combined insights from quantitative and qualitative analyses to analyse the extent to which Business Finland has helped attract foreign investments with economic value to the Finnish economy. In Section 2.1, we describe the invest-in services offered by Business Finland and the role of these services in attracting FDI towards Finland in 2016. In Section 2.2, we have used the Copenhagen Economics FDI Impact Assessment Model to assess the impacts of the 32 investment projects supported by Business Finland. In Section 2.3, we have identified some of the key FDI drivers that can be improved to enhance Finland's

FDI performance. In Section 2.4, we draw conclusions and discuss how Business Finland may improve its services going forward and steer more towards investments with a large economic value to the Finnish economy (so-called high value FDI).

2.1 HOW BUSINESS FINLAND HAS HELPED ATTRACT FDI

Business Finland offers a range of invest-in services to foreign firms, cf. Figure 9. Business Finland uses its access to detailed information about Finland as an investment location to help foreign firms find the location with the best potential for their business operations more easily (e.g. through data collection and location management services). This information is also being used to bring down the transaction costs and perceived uncertainty of entering the Finnish market (e.g. services related to setting up a business). In addition to this, Business Finland uses its established network to arrange

FIGURE 9. Free of charge services offered by Business Finland



Source: Copenhagen Economics based on Business Finland's web site

site visits and facilitate meetings with local suppliers, clients, the public sector and educational institutions (e.g. matchmaking services, opportunity analysis and site visits).

THE RELEVANCE OF SERVICES OFFERED BY BUSINESS FINLAND

Overall, the invest-in services offered by Business Finland are intended to ensure that foreign firm benefit from the information already prevalent within the Finnish investment promotion system. By bridging the information gap and reducing the uncertainty, the invest-in services can reduce barriers to investing in Finland and make it more attractive for foreign firms to choose Finland over other locations.

The general information about Finland as an investment location is particularly relevant for smaller firms

with limited internal resources to collect and analyse data. Being a one-stop shop for information about Finland reduces the transaction costs for smaller firms and makes even smaller investments profitable. For larger firms, invest-in services are more often relevant for their first investment in Finland, smaller (and perhaps more strategic) investment projects and takeovers of Finnish firms. In addition, very specific information about Finnish strongholds may be requested by larger investors.

Business Finland has offered invest-in services to 32 foreign firms that have decided to invest in Finland during 2016. Besides this, foreign investors have accessed the information available on Business Finland's web site. Of the 32 investments, 22 were establishments of new businesses, 3 were expansions of existing foreign firms in Finland and 7 were foreign takeovers of Finnish firms. Looking across origins, 40 per cent were intra-EU investments with Germany as the main EU investor in Finland accounting for 5 investments in 2016. After the crisis, around 60 per cent of all investments into Finland were from other European countries. Business Finland therefore seems to have focus on attracting extra-EU FDI, which is also where the home bias described in Chapter 1 should be expected to be larger.

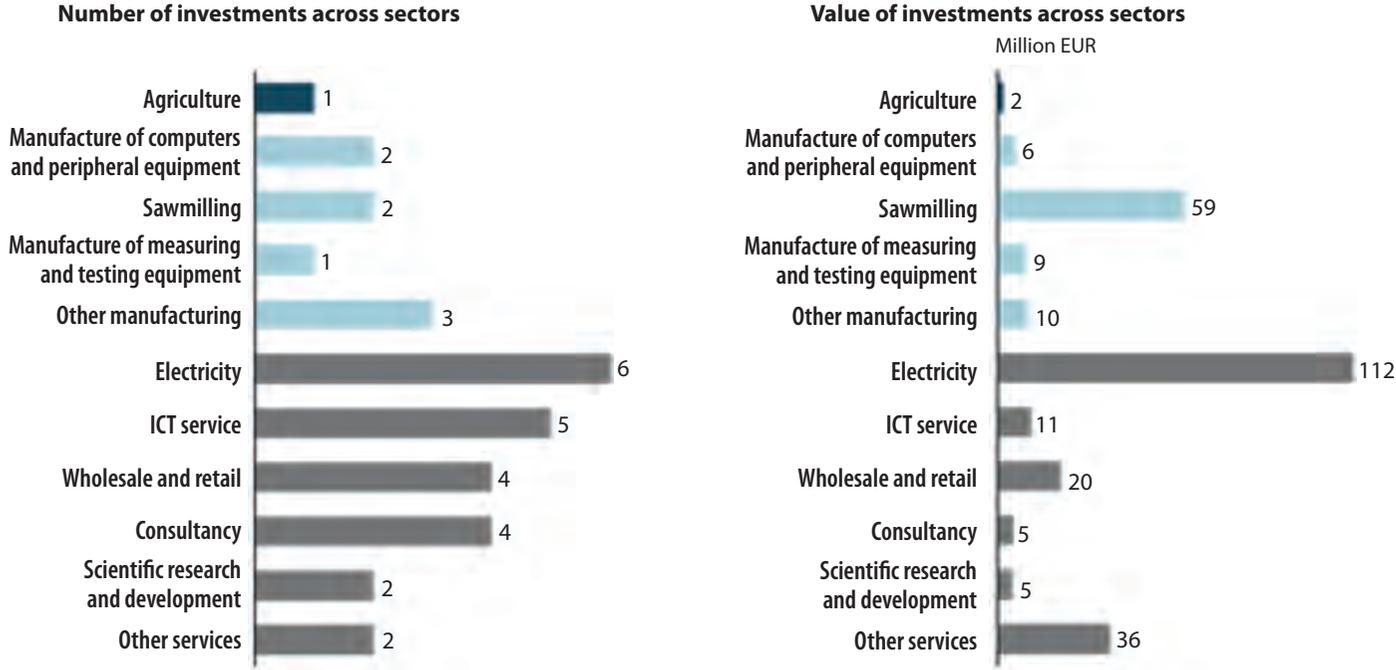
More than 70 per cent of the investments were in the services sector (23 investments compared to 8 in manufacturing and only one in agriculture), cf. Figure 10. Looking across all investments into Finland after the crisis in Table 1, around 60 per cent were in the services sector. This suggests that the services offered by Business Finland seem to be more relevant for investors in

the services sector. The FDI projects appear to be spread across many sub-sectors with only a few projects in each, which could indicate that investors request more general information about investing in Finland. This may indicate a potential for focusing the investment promotion more towards Finnish strongholds in specific sectors.

Investments in the services sector accounted for a total of EUR 187 million, which means that the average

deal value for services is EUR 8 million compared to an average deal value of EUR 10 million for manufacturing. The average deal value is particularly large for sawmilling and electricity. The average deal values are below the average deal values of all investments into Finland after the crisis, and the services offered by Business Finland therefore seem to be more directed towards smaller investors and/or smaller investments by larger investors.

FIGURE 10. Sector composition of investments supported by Business Finland, 2016



Note: 0.75 direct jobs are assumed per wind mill in wind mill farms based on SWECO (2015).
 Source: Copenhagen Economics based on Business Finland's FDI database, Statistics Finland and Eurostat

Overall, we find that the services offered by Business Finland are relevant and generally targeted towards foreign firms that may not otherwise have invested in Finland because lack of information about the investment climate caused uncertainty and higher entry costs compared to alternative locations. This is particularly the case for extra-EU investors and smaller investors/investment projects. However, the investments are spread across many sub-sectors, which could indicate a potential for Business Finland to broaden the knowledge about key Finnish strongholds.

THE ROLE OF BUSINESS FINLAND IN ATTRACTING FOREIGN INVESTMENTS

Understanding the role of Business Finland in attracting new FDI can help improve the quality of the services delivered and prioritise resources towards areas where Business Finland can play a key role. We have interviewed some of Business Finland's clients to assess the role and impact of invest-in services in their investment decision (additionality). Our approach to assessing additionality is described in Box 5. In the

assessment, we take a broad perspective on the role of Business Finland in terms of increasing the size, scope and/or timing of the project.⁹

All the firms interviewed recognise Business Finland as a one-stop agency for enterprises interested in investing in Finland.¹⁰ The firms mentioned that the services provided by Business Finland were clearly communicated from an early stage in their decision-making process and suggested that either the size, scope or timing of the project was positively impacted by Business Finland's support.

In addition, Business Finland was acknowledged for having a highly qualified team that met the firms' expectations. In some cases, the services provided exceeded the firms' expectations. None of the 10 firms interviewed were proactively contacted by Business Finland in the first place; rather the firms established the initial contact with the agency themselves. In some cases, the contact was established via foreign consulates or offices. In other cases, the contact was made through a personal connection and introduction to Business Finland.

⁹ See Appendix C on more detailed responses from foreign firms located in Finland on the role of Business Finland in their locational choice.

¹⁰ It is important to note that due to the mergers of different agencies in recent years that have resulted in the creation of Business Finland, different firms may be referring to different parts of Business Finland, depending on which organisation/s they engaged with at the time of making their investment. A couple of firms also mentioned the positive support received from local agencies in Tampere and Oulu.

BOX 5. METHODOLOGY USED TO ASSESS ADDITIONALITY

We have conducted 10 telephone interviews with existing foreign investors in Finland during November 2018. The aim of the interviews was to determine the role of Business Finland in attracting these firms to the country and the degree to which the support provided by the agency affected the decision-making process of the selected firms, particularly with respect to the scope, size and/or timing of their investments. The interviews also addressed the reasons for the firms to select Finland as an investment location as well as their experiences of operating in Finland.

We selected the 10 firms out of a list of 35 projects supported by Business Finland in recent years. The selected firms consist of large multinationals, medium-sized privately held enterprises and start-ups from different sectors including advanced materials, automotive, electronics and energy. Business Finland provided the list of 35 projects and contact details for the 10 selected firms. Business Finland's provision of the initial 35 projects may give rise to some selection bias in the results towards more positive responses, and we attempted to reduce this bias in our selection of the 10 firms.

The interviews were conducted as open discussions, and the assessment of Business Finland's role was based on the following questions:

- Which institutions have been most helpful?
- What type of support has your firm received?
- At what stage of your investment process did the support begin?
- Was the availability and nature of the support clearly communicated to you in advance?
- Would the investment project have taken place without the support? If not, what would have happened?
- How else did the government's support impact your investment (e.g. size, scope and timing of the project)?
- Did the support that you received meet your expectations?
- What other support could have been helpful during your investment?

Source: Copenhagen Economics and FDI Center

The support provided by Business Finland was described as focusing mainly on the following aspects (see Appendix C for more details):

- **Data collection and opportunity analysis** was mentioned by almost all firms as an important service received from Business Finland, e.g. support to understand the key advantages of establishing a research centre in the country (e.g. salary costs, talent pool availability, identification of possible partners for research cooperation projects) or information regarding the talent pool in Finland and the process for setting up a new operation.
- **Networking opportunities and introductions** was the most prevalent type of support highlighted by the 10 firms, e.g. setting up meetings with governmental authorities and facilitating Letter of Intent to demonstrate the government's commitment.
- **Funding services** stand out as an important aspect, especially for SMEs. Some of the SMEs interviewed received funding for R&D projects, to participate in international trade fairs or to hire qualified personnel, but for large firms, it is sometimes not worth applying for these due to the effort involved relative to the size of the funding.
- **Site selection** was also stated as an important service delivered by Business Finland, e.g. to help identify what type of premises are available in Finland.
- **Visa support** was also highlighted as important, particularly for firms investing from outside the EU or for foreign start-ups who have access to the start-

up permit (the newly introduced residence permit designed for people establishing a start-up in Finland).

Overall, we find indications that Business Finland has helped bringing new FDI to Finland. While the firms all identified and selected Finland without the support from Business Finland, the services provided by Business Finland played a role in helping some of the firms to select Finland over other locations and to justify the choice of Finland to their management. In other cases, the services from Business Finland enabled the project to commence earlier than planned, which means that the benefits to the Finnish economy also kicked-in earlier. Business Finland's support also contributed to the implementation of firms' investment projects, in some cases allowing firms to set up their investments more quickly and even at a larger scale (i.e. with more employees) than originally planned.

All the firms interviewed were satisfied with the support received from Business Finland as well as other government agencies in the country. While this may reflect a positive bias in the way that the firms were selected, we find that the services provided were balanced between general information and more specific information depending on the investors' needs. We also find that some of the investors received both invest-in services and funding services, which indicates that Business Finland is aware of and proactively pursuing synergies to support the transformation of the Finnish economy.

While it is positive that foreign investors contact Business Finland themselves, there could also be a risk that Finland is missing out on potential investments by not being proactive enough. With intense competition for FDI,¹¹ it is of utmost importance that Business Finland capitalises on existing strengths, and that investor advisors prioritise resources towards industries (and even specific firms) that promise the largest benefits to the Finnish economy.

2.2 SOCIO-ECONOMIC IMPACTS OF THE FDI SUPPORTED BY BUSINESS FINLAND

In this section, we assess the extent to which the investments supported by Business Finland have benefited the Finnish economy taking into consideration that the total impact reflects a combination of the number, size and quality of the investments. We use the sectoral composition of the portfolio of investments supported by Business Finland and match it with the productivity levels in these sectors to assess if the invest-in services have helped secure jobs in sectors with high productivity. We also use the Copenhagen Economics FDI Impact Assessment Model to quantify the contribution to jobs and GDP

in Finland from the 32 investments supported by Business Finland. Finally, we have conducted case studies to find example of broader impacts of FDI to local firms.

SECTOR COMPOSITION AND THE REVITALISATION OF THE FINNISH ECONOMY

According to Business Finland's FDI database, the 32 foreign firms supported by Business Finland employ around 502 workers, cf. Figure 11. Almost 55 per cent (275 jobs) of the jobs are in manufacturing, of which 90 are in manufacture of measuring and testing equipment, and an additional 70 jobs are in sawmilling. These jobs are placed in some of the sectors where Finland has lost international competitiveness, and the foreign investors may thus help Finland revitalise these sectors.¹²

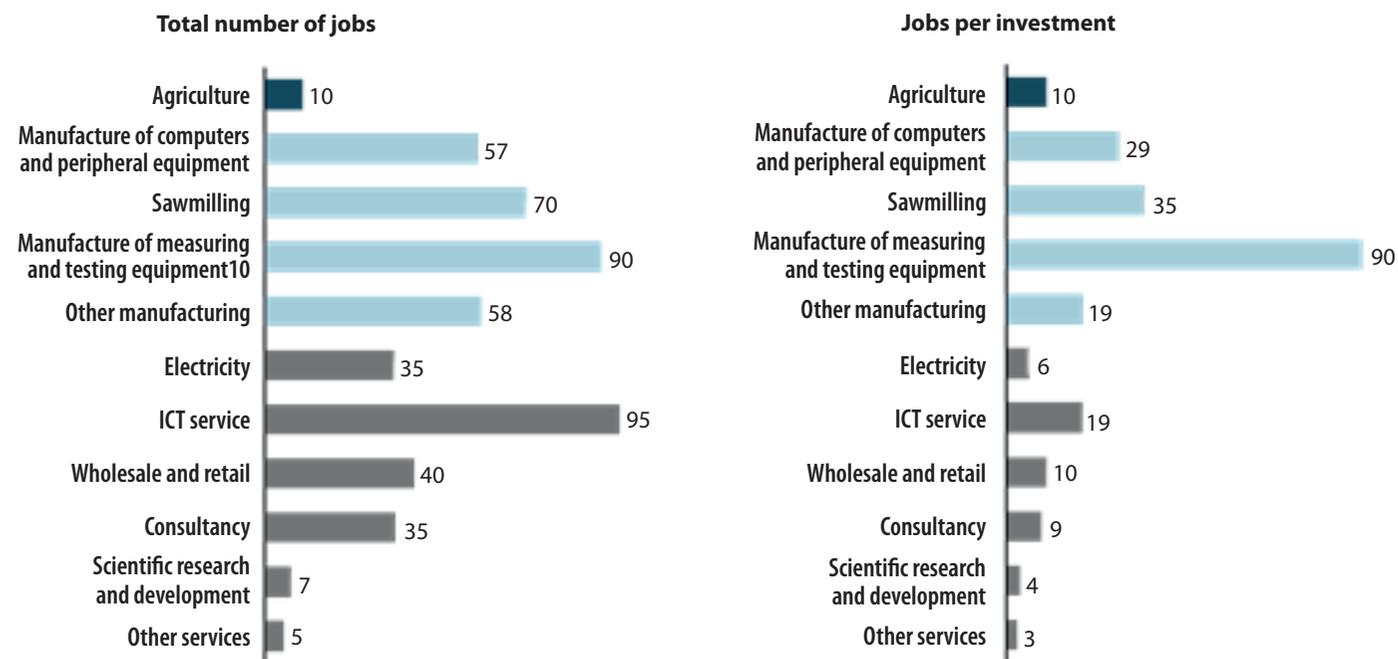
Around 43 per cent (217 jobs) of the jobs are in services, and 95 jobs are in ICT services alone demonstrating Finland's attractiveness for ICT firms (the so-called Nokia-effect as mentioned by several firms that were interviewed as part of this study, see Appendix C). The average number of jobs supported by the investment ranges between 3 and 90.

The jobs supported by investments that were won in 2016 give a snap shot picture of the footprint of the new FDI projects in the Finnish economy. All the firms that were interviewed as part of this study state that they

¹¹ As barriers to cross-border trade and investments have been dismantled during the past two decades, worldwide competition for attracting multinational firms has intensified. Before the financial and economic crisis, the EU was the destination for more than half of the global FDI flows, but the EU share was only around 35 per cent during 2010-2016. Low growth prospects make Europe a less attractive location for FDI than the US or the BRIC countries, and Brexit will tend to exacerbate the problem.

¹² See Ministry of Employment and the Economy (2014).

FIGURE 11. Sector composition of jobs in foreign firms supported by Business Finland, 2016



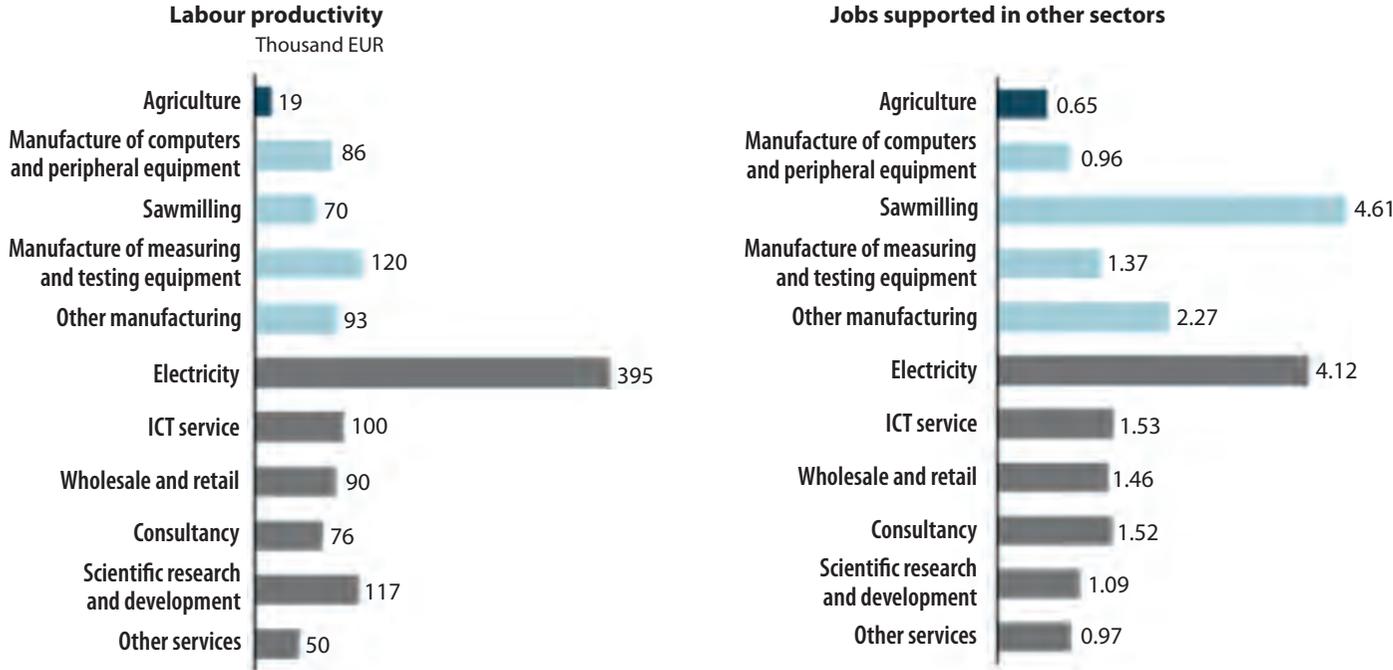
Note: 0.75 direct jobs are assumed per wind mill based on SWECO (2015). The job figures reflect the actual number of jobs within the given year.
 Source: Copenhagen Economics based on Business Finland’s FDI database, Statistics Finland and Eurostat

have recently expanded or have plans to continue growing in the country. Over time, the impact of the new FDI projects in Finland during 2016 should therefore be expected to grow. Likewise, the investments conducted in 2016 constitute only a fraction of the total number of jobs supported by the portfolio of firms that have received invest-in services from Business Finland.

Due to its a very high capital intensity, the electricity sector has a very high labour productivity, and the sector

furthermore supports many jobs in other sectors (large multiplier effect), cf. Figure 12. The 162 jobs within the 6 investments supported by Business Finland should therefore be expected to bring large positive benefits to the Finnish economy. The same is the case for the investments in sawmilling and manufacture of measuring and testing equipment. Jobs in ICT services and scientific R&D tend to be highly productive but stimulate less economic activity in other parts of the economy. Overall,

FIGURE 12. Productivity and multipliers across sectors, 2016



Note: 0.75 direct jobs are assumed per wind mill in wind mill farms based on SWECO (2015). Productivity is measured by GDP per employee in the sector. The multipliers are the number of jobs supported in other sectors per job supported in the specific sector. Numbers in both figures are weighted averages for the sectors included by the number of jobs in each sector.
 Source: Copenhagen Economics based on Business Finland’s FDI database, Statistics Finland and Eurostat

the 13 investments in agriculture, wholesale and retail, consultancy and other services seem to make a relatively low socio-economic contribution to the Finnish economy. Looking at the sectoral composition of the investments supported by Business Finland and the average productivity in these sectors, we find relatively mixed results. While some of the investments were undertak-

en in high-productivity sectors where Finland has initial strengths but currently faces challenges, others were in low-productivity sectors with a relatively low socio-economic contribution to the Finnish economy. If Business Finland was more proactively pursuing investments within sectors of key Finnish interest, the contribution to revitalising the Finnish economy is likely to be larger.

THE CONTRIBUTION TO JOBS AND GDP IN FINLAND

We have used the Copenhagen Economics' FDI Impact Assessment Model described in Appendix A to assess the socio-economic impacts of investments supported by Business Finland. The main assumptions within the model are summarised in Box 6.

BOX 6. MAIN ASSUMPTIONS IN THE FDI IMPACT ASSESSMENT MODEL

The Copenhagen Economics FDI Impact Assessment Model takes the numbers of jobs supported by the foreign investments as a starting point and quantifies the number of jobs supported in other Finnish firms through buyer-supplier linkages (indirect impacts), higher wage income (induced impacts) and productivity spillovers. From these job figures, we then calculate the GDP contribution from the foreign investments. The job figures are therefore an essential element in the model.

The model takes into consideration that the value a job varies across sectors. Firstly, jobs in highly productive sectors contribute more to GDP and economic activity in other sectors through higher wage income. Secondly, sectors vary in the extent to which they use supplies from other Finnish firms and thereby stimulate new economic activity elsewhere in the Finnish economy.

The model also takes into consideration that the value of a job depends on the type of investment. New establishments and expansions should be expected to support new jobs within the firm, whereas takeovers are more likely to preserve existing jobs. For the 7 takeovers supported by Business Sweden, we have therefore only taken into consideration the jobs that Business Finland expects have been retained by the takeover.

As the impact assessment has been undertaken at a national level, the assessment does not take into consideration that the value of a job may

also vary across different geographic locations within Finland. In regions with low unemployment, the foreign firm risks crowding out local firms and leave regional employment largely unchanged, whereas foreign investments in regions with high unemployment are more likely to create new jobs. The underlying assumption in the model is that there is a sufficiently large pool of qualified labour or high mobility of labour across regions to avoid crowding out.

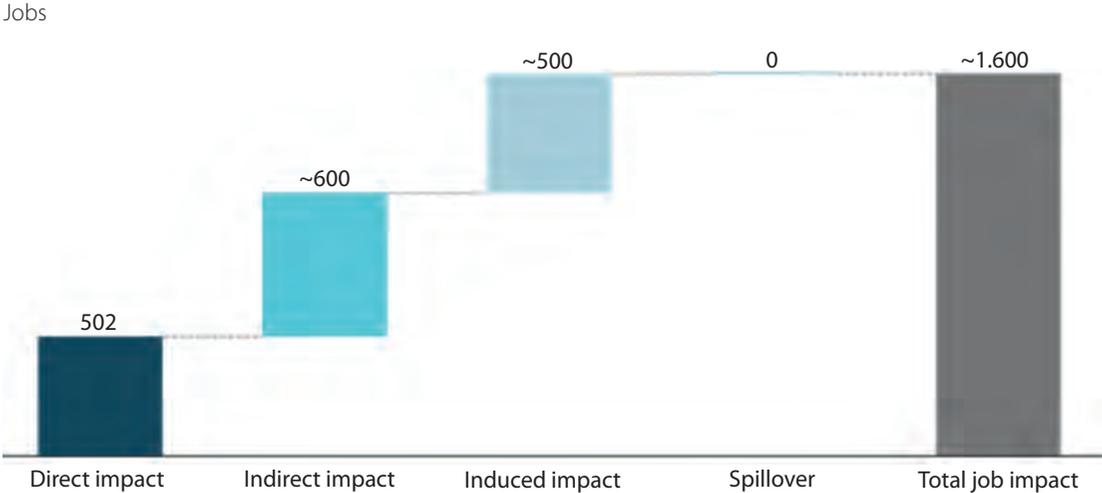
Another underlying assumption is that the foreign firms have the same characteristics as an average firm within the sector. This means that we can use sector averages from Finnish input-output tables to estimate their productivity and purchases from other sectors.

As part of this study, we have adjusted the Copenhagen Economics FDI impact assessment model to the Finnish context and trained Business Finland staff in using the model. The model is a flexible tool that can be used to assess both the impacts of FDI within a given year and to track impacts of the portfolio of investments that Business Finland has helped bring to Finland during a given period. Going forward, Business Finland can use this tool to build KPIs, evaluate the efficiency of their invest-in activities and analyse patterns in impacts of FDI on the Finnish economy.

Source: Copenhagen Economics based on the detailed methodology description in Appendix A

We find that the 32 foreign firms support a total of around 1,600 jobs within Finland, cf. Figure 13. The foreign firms support around 600 jobs among its local suppliers and their suppliers within Finland (indirect impact). Furthermore, the wages paid to workers directly in the foreign firms and among suppliers throughout the value chain support an additional 500 jobs across a broad range of industries within Finland.

FIGURE 13. Jobs in foreign firms receiving invest-in services from Business Finland, 2016



Note: The figure covers jobs supported by greenfield investments, expansions and M&As (retained jobs).
 Source: Copenhagen Economics based on Business Finland’s FDI database, Statistics Finland and Eurostat

While the spillovers from the foreign firms to local firms enhance their productivity (and thereby their GDP contribution), there is no empirical support for foreign firms to have a net impact on job creation in local firms (see methodology description in Appendix A). This means that potentially negative impacts on employment in some local firms (e.g. due to increased competition or crowding out in factor markets) are fully compensated for by positive impacts on employment in others (e.g. due to higher competitiveness or access to global markets).

One example is Huawei, a Chinese firm that has been in Finland since 2008 and decided to expand its operations to Tampere in 2016. Huawei produces mainly telecommunications and networking equipment with the use of many subcontractors in Finland, and the local firms can use the collaboration with Huawei as a reference. This allows the subcontractors to come across as trusted partner to potential customers and gives them the competitive edge over many of their peers, cf. Box 7.

BOX 7. HUAWEI IN FINLAND

Huawei is a Chinese enterprise focusing primarily on development and manufacturing of tele-communications and networking equipment. Huawei has operated in Finland since 2008 through its subsidiary Huawei Technologies Oy, and in 2012 the firm made an initial investment of EUR 70 million to establish a R&D centre in Finland. Following the initial investment, Huawei has made continuous investments in Finland and now has two R&D facilities in Finland, in Helsinki (where research focuses on connectivity solution) and in Tampere (where the facility opened in 2016 focuses on optics and related software solutions).

Finland had been identified as a strategic target by Huawei due to its availability of highly-skilled IT-engineers with expertise both in software and hardware design. Especially the Finnish knowledge on open source mobile operating systems was cited as a key factor. The sudden supply of ex-Nokia employees further increased the attractiveness of Finland as investment location and has fuelled the continuous growth of Huawei in Finland. At the same time, Huawei like many other R&D-focused firms has been suffering from global lack of specialised labour force in e.g. photonics.

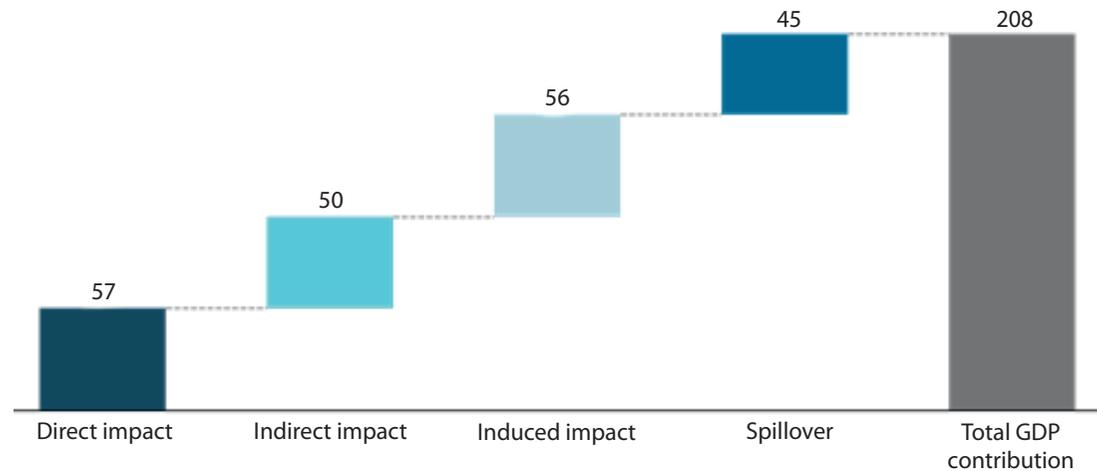
Not only does Huawei employ some 300 people in its R&D facilities, they also have extensive collaborative research initiatives with Finnish universities, government-owned research organisations and privately held firms of different sizes. One example of such private sector collaboration is the R&D work carried out together with [undisclosed client]. This collaboration has taken place over number of years and has enabled a substantial growth of the partner.

Furthermore, Huawei uses many subcontractors in Finland. Through these collaboration arrangements, the investments both in physical and human capital carried out by Huawei create productivity spillovers to other actors in the Finnish economy. When collaborating with Huawei, for example, firms are allowed to use these projects as references, which allows them to come across as trusted partner and gives them the competitive edge over many of their peers.

Source: Interview with Huawei in Finland

FIGURE 14. GDP contribution from foreign firms receiving invest-in services from Business Finland, 2016

Million EUR



Note: Covering GDP contribution from jobs supported by greenfield investments, expansions and M&As (retained jobs).

Source: Copenhagen Economics based on Business Finland's FDI database, Statistics Finland and Eurostat

Using the same methodology, we find that the economic activity supported by the 32 foreign firms has added more than EUR 200 million to Finland's GDP in 2016, cf. Figure 14. EUR 57 million of these are created directly in the foreign firms, whereas the remaining GDP contribution accrue through Finnish firms of which EUR 45 million come through spillovers to local firms. We therefore conclude that the investments supported by Business Finland have created new economic activity and helped support the revitalisation of the Finnish economy through higher productivity in Finnish firms.

One example of this transmission channel from FDI to the Finnish economy is Landis+Gyr's R&D collaboration with academic institutions, research centres and other firms within the region. Another transmission channel is the central role of Landis+Gyr in attracting firms to the growing ecosystem within the region, cf. Box 8.

BOX 8. LANDIS+GYR IN FINLAND

Landis+Gyr is a Swiss enterprise developing and manufacturing energy management solutions, currently engaging itself smart grid solutions both for gas and electricity management. The Finnish branch of the firm originates itself from the metering department of Valmet and later Enermet, which was acquired by Landis+Gyr in 2006.

Landis+Gyr considers Finland a highly competitive location for further investment. The firm carried out an extensive investment programme at a time when Landis+Gyr centralised its global solution integration testing and software platform development functions, creating around 80 new jobs in Jyväskylä region during 2016 and 2017. As many other technology firms, also Landis+Gyr continuously searches skilled labour, especially in ICT field. The firm has also taken the role of growth promoter in its home region and has decided to relocate into Kangas Smart City -business area, a new ICT hub currently under construction in Jyväskylä. In this new area, Landis+Gyr will play a central role in attracting firms to the growing ecosystem.

Currently, Landis+Gyr Oy employs around 270 people at their facility located in Jyväskylä, where the firm focuses on developing smart grid solutions for electricity doing both hardware and software designs for better energy management. In addition to the R&D facilities located in Finland, the firm has also centralised its Nordic support functions in Finland.

Landis+Gyr engages itself in R&D collaboration with academic institutions, research centres and other firms. In addition to these R&D collaborations, Landis+Gyr is an active user of sub-contractors when rolling out new energy management solutions to its clients – employing sub-contractors to integrate Landis+Gyr's smart grid solutions into the existing client software and to carry out the physical installations of the new hardware solutions. In addition to the direct benefits of working together with Landis+Gyr, the collaborating firms are given the right to use the projects as references, promoting credibility of the collaborator.

Source: Interviews with Landis+Gyr in Finland

2.3 IMPROVING FINLAND'S FDI PERFORMANCE

A wide range of factors go into the decision of investing abroad, and firms will balance pros and cons to make their investment in the location that promises the highest long-term profit. The FDI attractiveness of a country, region or city should therefore be seen relative to the attractiveness of other locations as well as the attractiveness of other modes of entry (e.g. exporting). Some factors are difficult for Finnish policy makers and actors working with investment promotion to influence, such as geographical factors, demographic trends, global business cycles, language and historical ties. Other factors can be influenced by EU, national and regional policies (see Appendix B for a detailed literature survey of FDI drivers).

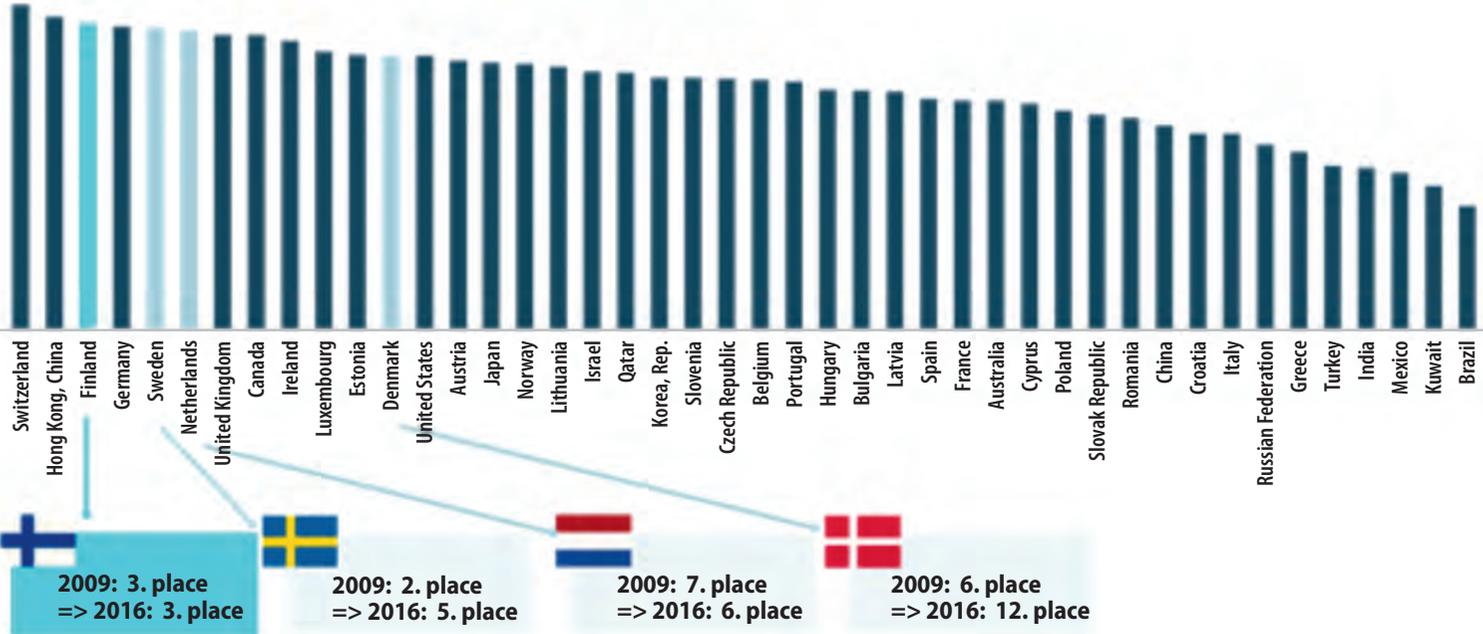
FINLAND'S POSITION MEASURED BY THE FDI ATTRACTION SCOREBOARD

Overall, Finland appears to have a very attractive investment climate measured in terms of a range of FDI policy indicators.¹³ Measured by the FDI Attraction Scoreboard, Finland is the most attractive EU Member State and only behind Switzerland and Hong Kong on a global scale, cf. Figure 15.

¹³ See Appendix B on an overview of the main FDI drivers identified in the empirical literature.

FIGURE 15. The FDI Attractiveness Scoreboard, 2016

Country ranking



Note: The FDI Attractiveness Scoreboard measures the investment climate across 44 countries in 2009 and 2016. The scoreboard is based on a total of 18 policy indicators of 1) the political, regulatory and legal environment, 2) the quality of infrastructure and market access, 3) the knowledge and innovation capacity, and 4) the cost competitiveness. The overall score is the simple average of the country's equivalent score across the four sub-indices that, in turn, is the average score across the indicators included in each sub-index.

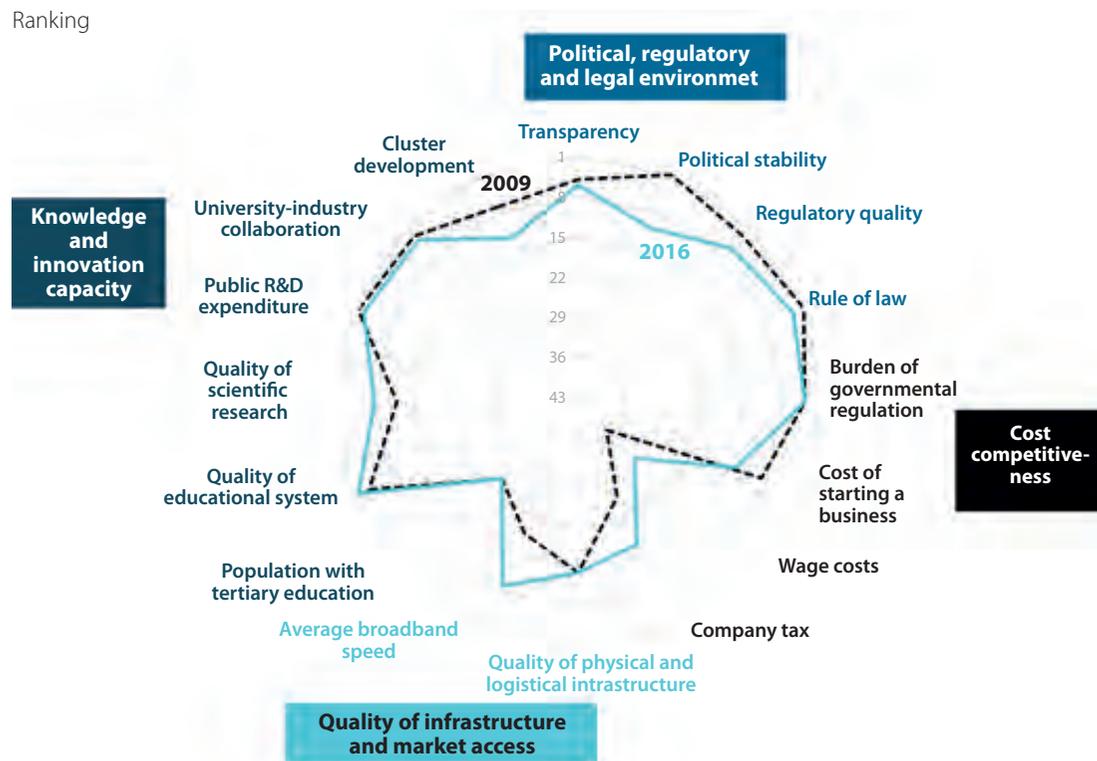
Source: Copenhagen Economics (2016) commissioned by DG Growth at the European Commission

Finland has maintained its position as the 3rd most attractive country from 2009 in the 2016 update we have conducted for this study. It therefore appears that other factors than the FDI policy indicators used in the scoreboard tend to pull down Finland's overall attractiveness, such as the peripheral location of Finland in

the EU, the tense relations between the EU and Russia, the Finnish language and the small size of the local market. The implication is that Finland must be even more attractive measured in terms of the key FDI policy drivers that can be influenced in the short to medium term.

Double-clicking on the FDI Attractiveness Scoreboard shows that Finland has a very attractive political, regulatory and legal environment although the strong position relative to other countries has been somewhat eroded in 2016 (the solid, blue line) compared to 2009 (the dotted, black line), cf. Figure 16.

FIGURE 16. The FDI attractiveness of Finland, 2009 and 2016



Note: The figure shows Finland's ranking relative to 43 other countries based on the 18 policy indicators that enter the FDI Attractiveness Scoreboard. The solid, blue line indicates Finland's rank in 2016, whereas the black, dotted line indicates Finland's position in 2009.

Source: Copenhagen Economics (2016) commissioned by DG Growth at the European Commission

Finland also has a high rank measured in terms of the knowledge and innovation capacity available in the country. While the quality of scientific research appears to have improved relative to other countries, Finland receives a lower score on cluster development in 2016 compared to 2009. The in-depth literature survey conducted as part of this study shows that cluster development and a human capital availability are two of the FDI drivers that are most often found to have a positive impact on FDI inflows (see Appendix B). Along with a relatively low share of the population with a tertiary education, weak cluster development is one of the factors that weakens Finland's knowledge and innovation capacity. Over time, Business Finland's funding of ecosystem development may help improve Finland's attractiveness in this dimension.

The Netherlands ranks third and is the only small, open economy among the top-5 performers in terms of cluster development (the US and Germany are ahead of the Netherlands and the UK and Hong Kong immediately after). Likely factors that could be behind this high performance include the provision of strategic market information, ready access to network brokerage and similar platforms or schemes, and support for specific cluster development programs. Furthermore, these factors are likely to be driven by a market forces rather than direct government intervention, with the state focusing on analysis and reporting tin close cooperation with researches and industry bodies.

Finland has a low cost-competitiveness, which mainly reflects high wage costs and company taxes. Relative to other countries, Finland has improved its average broadband speed, which has pulled up the quality of Finland's infrastructure and market access relative to other countries.

It should also be highlighted that the presence of so-called global cities (characterised by global interconnectedness, cosmopolitanism and abundance of advanced producer services) also attracts FDI to a given host country as they help foreign investors overcome the costs of establishing a business abroad. Investors therefore sometimes chose between cities – not countries. This implies that the attractiveness of Helsinki and other major cities in Finland relative to large cities in peer countries that are direct competitors to Finland should be monitored closely to ensure that Finland is not falling behind.

A FOREIGN INVESTORS' PERSPECTIVE ON THE FINNISH INVESTMENT CLIMATE

Finland's high attractiveness measured in terms of the country's knowledge and innovation capacity also comes out strongly in the interviews with foreign firms in Finland that were conducted as part of this study.

All the firms were aware of the advantages that Finland has to offer before making their investment. Four out of 10 firms were considering other countries (mainly the Netherlands, Norway, Germany and Sweden) in their

decision-making process, while the remainder stated that Finland was the only location considered for the investment. The main reasons behind the selection of Finland as a destination for the new projects were:

- **Access to qualified labour** was highlighted by almost all the interviewed firms as the main reason to establish a presence in Finland. Many of the firms identified Finland as an ideal location for setting up R&D activities. Several firms referred to the "Nokia effect" or "Nokia legacy" as a chance to access qualified employees with the expertise and experience to lead new research and development projects. Furthermore, several firms mentioned that salaries in Finland are competitive, particularly compared to other Nordic countries, while employees tend to be loyal and stay in firms longer than in other countries with higher staff turnover rates. This is key because high turnover translates into constant training and reorganisation leading to inefficiency and higher expenses. One firm also mentioned that Finland represented an opportunity for bringing an alternative perspective to the firm with people that could bring fresh and unique ideas.
- **Strong public-private-academia cooperation** was emphasised by all the firms interviewed for the analysis as an important factor for investing in the country. The possibility of easily creating a reliable network of partners that could help to develop a successful investment project in Finland was perceived essential.

- **Acquisition of an existing firm** was the chosen entry mode of the three firms, who entered Finland by acquiring an existing business. These firms have since expanded their presence in the country by opening or acquiring additional operations in Finland.
- **Political and economic stability** in Finland was also mentioned as a key factor for establishing new operations.

Market access is usually one of the main drivers of new investment projects worldwide (see Annex B). However, the 10 firms mentioned that this was not a factor in their decision-making process for Finland. This may reflect the relatively small size of the Finnish market, which means that foreign firms located in Finland tend to be more technology-oriented investments (such as R&D centres) or strategic investments (such as headquarters) where market size is not a key consideration.

A case study of a foreign firm in the biotech industry shows that while regional unemployment may be high, foreign firms face growth constraints from being unable to hiring qualified labour within the regions.¹⁴ Some firms therefore resort to bringing foreign employees to

Finland. While bringing new talents to Finland increases the labour supply and may contribute to reducing bottlenecks in the labour market, the regional benefit of the FDI will tend to be lower.

Regarding the selection of location within Finland, the 10 firms are spread across Finland. In some cases, the site selection decision was the result of an acquisition, while in other cases the location was selected based on the ecosystem in the area as well as the network of talented people, industry partners and investors for the energy sector.

Overall, Business Finland appears to have been successful in branding Finland particularly well towards knowledge-intensive firms with a large potential for generating knowledge spillovers that can help local firms become more productive and, over time, contribute to the revitalisation of the Finnish economy. From a foreign investor's perspective, it important to ensure that there is enough qualified labour, and the low share of the population with a tertiary education (relative to other investment locations) may therefore be a concern to Finnish policy makers going forward. This and other concrete recommendations from foreign investors in Finland have been listed in Box 9.

¹⁴ The respondent wishes to stay anonymous, and the case study is therefore referred to in general terms only.

BOX 9. RECOMMENDATIONS FROM FOREIGN FIRMS IN FINLAND

All the firms generally expressed that there were only minor challenges when establishing in Finland and that processes are very straightforward. In some cases, ‘cultural challenges’ related to the way Finns work were brought forward as a hindrance. Most of the firms interviewed have found it easy to find local suppliers because they do not require large amounts of inputs for their research and development activities. However, a firm establishing a larger manufacturing operation in Finland is concerned that it will not be able to source suppliers locally since Finnish firms may not have the necessary scale.

While these factors are to a large extent outside the scope of Business Finland and Finnish policy makers, other factors can more easily be improved:

- **Avoid bottlenecks in the labour market.** In terms of recruiting qualified employees for their operations, it has been easier to find the required people thanks to the “Nokia effect”. However, the firms found that it has become more difficult to find the necessary people (e.g. software developers), especially for start-ups and small firms that are not well known in the market. As talent availability and networks were key drivers for the 10 firms to select Finland, it will be important to avoid bottlenecks in the labour market going forward, e.g. by ensuring that a higher share of the population gets a tertiary education.
- **Secure good access.** International flight connectivity is seen as an advantage, but also national flight connections are brought forward. There have, for example, been some issues with the flight connections from Jyväskylä to Helsinki due to the small number of passengers on that route.
- **Streamline procedures.** A couple of firms suggested that it would be very useful to have a detailed “newbie entrepreneurs guide” and a “check list” of important aspects to consider when investing in Finland, in the form of a practical step-by-step guide with recommendations for each step in the process. Although such a guide exists, the firms may not have been aware of this. Some firms also mentioned that after securing the residence permit, it takes some time to register with the local authorities and to have access to banking.
- **Limit capital constraints.** One suggestion from the foreign firms was that a list of venture capital firms and angel investors by sector would be useful for firms looking for new capital.

Source: Interviews with 10 foreign firms in Finland

2.4 CONCLUDING REMARKS AND THE WAY FORWARD

Business Finland has offered invest-in services to 32 foreign firms that have decided to invest in Finland during 2016. The 32 foreign firms support around 1,600 jobs within Finland and have added more than EUR 200 million to Finland's GDP in 2016. EUR 57 million of these are created directly in the foreign firms, whereas the remaining GDP contribution accrue through Finnish firms of which EUR 45 million come from spillovers from foreign to local firms. We therefore conclude that the investments supported by Business Finland have created new economic activity and helped support the revitalisation of the Finnish economy by enhancing the productivity in local firms.

Overall, we find indications that the invest-in services have helped bringing new FDI to Finland, but we also find that there is room for improvement. *Firstly*, we find that the services offered by Business Finland are relevant and generally targeted towards foreign firms that may not otherwise have invested in Finland because lack of information about the investment climate caused uncertainty and higher entry costs compared to alternative locations. This is particularly the case for extra-EU investors and smaller investors/investment projects. However, the FDI projects appear to be spread across many sub-sectors with only a few projects in each, which indicates that there could be a potential for focusing the in-

vestment promotion more towards Finnish strongholds in specific sectors.

Secondly, the services provided by Business Finland have had a positive impact on the size, scope and/or timing of the investment. This means that the benefits to the Finnish economy commenced earlier and should be expected to be larger than if no services had been offered. We also find that some of the investors received both invest-in services and funding services, which indicate that Business Finland is aware of and proactively pursuing synergies to support the transformation of the Finnish economy. However, none of the 10 firms were proactively contacted by Business Finland. While it is positive that foreign investors contact Business Finland themselves, there could also be a risk that Finland is missing out on potential investments by not being proactive enough.

Thirdly, it is important that Finland maintains its position in terms of knowledge and innovation capacity, which is one of the key drivers of FDI into Finland. While the quality of scientific research appears to have improved relative to other countries, Finland has fallen behind on cluster development, and Finland continues to have a relatively low share of the population with a tertiary education.

The need for Business Finland to capitalise on existing strengths and prioritise resources towards industries (and even specific firms) that promise the largest benefits to the Finnish economy come out clearly in the report. This speaks in favour of a 'smart specialisation' or a so-called 'place-based approach' to investment promotion.

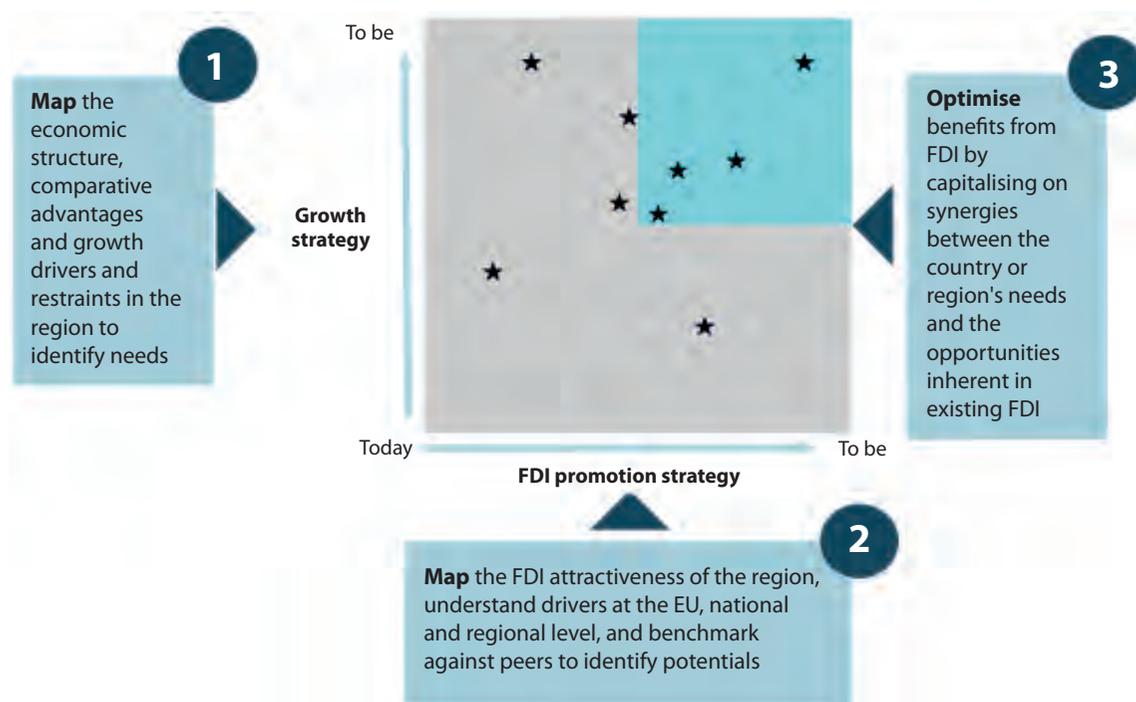
The starting point would be to understand the main needs of the Finnish economy, i.e. the economic structures, comparative advantages as well as growth drivers and restraints that underline Finland's growth strategies at the national and regional levels. Understanding drivers of FDI across industries, types of investments and origins of investments can then help Business Finland develop high-impact FDI promotion initiatives and

benchmark its FDI attractiveness against peers to assess the chance of winning. Capitalising on synergies between Finland's needs and the opportunities inherent in Finland's FDI attractiveness (and existing foreign firms) can help Business Finland optimise the benefits to the Finnish economy. This is illustrated as the blue square in Figure 17.

The total socio-economic impact of Business Finland's invest-in activities depend on the number, size and benefits of the investments to local firms. Steering toward investments that capitalise on synergies between Finland's needs and opportunities will help Business Finland prioritise high-quality investments. Going forward, it will be important to ensure that the performance of Business Finland is measured in terms of the total socio-economic impact and not on sub-indicators alone (e.g. the number of investments and the number of direct jobs disregarding the quality of the investments).

As part of this study, we have adjusted the Copenhagen Economics FDI impact assessment model to the Finnish context and trained Business Finland staff in using the model. The model is a flexible tool that can be used to assess both the impacts of FDI within a given year and to track impacts of the portfolio of investments that Business Finland has helped bring to Finland during a given period. Business Finland can use this tool to build KPIs, evaluate the efficiency of their invest-in activities and analyse patterns in impacts of FDI on the Finnish economy. External audit of the calculations can support the use of the model.

FIGURE 17. Capitalising on synergies between Finland's needs and opportunities



Source: Based on Copenhagen Economics (2018)

3 DEVELOPING ECOSYSTEMS IN FINLAND

Developing ecosystems is a new part of Finland's industrial and innovation policy.¹⁵ Ecosystems are also a key element in Business Finland's strategy towards building a world class competitive business environment in Finland. The intention is to underpin global growth for companies located in Finland via research and innovation initiatives around selected ecosystems. To deliver a competitive business environment, Business Finland supports the development of ecosystems through research projects, grants, loans and support for so-called orchestrators of the individual ecosystems.

This chapter sums up what can be said about the economic impacts of Business Finland's support granted to ecosystems. The assessment is based on existing impact studies of the relevant types of funding and on an assessment of four selected ecosystems, to whom research funding alone is around EUR 30-50 million per year. In addition to reviewing existing evaluations of the various funding, we have also analysed data on the actu-

al funding and business level data for the funded firms. We have also collected insights on the functioning of the ecosystems via interviews with stakeholders in the four selected ecosystems.

In Section 3.1 we describe Business Finland's approach to developing ecosystems. In Section 3.2, we introduce the four ecosystems that Business Finland selected for the assessment, and Section 3.3 contains an overview of our approach to assessing the selected ecosystems. In Section 3.4, we describe the firms and employment in the four selected ecosystems, and Section 3.5 provides an overview of the funding of Business Finland's funding of the ecosystems. Section 3.6 contains a review of the existing knowledge about the impacts of funding on productivity and employment in the firms. Section 3.7 contains an assessment of the four ecosystems, and Section 3.8 concludes and provides recommendations on the way forward.

¹⁵ According to the Ministry of Economic Affairs, platforms and ecosystems of various sectors are crucial for innovation activities and for harnessing the potential of digitalisation. The ministry defines ecosystems as: "interdependent networks between enterprises, entrepreneurs, researchers, public administration and third-sector operators", cf. <https://tem.fi/en/ecosystems>.

3.1 BUSINESS FINLAND'S APPROACH TO DEVELOPING ECOSYSTEMS

Business Finland has a strong focus on ecosystems and on strengthening the cooperation between the ecosystem members, both private companies and public research institutions. While the rationale for public funding of ecosystem development was explained in Chapter 1, this section introduces the concept of ecosystems and review the goals of Business Finland regarding the ecosystems.

An industrial ecosystem is a collaboration between businesses or a collaboration between businesses and research institutions.¹⁶ The goal is to share knowledge and increase innovation and growth rates of existing or new promising industries. The ecosystem can include any combination of private firms, public research institutions and Public-Private Partnerships (PPPs). An ecosystem often combines competences from multiple industries and both the private and public sector.¹⁷

The concept of ecosystems derives from the idea of industry clusters, where similar firms locate in the same geographical area to exploit the synergies of co-location.¹⁸ Ecosystems differ from clusters in three main dimensions. *Firstly*, geographical co-location is not fundamental in ecosystems, and geographic proximity plays a much larger role in clusters.¹⁹ *Secondly*, firms in the ecosystems are not necessarily in the same or similar industries. Often, the firms bring industry-specific knowledge, where the combination makes up the strength of the ecosystem. *Finally*, ecosystems have a stronger focus on innovation and the inclusion of research and research institutions.²⁰

The Ministry of Economic and Foreign Affairs and Employment of Finland states that the “...vision is that Finland will be the most attractive and competent environment for experimentation and innovation by 2030”.²¹ At the same time, Business Finland has formulated a growth ambition for Finnish Growth Engine²² ecosystems to generate “EUR 1 billion in turnover from new businesses, exports and foreign investments in Finland”.²³

¹⁶ Peltoniemi and Vuori (2004). They provide the following definition of an ecosystem “As a conclusive definition we consider a business ecosystem to be a dynamic structure which consists of an interconnected population of organizations. These organizations can be small firms, large corporations, universities, research centres, public sector organizations, and other parties which influence the system.”

¹⁷ See footnote 16.

¹⁸ These synergies include access to qualified labour, knowledge of suppliers and customers, and other types of spillovers.

¹⁹ Business Finland (2018a) and Peltoniemi (2004), among others, discuss additional differences between clusters and ecosystems.

²⁰ Ministry of Economic and Foreign Affairs and Employment of Finland: <https://tem.fi/en/ecosystems>.

²¹ Ministry of Economic and Foreign Affairs and Employment of Finland: <https://tem.fi/en/ecosystems>.

²² A Growth Engine is a “market-driven, open, global business ecosystem” that “generates a significant new global business”, cf. Business Finland presentations “Business Finland services for Growth Engines” and “Ecosystems and Growth Engines”. The best and most important ecosystems can grow into Growth Engines, cf. Business Finland presentation “Ecosystems and Growth Engines”.

²³ Business Finland presentation (2018), “Growth Engines – Orchestration of Ecosystems”.

To achieve these ambitions, although vaguely formulated, Business Finland is prioritising significant resource to ensure that the ecosystems have optimal conditions and that public funding is provided where it generates the highest benefits to the ecosystems and to the Finnish society.

3.2 INTRODUCTION TO THE SELECTED ECOSYSTEMS

Business Finland has selected four Finnish ecosystems for the assessment: Traffic including Mobility as a Service (MaaS), Mobile Games, Marine including One Sea, and Health.

- **Traffic – incl. Mobility as a Service (MaaS)**

The Traffic ecosystem around *Mobility as a Service* is part of a larger effort under the heading “Smart mobility”.²⁴ The ambition of MaaS is to create a smooth door-to-door urban transport system where digital platform solutions bring together different types of transport providers (busses, trains, taxis and sharing cars) with transport users. Finland aims to provide a test-bed for this new approach with the aim to solving transport and climate problems.

- **Mobile games – Gaming apps on mobile devices**
Finland is home to many of the world’s most successful mobile games developers. Homegrown spearheads in the global gaming industry such as Rovio (known for e.g. Angry Birds) and Supercell (e.g. Hay Day and Clash Royale) each employ hundreds of high paid game developers in Finland. Global game and tech giants (e.g. AMD, Nvidia, EA, Ubisoft and Unity) are all present in Finland.²⁵ Business Finland (and before that, Tekes) has been funding firms within mobile games development for decades.
- **Marine – One Sea and autonomous ships**
Finland is already having an industrial stronghold in the global maritime equipment industry with a focus on cutting edge ships, engines, propellers and other equipment for the maritime industry. The One Sea ecosystem was founded in 2016. The ambition is to lead in the field of autonomous ships. The One Sea – Autonomous Maritime Ecosystem includes global leaders in the maritime and leading digital firms from Finland such as ABB, Cargotec (MacGregor and Kalmar), Ericsson, Meyer Turku, Rolls Royce, Tieto and Wärtsilä. The Association of Finnish Marine Industries supports the work, and Business Finland (and before that Tekes) has invested in the ecosystem. The leader of One Sea is DIMECC.

²⁴ See presentation from Business Finland “Smart Mobility”, November 2018, <https://www.businessfinland.fi/globalassets/finnish-customers/02-build-your-network/digitalization/smart-mobility/smart-mobility-pres-2018-11-www.pdf>.

²⁵ See <https://www.businessfinland.fi/en/games>.

- **Health – Smart ICT solutions in the health care sector**

The Health ecosystem seeks to facilitate open collaboration and to accelerate innovation by bringing together experts from wireless information technologies and life science. The goal is to introduce smart ICT solutions for delivering advanced, personalised and connected health service solutions. Large historic investments have resulted in acknowledged Finnish research and treatment for such specialist areas as cancer, brain diseases, orthopaedics and genetics research. Finland has several health care regulatory initiatives.²⁶ The Health ecosystem comprises several stakeholders from academia, the public sector and the private sector, and the ecosystem spans the areas of Diagnostics & Analytics, Digital Health, Pharmaceuticals, Wellness & Care, and Medical Devices & Imaging.

3.3 OUR APPROACH TO ASSESSING IMPACTS

The assessment of the economic impacts is based on Copenhagen Economics' Impact Assessment Model, which is aligned with Business Finland's impact model, cf. Box 4. The funding from Business Finland goes to firms and research institutions to support their activi-

ties. The increased funding and support from Business Finland should lead to the recipients increasing their output and performance. The general intervention in the ecosystem follows the overall rationale for public R&D funding and efforts around better regulation. This has specific formulations in each of the eco-systems, which are outlined below.

- **Traffic – incl. Mobility as a Service (MaaS)**

The idea is to foster good conditions for business and innovation in the field through a conducive and coordinated regulation and research funding. The aim is to be a first mover in this field. If successful, this could spark export opportunities for both digital mobility platform services and for related technology products and advanced vehicles and components. The program builds on an earlier Smart City program.

- **Mobile games – Gaming apps on mobile devices**

The efforts towards the gaming ecosystem relate to game development activities, growing young firms and attracting investors. Gaming companies can apply for funding when developing new game concepts, game platforms or game development tools or when developing new operation and business models and cross media concepts and formats or when using gamification in development of new product and service concepts. The game companies can use funding e.g. for testing the viability of the business concept, exploring demand on a new market and getting feed-

²⁶ Population-based biobanks and innovation-friendly biobank legislation, comprehensive healthcare registers, electronic medical records, and an isolated gene pool, cf. Business Finland's homepage.

back from potential customers. Gaming firms can also use it for developing and piloting new products, services and business models or a rapid scaling of business to international markets e.g. strengthening the team and developing global growth strategy. A previous program (Skene) funded these activities in earlier days. With a continued focus on these programs, Finland may capture a significant share of a growing global market.²⁷

- **Marine – One Sea and autonomous ships**

The programme aims to make the players in the ecosystem work together to reach their joint goal of autonomous ships. As with the Traffic ecosystem, the involvement of the regulators and policy makers is essential to provide a real-world testbed. The Finnish Ministry of Transport and Communications is preparing legislation to enable remote and autonomous piloting of ships in Finland. The efforts towards autonomous sea traffic follows from the earlier “Arctic Seas”-program. The industry policy objective of the investment is to help an existing industrial stronghold (maritime equipment) stay on the forefront of research and innovation with the industry, and the aim is to create a first mover advantage in an important global industry through research, development and innovation collaboration across businesses and research institutions.

- **Health – Smart ICT solutions in the health care sector**

Finland is the home of an innovative ICT sector. Bringing health and ICT partners together to contribute to the needs of the health care sector is the goal of the Health ecosystem. The goal is thus to automate standardised procedures and, in this way, free up health personnel to focus on more complicated tasks that require personal attention. Many developed countries experience longer life longevities. These demographic changes put a strain on public finances as the ratio of retired people in a society increases. Coming up with innovative solutions is one way to counter the development and maintain or increase the quality of health services.

Adopting regulation is part of several of the ecosystems’ initiatives. We have not reviewed these efforts and any impacts related to these changes are not considered in our assessment. Our focus is on the impacts of the funding granted to the ecosystems. This is based on the presumption that this is the dominating effect. In principle, if two interventions take place at the same time towards the same firms (more funding and better regulation), we would not be able to disentangle the two.

²⁷ PwC (2018) estimates that “video games and e-sports” grow at around 7 percent annually between 2018 and 2022, see <https://www.pwc.com/gx/en/industries/tmt/media/outlook.html>. They conclude that “one of the most noteworthy likely developments in the market’s near future is the further emergence of mobile games as an important e-sports vehicle. The lower barrier to entry for such games – a smartphone as opposed to a PC – could lead to a major democratisation of the viable competitor base for e-sports.” See <https://www.pwc.com/gx/en/industries/tmt/media/outlook/segment-findings.html>.

3.4 FIRMS AND EMPLOYMENT IN SELECTED ECOSYSTEMS

To assess the economic contribution of the funding towards the ecosystems, we have identified around 60 core companies²⁸ within the Traffic ecosystem, cf. Figure 18. The 60 companies employed more than 2,000 persons in 2017, and 50 of these firms have received some form of direct funding from Business Finland. Several of the firms in the Traffic ecosystem are also having activities outside the field of smart urban mobility.²⁹

Within the Marine ecosystem, we find around 15 core companies. We have identified 10 core firms within the ecosystem having received some form of funding from Business Finland. The 15 core firms had a combined employment of around 18,000 persons in 2017. This number is the full employment for the 15 firms in Finland. The activities related to autonomous ships are only a smaller part of the Marine ecosystem.

²⁸ The firms are identified via material from the ecosystems and via the interviews with stakeholders in combination with Business Finland's funding data. A core company is a company that is active in the core research and innovative activity of the ecosystem, e.g. for Traffic, a core firm is working with mobility as a core business element.

²⁹ As an example, the software company, Unikie, is both participating in the Traffic and in the Marine (autonomous ship) ecosystem, <https://www.unikie.com/en/unikie-participates-in-the-development-of-remotely-operated-and-autonomous-platforms/>.

FIGURE 18. Estimated employment and firms in the selected ecosystems, 2017

Number of firms and jobs

Traffic	Marine
~ 60 core firms identified	~ 15 core firms identified
2,000 – 3,000 jobs	~ 18,000 jobs*
~ 50 firms receiving Business Finland funding and/or support	~ 10 firms receiving Business Finland funding and/or support
Mobile Games	Health
~ 300 core firms identified	~ 140 core firms identified
4,000 – 5,000 jobs	~ 6,000 – 12,000 jobs**
~ 125 firms receiving Business Finland funding and/or support	~ 100 firms receiving Business Finland funding and/or support

Note: The number of firms and the job numbers are reported as approximations, since the number of active firms and number of staffs vary from year to year. The reported numbers are best estimates for latest year and it includes the full employment of the firms involved. The number of firms receiving funding or other support from Business Finland cover the period 2013-2018 for the Traffic ecosystem, 2001-2018 for the Mobile Games ecosystem, 2016-2017 for the Marine ecosystem, and 2014-2018 for the Health ecosystem. The varying lengths of the support reflects that some of the ecosystems are more mature and have existed longer.

*The number of jobs in the Marine ecosystem are reported in the same ways as for the other ecosystems, namely the full employment of the firms involved. A fraction of the full employment of the involved firms is currently around autonomous ships.

**The large interval reflects the inclusion of Nokia in the Health ecosystem. Nokia employs around 6.000 people in Finland, but it is specialised in many other industries in addition to the Health ecosystem.

Source: Copenhagen Economics based on data from Business Finland and company information

For the Mobile Games ecosystem, we have identified around 300 core firms³⁰ in the mobile gaming industry³¹ with a total of employment of 4,000-5,000 persons in 2017. Of these firms, less than half (125 firms) have received funding from Business Finland since 2001.

Within the Health ecosystem, we identify around 140 core companies with a combined employment of 6,000-12,000 persons in 2017. The large interval reflects the presence of Nokia in the ecosystem. Of these firms, around 100 have received funding from Business Finland.

The firms in the ecosystems vary in size and maturity. Traffic and Mobile Games firms are typically younger, born digital and on average smaller. Still firms in both ecosystems can demonstrably grow to considerable size.³²

The Marine ecosystem includes large and mature firms such as Wärtsilä with more than 18,000 jobs globally and around 3,600 in Finland,³³ and other large firms such as Meyer and Rolls Royce.³⁴ While the employment in the autonomous shipping part of these firms is still only a fraction of their total employment, the research and innovation funded can possibly over time affect large parts of their business footprint in Finland. Continued innovation and R&D investment can be seen as a key part of maintaining and growing the industry. It is therefore very difficult and not the best guidance to separate out the size of the new business area. For this reason, we report the total employment of the Marine ecosystem firms in Figure 19.

³⁰ For mobile games, a core firm is engaged in the development of mobile games or involved in development of systems or software to support game development.

³¹ <https://www.neogames.fi/en/>.

³² The gaming firm Rovio Entertainment has grown to more than 300 employees.

³³ See Wärtsilä company website (<https://www.wartsila.com/about>).

³⁴ Meyer's Finland operation employs close to 1,900 people, see <https://www.cruiseindustrynews.com/cruise-news/18973-meyer-turku-reports-profitable-2017.html>. Rolls Royce's Finland operation employs close to 600 people, see <https://www.rolls-royce.com/about/where-we-operate.aspxeurope>.

FIGURE 19. Examples of firms in the selected ecosystems

Traffic	Marine	Mobile Games	Health
<p>Siili Solutions ~ 450 employees</p> <p>Siili Solutions is a software company and has worked in the field of motoring technology since 2016 at their Oulu office.</p> <p>They are working on programming and embedding computers and software into commercial cars that will be rolled out in the near future.</p>	<p>Wärtsilä ~ 3.600 employees*</p> <p>Wärtsilä produces ship machinery, propulsion, and manoeuvring solutions. Wärtsilä is testing and developing an automated dock-to-dock solution. In the presence of the Norwegian Maritime Authority, the system was tested with the autonomous operation being utilised uninterruptedly.</p>	<p>Rovio Entmt. ~ 325 employees</p> <p>The video game developer behind the Angry Birds games and franchise. The company was founded in 2003 and the first Angry Birds game came out in 2009. As of September 2018, 18 games have been published in the series.</p>	<p>Orion ~ 2,800 employees*</p> <p>Orion develops, manufactures and markets pharmaceuticals and pharmaceutical ingredients. The core therapy areas of Orion's pharmaceutical R&D are central nervous system (CNS) disorders, oncology and respiratory diseases.</p>
<p>Unikie ~ 50 employees</p> <p>A firm with AI and machine learning expertise.</p> <p>Uses cloud-based data collection platform that gathers data from various sensors to analyse and visualize the information.</p>	<p>Rolls Royce ~ 550 employees*</p> <p>Together with ferry operator Finferries, Rolls Royce successfully demonstrated the world's first fully autonomous ferry in late 2018. Earlier in 2018, Rolls-Royce and Finferries began collaborating to continue implementing the findings from a research project, funded by Business Finland</p>	<p>Critical Force ~ 50 employees</p> <p>Has developed the Critical Ops mobile game. It is a 3D first-person-shooter game built for mobile multiplayer. The game was first released in 2015. As of September 2018, the game has been downloaded over 34 million times. Critical Force is located in Kajaani in central Finland.</p>	<p>Polar Electro ~ 500 employees*</p> <p>Polar Electro develops and produces heart rate monitors and performance sports watches. The products are designed for e.g. swimming, cross-training, yoga, and tracking daily activity and calorie consumption.</p>
<p>MaaS Global ~ 15 employees</p> <p>The developers of the "Whim" app. Whim can be used for door-to-door transportation, including taxi, public transport, car service and bike share. The app works as pay as you go or using a monthly plan.</p>	<p>Kyynel ~ 30 employees</p> <p>Kyynel develops wireless telecommunication systems. It offers high frequency (HF) wireless systems and HF-radio systems. The company was incorporated in 2011. Based in Oulu.</p>	<p>Big Ear Games ~ 5 employees</p> <p>Currently working on the final steps of developing a mobile game that teaches music theory, computational thinking, and coding through fun activities and puzzles involving rhythm, melody, and harmony.</p>	<p>Digifundus ~ 12 employees</p> <p>Digifundus diagnose, screen, and monitor eye diseases. Specialising in routine screening tasks, Digifundus help their customers use their personnel for more specialised tasks. The company started in 2000.</p>

Note: The job numbers are reported as approximations, since the number of staffs varies from year to year. The reported numbers are best estimates for latest year.

*Number of employees in Finland.

Source: Copenhagen Economics based on data from Business Finland and company information

3.5 BUSINESS FINLAND'S FUNDING OF ECOSYSTEMS

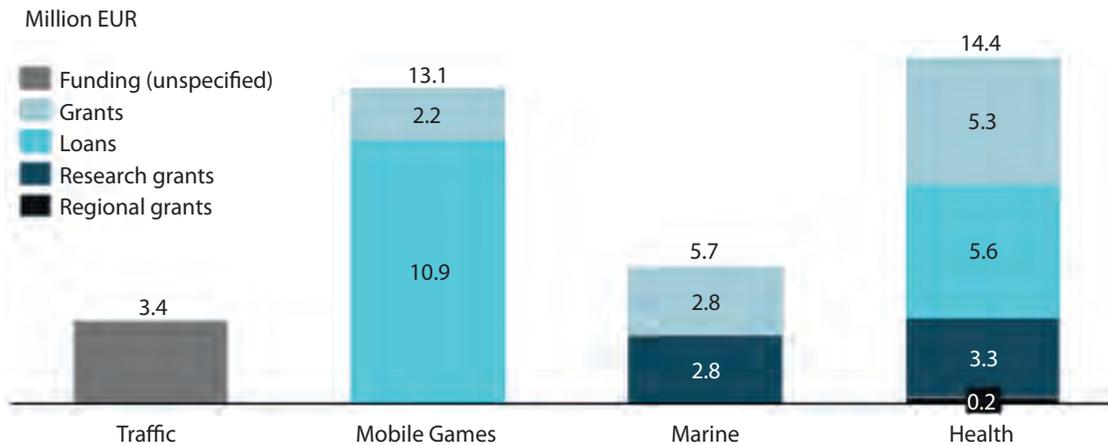
The four selected ecosystems received funding worth EUR 36.6 million in 2017, cf. Figure 20. The total funding provided for the ecosystems varies across the years. In 2016, the funding of the four ecosystems reached EUR 50 million.³⁵ The funding of the Traffic and Mobile Games ecosystems has been relatively stable within recent years. Between 2012 and 2017, the Finnish game companies attracted around EUR 100 million in private funding and EUR 75 million in public research funding, grants and loans. The Marine ecosystem and its focus on

autonomous ships is new, and funding for the ecosystem has only been provided in 2016 and 2017.

The type of funding varies across ecosystems, reflecting the different needs and challenges in the ecosystems. The funding of the Mobile Games ecosystem is mostly via loans (around 80 per cent), and grants make up the remaining funding.³⁶ This is consistent with the fact that the Mobile Games ecosystem contains many SMEs and young start-ups. Young entrepreneurial companies often need financing early in the process to develop and market their products. Such investments are often risky, and funds from private investors are not necessarily enough from a societal viewpoint, e.g. because it generates spillovers to other companies in the ecosystem that the private investors do not consider.³⁷

The funding of One Sea and the Marine ecosystem is composed of grants and research grants. This ecosystem consists of many large firms, and the funding is in line with the strategy of Business Finland to encourage increased collaboration between large firms and public research institutions.³⁸ The goal of the One Sea ecosys-

FIGURE 20. Overview of the funding of the selected ecosystems, 2017



Note: The funding of the MaaS ecosystem is not sufficiently detailed to be divided between grants, loans and research grants.

Source: Based on data from Business Finland

³⁵ In 2014 and 2015, the funding was around EUR 20 million and EUR 37 million, respectively. These numbers exclude the Marine ecosystem, which did not receive funding before 2016.

³⁶ Loans have gradually become more important as a means of funding the Mobile Games ecosystem. In 2008, around 40 per cent of the funding for the ecosystem was provided via loans.

³⁷ The focus of Tekes, the Finnish Funding Agency for Innovation, has shifted in recent years towards young companies (less than five years), cf. Business Finland (2018a). Tekes Venture Capital Ltd. was established in 2014 and later renamed Business Finland Venture Capital Ltd. Both initiatives highlight the focus on start-ups and entrepreneurs.

³⁸ See Tekes (2015).

tem is to develop and commercialise autonomous ships, which involves large research investments and cooperation between firms from various industries.

The funding of the Health ecosystem is primarily split between grants, loans and research grants. This reflects that the ecosystem is very diverse and includes both large and small companies, undertaking many different tasks in the ecosystem. The ecosystem includes IT companies (e.g. IBM Healthcare) and pharmaceutical companies (e.g. Orion). Two thirds of the funding provided for the ecosystem in the period 2014-2018 was provided to large companies.

The members of the Traffic ecosystem are more reminiscent of the members of Mobile Games ecosystem in terms of size and industry. This indicates that the funding strategy for the MaaS ecosystem should be like the funding system of Mobile Games more than Marine (One Sea) and Health.

3.6 REVIEW OF IMPACTS FROM BUSINESS FINLAND FUNDING

Many evaluations have assessed a broad spectrum of outputs, outcomes and impacts of funding and support from Business Finland, cf. Figure 21. The reports focus on funding related to three key performance indicators

for Business Finland: R&D funding, entrepreneur programmes, and ecosystem management and facilitation.³⁹

The *outputs and outcomes* of Business Finland funding can be assessed through surveys and questionnaires. Here, the firms can make individual judgements of the effects of the funding. The reports applying this approach can be seen on the top row of Figure 21. The concern is that not even the firms themselves know what their performance would have been without the funding, and the firms might misjudge the effect of the funding. Therefore, advanced statistical analyses are needed to identify the causal *impact* of the funding. The impact refers to the additional improved performance of the supported firms, relative to a situation where they had not been supported.

Three reports are identified that analyse the causal impact of the support from Business Finland. These are shown in the bottom row of Figure 21. The reports all utilise a difference-in-difference methodology and compare the supported firms to similar firms in a control group of firms that have not received funding. In this way, the impacts on e.g. employment, turnover and productivity from R&D funding and entrepreneur programmes are isolated from other factors that influence the performance of the firms. The impacts of ecosystem management and facilitation have not been analysed.

³⁹ Ecosystem management and facilitation refers to the time and resources dedicated to improving cooperation within an ecosystem, rather than direct funding for a specific firm or research institute.

FIGURE 21. Overview of key reports evaluating the funding of Business Finland



Source: Based on literature review by Copenhagen Economics, including Tekes, (2012), Tekes, (2013), Tekes, (2014), Tekes, (2015), Business Finland (2018a) and Business Finland (2018b)

In the following, we summarise the key quantifiable and measurable *impacts* of the funding from Business Finland. We relate this to the nature of the four ecosystems that are analysed here and the funding they receive. We focus on quantitative impacts on three key economic impact variables: Employment, turnover and productivity.⁴⁰

IMPACT RESULT A: FUNDING HELPS FIRMS TO GROW

Funding from Business Finland has been shown to have a positive and significant effect on employment and turnover in the SMEs and start-ups that receive the funding. Funding from Business Finland for SMEs increases employment by around three employees in the average sup-

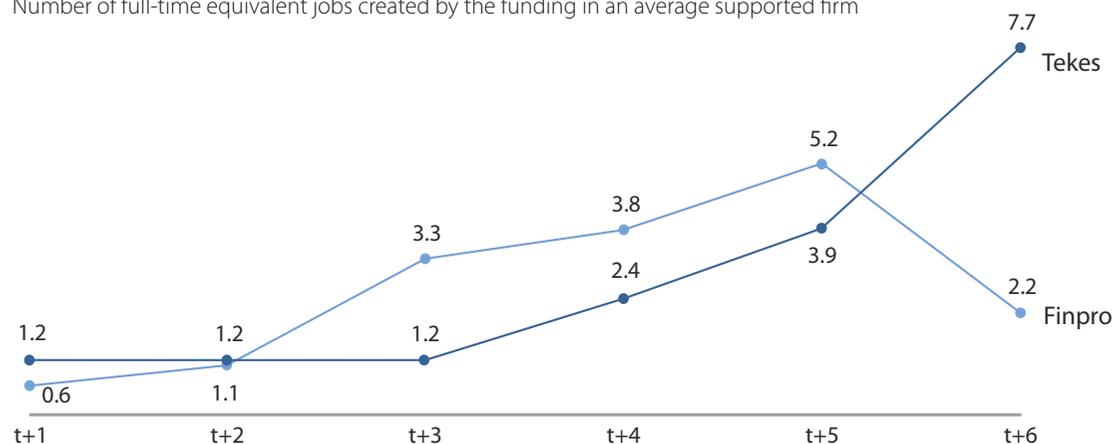
ported firm.⁴¹ The size of the employment effect seems to increase over time for the funding of research projects (i.e. the type of funding previously provided by Tekes). One year after the funding of research, the firm employs one additional employee. Six years after the funding, the firm employs close to eight more employees, and the rate of growth increases from year five to six indicating longer lasting effects, cf. Figure 22.

The size of the employment effect from the type of support formerly provided by Finpro seems to appear faster, but also to be fading after approximately five years indicating short time span of the intervention of this type of funding. To assess the impacts of the ecosystem funding, we use the proportion of spending across the two types to assess the expected time profile and duration of impacts.

Start-ups supported by Business Finland on average hire one additional employee one year after the funding was received compared to firms in the control group.⁴² 10 years after receiving the support, they employ around eight more workers than firms in the control group. Similar effects are found for turnover in the start-ups. After four years, turnover is more than EUR 0.5 million higher

FIGURE 22. The impact on employment from funding from Finpro and Tekes

Number of full-time equivalent jobs created by the funding in an average supported firm



Note: The x-axis refers to the time since the firm received the funding, e.g. t+3 indicates three years after the firm received funding or support.

Source: Business Finland (2018a)

⁴⁰ At the same time, several studies are also looking at how the supported firms are changing their businesses, operations and collaboration with for example research institutions because of the participation. Key example of this includes Tekes (2014, 2015).

⁴¹ See Business Finland (2018a). The report analyses the effects of funding from Finnvera, Finpro, and Tekes, where Finpro and Tekes today are part of Business Finland.

⁴² See Business Finland (2018b). The report analyses funding provided by Tekes, which is part of Business Finland today.

than if the firm had not received support. The impact on turnover is persistent and is still statistically significant after 10 years.

Less evidence is available about the impact of funding for large firms. However, slightly more than 70 per cent of large firms have responded that the support they received three years previously has had a “moderately”, “very” or “invaluable” effect on “achieving/creating business growth”. These effects are self-reported, and there is a risk that the firms misjudge the effect of the funding.

IMPACT RESULT B: NO DIRECT IMPACT ON FIRM PRODUCTIVITY THROUGH FUNDING

Another key effect from funding is to improve productivity of the participating firms. Increased productivity leads to higher competitiveness and allows the firm to expand – both domestically and on foreign markets.

However, none of the evaluations document any significant and measurable impact on productivity for the participating firms.⁴³ It is important to stress that this does not necessarily mean that the funding does not have an impact on productivity. There are several reasons why this impact can be difficult to capture, e.g. that the effect is expected to take time to materialise and the productivity effect might occur through different channels that are difficult to measure empirically. Furthermore, Business Finland is careful in choosing the firms they fund and are selecting the best firms to receive the funding.

The recipients of funding from Business Finland report increased investments in R&D, innovation and higher productivity.⁴⁴ In particular, around half of the supported firms report a positive impact on productivity, with SMEs reporting slightly higher impacts than large firms.⁴⁵ However, no causal effects are found, and the effects of the funding on productivity are interpreted as indicative.⁴⁶

Even if the programs do not increase the productivity of the participating firms, the intervention may still be worthwhile from a productivity perspective. This is the case if the programs help a healthy transition of the industry structure in Finland, allowing new and more productive parts of the economy to grow relatively faster than other and less productive parts of the economy.

LITERATURE REVIEW ON THE IMPACTS OF R&D FUNDING

This subsection reviews four related papers focusing on the impacts of R&D funding. The focus is on impacts of R&D funding on private R&D expenditure, employment, sales, and productivity for Finland and other European countries.

⁴³ See Business Finland (2018a, 2018b) and Tekes (2014).

⁴⁴ Tekes (2013) and Tekes (2014).

⁴⁵ Tekes (2014).

⁴⁶ Einiö (2014) shows indication of positive impacts on labour productivity in the long run based on Tekes funding between 2000 and 2006.

Einiö (2014), analysed R&D subsidies and company performance based on evidence from geographic variation in government funding. The research finds that Tekes' support has had positive significant impacts on R&D investment, employment and sales. The author finds no effects on labour productivity in the short run. However, the author concludes that the *“estimates indicate that the program induced labour productivity gains in the long run”*. The study uses Finnish data and R&D subsidies provided by Tekes during the period 2000-2006.

Bronzini and Piselli (2014) assesses the impact of R&D subsidies on firm innovation in relation to an R&D subsidy program implemented in a region of Northern Italy. The authors find *“that the program had a significant impact on the number of patents, more markedly in the case of smaller firms”*. In addition, they conclude that for smaller firms the program was *“successful in increasing the probability of applying for a patent”*.

Ali-Yrkkö (2005) studies the impact of public R&D financing on employment. The working paper shows that public funding provided to Finnish companies during the period 1997-2002 had positive significant effects on R&D employment. The positive impact is present both for domestic and global R&D employment. The author does not find an impact on non-R&D employment.

Görg and Strobl (2005) look at the effect of R&D subsidies on private R&D and show that government support for R&D serves to increase private R&D spending for small and medium sized public grants. Large public grants are found to crowd out private financing of R&D.

These findings are present for domestic plants, whereas the authors found no effects on private R&D expenditure by foreign establishments. The study is based on data from Ireland and support provided during the period 1999-2002.

These findings are important for the analysis of funding for the Finnish ecosystems because they highlight that public R&D funding has been shown to impact firm performances. This increases the trust regarding the impacts found by Business Finland in their own assessments. In addition, the studies show that there is consensus that public R&D funding has significant impacts on the supported firms.

3.7 THE FUNDING FROM BUSINESS FINLAND HELPS IMPROVE FINNISH PRODUCTIVITY

In this section, we analyse the ecosystems compared to the private sector in Finland and combine this with existing impact evaluations. We compute the expected payback times of the funding from Business Finland. This analysis is new. Further, we discuss how the payback time is affected by changes in productivity growth in the ecosystems and the duration of the effects from the funding of Business Finland.⁴⁷

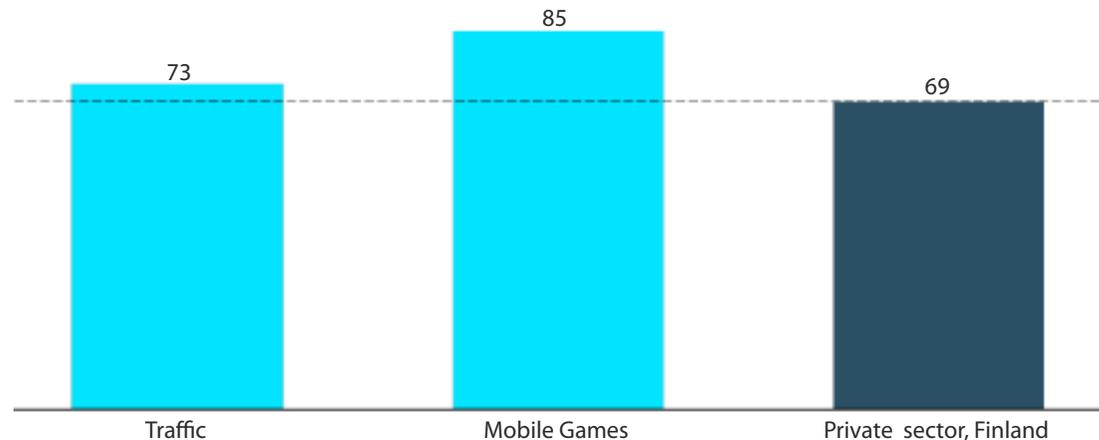
⁴⁷ The methodology used in the analysis has been explained in more details in Appendix D.

ECOSYSTEM FIRMS ARE MORE PRODUCTIVE

Knowing that support targeted at SMEs has a positive significant impact on employment, we assess the productivity level of the firms in the Traffic and Mobile Games ecosystems, which are both heavily dominated by SMEs. We find that the firms in the ecosystems are on average more productive than the average Finnish private sector, cf. Figure 23. This implies that a worker employed in one of the ecosystems creates more value than

FIGURE 23. Labour productivity in the ecosystems and the private sector, 2017

Thousand EUR per employee



Note: Labour productivity is defined as value added per employee. Data for the Finnish private sector is for 2016, which is the latest available year. One firm in the Mobile Games ecosystem was excluded from this figure as an outlier due to its very high productivity. The private sector excludes “agriculture, forestry and fishing”, “information and communication”, “financial and insurance activities”, and “real estate activities”. The number of employees is full-time equivalent employees for the ecosystems and number of persons engaged for the private sector. This is due to data limitations.

Source: Based on data from Business Finland and OECD

the average person working in the private sector. This means that increased growth of the firms in the ecosystem (via impact result A above) helps to accelerate a healthy transition towards more productive industries.

There are several uncertainties in these numbers, which need to be considered. *Firstly*, the productivity levels for the ecosystems have been computed from firm level observations. These vary across time depending on how the firm performs. Several firms in the two ecosystems have negative value added in 2017. This poor economic performance should not be expected to last, as the firm will either recover or exit the market. Including firms with negative value-added means that our assessment provides a conservative estimate about the productivity in the ecosystem at a given point in time.

Secondly, employment figures used in the calculation differs between the ecosystems and the private sector. For the ecosystems, full-time equivalent employment measures have been used, while the computation of the productivity in the private sector is based on the number of persons engaged. This is due to data limitations. It lowers the estimate for the productivity in the Finnish private sector and decreases the gap between the productivity in the ecosystems and the private sector in general.

Finally, the private sector refers the non-financial private sector net of agriculture and real estate activities. These industries are highly different from the remaining part of the private sector and are often excluded when analysing productivity. In addition, we have excluded the ICT sector. This is because the new employees at-

tracted in the ecosystems are expected to be employees with enough computer skills from outside of the ecosystems which are ICT firms.

In addition, the productivity in the Marine (One Sea) ecosystem has not been estimated since the ecosystem is built around creating autonomous ships and includes firms in many industries spanning software programming, electronics, ship building and cell technology.⁴⁸ The autonomous ships have not yet seen the light of day, and it is not possible to estimate the future productivity of the industry. However, we would argue that this new line of business will only grow if it yields a better economic performance than the existing core business. Therefore, we have based our assessment on the assumption that the new and innovative part of the maritime industry around autonomous ships will only grow if it is more productive than the average of the maritime industry.

The productivity in the Health ecosystem has not been estimated since the available data provide for an estimate that is too uncertain. This is the case as the ecosystem consists of many large companies, where only a fraction of the staff within the company is involved in the ecosystem, e.g. Nokia, IBM and Solteq. Including all activities of these large firms can distort the estimate. Excluding the firms – which are important parts of the ecosystems – also distorts the estimate.

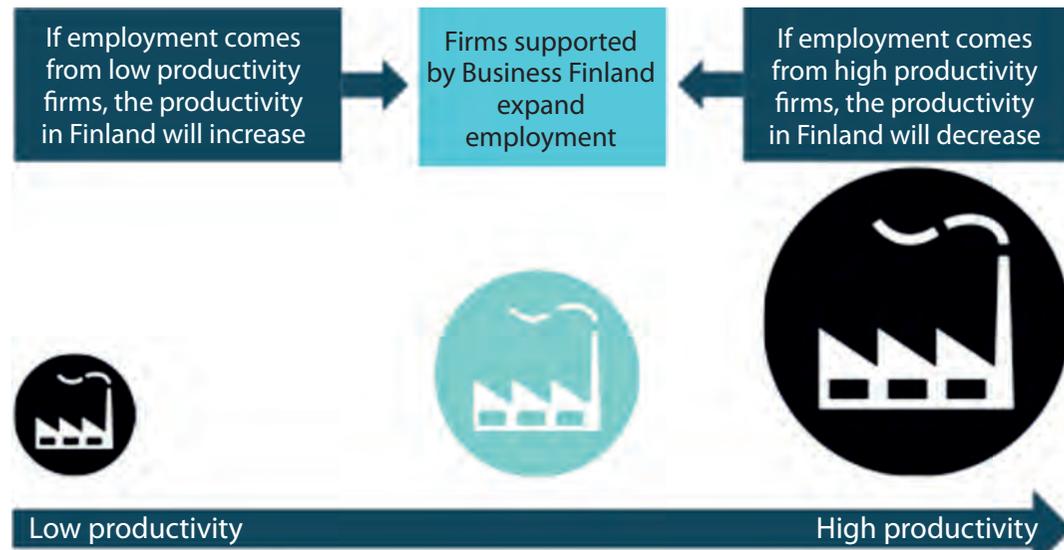
GROWTH OF HIGH-PRODUCTIVITY FIRMS INCREASES FINLAND'S OVERALL PRODUCTIVITY

Growth of high-productivity firms increases Finland's overall productivity. When firms with high productivity expand, the average productivity in Finland improves. Funding from Business Finland has a positive significant impact on employment in the supported firms (impact result A). This implies that support of Business Finland might increase the general productivity level in Finland, even if the funding has no direct impact on productivity in the supported firms (impact result B).

If the firms supported by Business Finland grow at the expense of less productive firms, productivity in Finland increases, cf. Figure 24. However, if the support from Business Finland allows the supported firms to grow at the expense of more productive firms, the impact of the funding on Finland's productivity level is negative. In the long run, the employment level is determined by structural changes in the economy, e.g. labour market reforms, education policies and retirement reforms. Hence, increased employment in the supported firms will in the long run occur at the expense of other firms in the economy. Since wages are in general growing in accordance with its labour productivity development, we will posit that accelerating growth in firms with above average productivity would over time help to increase the overall wage-level.

⁴⁸ See <https://www.oneseaecosystem.net>.

FIGURE 24. How growth in the ecosystems can increase productivity in Finland



Source: Copenhagen Economics

Quantifying the exact impact of this relocation of workers from firms with low to firms with high productivity is complicated.⁴⁹ Relocating one worker from an average firm into the ecosystems increases the annual value added per person employed by around EUR 10,000. Support from Business Finland creates around 14-17 jobs per million EUR invested. This implies that the combined funding of EUR 16.5 million provided for

the Traffic and Mobile Games ecosystems in 2017 is expected to create 230-290 full-time equivalent jobs annually in the more productive ecosystem firms, increasing Finnish value added by EUR 2.3-2.9 million annually.⁵⁰ These results should be interpreted with caution. They are based on uncertain estimates of the gap in productivity between the ecosystems and the private sector. In addition, the prediction relies on estimated impacts from the existing literature, which might not materialise to the same extent for future funding programmes as existing programmes. The impact of future programme could be both smaller and larger.

The payback time of the funding is estimated to be between seven and nine years depending on the size of the employment effects and the productivity growth in the ecosystems. This calculation considers the following three important aspects. *Firstly*, the funding of Business Finland is tax financed, which implies that there is a cost associated with collecting the funds that should be taken into consideration. *Secondly*, the expected future flow of benefits has been discounted. *Finally*, productivity *growth* is higher in the ecosystems than the average firms.⁵¹

These effects only represent a part of the expected effects from funding provided by Business Finland. The present analysis is limited by the coverage of available

⁴⁹ See Appendix D for a detailed explanation of the methodology.

⁵⁰ In addition, funding firms in the ecosystems is likely to generate spillover effects to other firms in the ecosystem or more broadly in society. All else equal, this will increase the gains from funding the ecosystems.

⁵¹ In the case that Business Finland funding directly impacts productivity in the supported firms, the benefits of the funding would be higher and the payback time shorter. Direct impacts on productivity has been difficult to show, cf. Business Finland (2018a, 2018b) and Tekes (2014) who find no effects on labour productivity. However, Einiö (2014) shows estimates that indicate that Tekes' funding induces labour productivity gains in the long run.

econometric impact studies. These previous studies have focused on SMEs, limiting the existing knowledge base to this type of companies. However, this does not mean that there are no effects on other dimensions and the effects from Business Finland funding can potentially be larger – and the payback time shorter – than estimated above. A range of potential impacts cannot be assessed quantitatively in the present analysis due to lack of impact studies, and this includes:

- **The impacts on large firms:** Large firms also receive funding from Business Finland, but the impacts on these firms have not been econometrically quantified.
- **The intra-ecosystem spillover effects:** Impacts on other firms in an ecosystem from funding a firm in the ecosystem. This has not been quantified.
- **The extra-ecosystem spillover effects:** Impact on firms outside the ecosystem from funding to the ecosystem. This has not been quantified.
- **The potential direct impact on productivity for SMEs:** This link has not been finally established, but the effect might still exist. This has not been quantified.
- **Impacts of orchestration funding:** This funding – provided to smooth the cooperation within ecosystems – has not been econometrically quantified.

The EUR 5.7 million provided in funding for the Marine ecosystem in 2017 is also expected to affect the ecosystem. These impacts have not been evaluated above. The Marine ecosystem mostly consists of large firms, and

the causal impacts from previous studies are not expected to be directly transferable to the One Sea ecosystem, because the impact studies have focused exclusively on SMEs and start-ups. However, the funding type for the One Sea ecosystem, focusing on R&D and collaborations between firms and public research organisations, should be expected to yield gains in the long run. The same is the case regarding the Health ecosystem and the EUR 14.4 million this ecosystem received in 2017. Around two thirds of the funding in the Health ecosystem is received by large firms.

3.8 CONCLUDING REMARKS AND THE WAY FORWARD

Having reviewed the programs and combined firm-level data for the participating firms, and after having reviewed the existing evaluations, data and insights collected via interviews with stakeholders, we reach the following conclusions:

- Business Finland's funding and services towards ecosystems have contributed to develop the ecosystems in Finland. Evaluations show that participating firms grow faster than they would have done without the funding. More qualitative studies also support the conclusion that innovation and collaboration activities are strengthened and expanded through the support from Business Finland.

- The evidence-base shows a positive economic impact for Finland from funding ecosystems. In 2017, the Traffic and Mobile Games ecosystems received funding worth EUR 16.5 million. This funding is expected to create 230-290 full-time equivalent jobs annually in the more productive ecosystem firms and increase value added by EUR 2.3-2.9 million annually. It is estimated that the investment programmes have a payback time between seven and nine years. This depends on the productivity growth in the ecosystems and the future employment impacts from the Business Finland funding.

There are several uncertainties in the calculation of payback times. Firstly, the estimation of the gap in productivity between the ecosystems is uncertain. Secondly, effects of past funding programmes are not guaranteed to materialise for future funding programmes to the same extent. Finally, there is uncertainty about the duration and trend in the impact of the funding in the long run (after six years).

Based on this analysis and on interviews with ecosystem companies and Business Finland employees responsible for the four ecosystems, we make the following recommendations:

- **Continue the support for SMEs and start-ups.** This is based on the findings in the existing impact studies, which show a positive and statistically significant effect on growth in both employment and turnover. The recommendation is also supported by an interview with a company from the Mobile Games ecosys-

tem. In the interview, it was stressed that relatively small amounts of loans and grants (e.g. around EUR 50,000) could be the difference between make or break for the start-ups. An interview with a company from the Traffic ecosystem points at a lack of venture capital in Finland to support start-ups and that Business Finland support can help start-ups keeping ownership within the company. This makes the funding from Business Finland more important.

- **Support high-productivity ecosystems and ecosystems with the potential to develop into high-productivity ecosystems.** Our assessment is that existing studies document that supported ecosystem-firms grow faster than they would otherwise have done. Our analysis highlights the important fact that this is beneficial for the Finnish economy since the supported firms have higher productivity than the average jobs they would be replacing. The same is true for ecosystems that are currently less productive but have the potential to become highly productive. This means two things going forward. First, the support of growth in high productivity ecosystems should encourage Business Finland to integrate this crucial aspect in their priorities and modalities for granting/selecting support. Secondly, Business Finland should investigate whether programs could be improved with a view to delivering a significant positive contribution to productivity growth in the supported firms – e.g. via inspiration from programs elsewhere that are succeeding in this regard.

- **Support the orchestration of the ecosystems.** It was highlighted in the company interviews that funding for the orchestration made them run much more smoothly to the benefit of all companies involved. As an example, one of the key companies in the Marine ecosystem points to the fact that the participation of a public entity makes the cooperation between otherwise competing firms stronger and better managed.
- **Support activities that benefits the networks in the ecosystems.** A company from the traffic ecosystem highlighted that Business Finland helps putting companies in contact with one another, which creates important spillovers between the firms. The firms are not experts on all dimensions, which increases the value of learning from other companies and drawing on their experiences.
- **Support collaboration of ICT with other sectors.** A company from the Marine ecosystem highlighted the potential in collaborating in ICT and digitalisation with other industries. Digitalisation and automation are not only essential in the Marine ecosystem but can be implemented in the wider mobility sector together with many sectors and increase productivity in the long run. At the same time, Business Finland was deemed to have high expertise within promoting digitalisation, which should be utilised.

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APPENDIX A. METHODOLOGY TO ASSESS IMPACTS OF FDI

Business Finland helps attract foreign investments to Finland, which in turn have an impact on the Finnish economy. The economic impact of FDI occurs directly via the activity that is generated within the foreign firms themselves. It also occurs indirectly via local suppliers and so-called induced impacts due to higher wage income. Finally, foreign firms also enhance the productivity of local firms in Finland, which also has a positive impact on the Finnish economy.

In this appendix, we explain how we assess the full impact of FDI in Finland, taking the direct, indirect and induced impacts as well as productivity spillovers into account. We assess the impact of FDI on:

- Number of jobs supported
- GDP contribution

THE ECONOMIC IMPACTS OF INWARD FDI

The foreign firms that Business Finland helps attract to Finland impact the Finnish economy through direct, indirect and induced impacts as well as through so-called spillover effects.

The *direct impacts* arise from the economic activity in the foreign firms themselves and the contribution they make to the Finnish GDP and employment via their own production. *Indirect impacts* arise when the foreign firms purchase inputs for production from local suppliers, e.g. intermediate goods or business services. Via this channel, foreign firms support jobs among their Finnish suppliers, their Finnish suppliers and so forth. *Induced impacts* arise when the wages paid out by the foreign firms and their suppliers are spent in Finland. The demand generated via this channel supports jobs in most sectors, including retail, restaurants and hotels.

Foreign firms can also impact the productivity level among local firms via so-called productivity spillovers. These effects can be both positive and negative, and spillovers can impact both local firms within the same industry (industry-specific spillovers) and local firms in other industries (broader spillovers). Spillover effects can arise via numerous channels, including knowledge transfer, increased competition and/or local supply chains. These channels are described below.

KNOWLEDGE TRANSFER

Foreign firms are typically larger, more productive and more trade-oriented than local firms. As these firms have been able to establish themselves in a foreign market, they generally comprise large amounts of technical, operational and managerial knowledge.⁵² This knowledge can ‘spill over’ to local firms and enhance their productivity and growth. This can occur via:

- **Labour mobility**
The most obvious channel through which knowledge can ‘spill over’ from foreign to local firms is via labour movements between firms. When local firms hire former employees of foreign firms, they benefit from the knowledge that these employees have built up from their former positions. This can for example be knowledge about specific ways of doing things, e.g. technical or managerial know-how, which can be transferred to local firms and increase their productivity directly.
- **Imitation/demonstration**
Local firms may also learn from foreign firms via less tangible channels, such as informal knowledge exchanges or via imitation (reverse engineering). However, local firms may also imitate foreign firms’ production methods or managerial practices.⁵³ Through

their own production methods, foreign firms can also demonstrate the viability of a given technology towards local firms, which may cause the adoption of new technologies among the latter.

- **Exporting**
Productivity gains through knowledge transfer may also arise indirectly via exporting. The knowledge foreign firms hold about foreign markets (e.g. knowledge regarding consumer tastes, international standards, distributional channels, etc.) and their potential network of affiliates across multiple markets can help local firms get a foothold on export markets and increase their international competitiveness.⁵⁴ Foreign firms can also help local firms become more productive and thereby increase their chances of starting to export.⁵⁵

INCREASED COMPETITION

Increased competition, arising from the entry of a foreign firm, can also result in productivity enhancements among local firms in the same industry. This can occur if the competitive pressure is large enough to give local firms an incentive to use their resources more efficiently or to adopt new technologies to survive in the market. The least efficient local firms that are not able to survive

⁵² Markusen (1995) refers to such assets as ‘knowledge capital’, which include factors such as superior production processes, technology, management techniques or marketing and advertisement campaigns. See Copenhagen Economics (2018).

⁵³ Görg and Greenaway (2003).

⁵⁴ Aitken, Hanson and Harrison (1997).

⁵⁵ Kneller and Pisu (2007).

when competition increases will be forced to leave the market. This restructuring combined with productivity enhancements among the surviving local firms through knowledge transfers and increased competition cause the average industry productivity to increase.

Via competition effects, however, foreign firms can also push up the average cost of production for the local firms and thus have a negative impact on the productivity of their local competitors. This can occur if the foreign firms take over significant market shares from local firms, in which case the local firms' fixed costs of

production will be spread across fewer units. The firm's productivity will thus be lower when its market share is reduced (dis-economies of scale). Finally, increased competition for specialised labour and other key inputs to production may drive up prices and impact negatively on the productivity of local firms within and across industries.

VERTICAL LINKAGES

Buyer-supplier relations between foreign firms and their local suppliers and buyers can also lead to productivity enhancements in Finnish firms. However, if foreign firms source all their inputs from suppliers outside of the local market, and at the same time crowd out local competitors that did purchase inputs locally, they reduce the productivity among local suppliers via dis-economies of scale.

The various channels through which spillover effects can arise are summarised in Figure A.1.

FIGURE A.1. Possible spillover channels from foreign to local firms

Spillovers can occur via	Impact on local competitors	Impact on local firms in other industries
 Labour mobility	+	+
 Imitation/demonstration	+	+
 Exporting	+	+
 Competition	+ / -	-
 Vertical linkages		+ / -

Note: The figure shows the various channels through which spillover effects can arise. A plus sign means that any spillover effects arising via the given channel is expected to be positive, while a minus sign means that any spillover effects are expected to be negative. If both signs are present, this means that the spillover effects can be both positive and negative.

Source: Copenhagen Economics based on an in-depth literature survey

IMPACTS ARISING FROM DIFFERENT TYPES OF INWARD FDI

FDI into Finland can occur via three different types of FDI, including:

1. Reinvested earnings or locally raised capital. This type of investment takes place when a foreign firm that is already located in the country expands its business. This type of FDI expands the capital stock in Finland and is likely to support job creation and stimulate further activity in the Finnish economy.

2. Greenfield or brownfield investments. This type of investment takes place when a foreign firm establishes a new affiliate in Finland. A brownfield investment takes place when the firm purchases or leases existing production facilities to launch a new production activity. A greenfield investment takes place when a new plant is constructed. Both types of investments expand the Finnish capital stock, but greenfield investments should all else equal be expected to have a larger positive impact on the Finnish economy as the construction phase will have a short-term positive impact on the economic activity in the economy.

3. Mergers & acquisitions. Mergers & acquisitions (M&As) take place when a foreign firm acquires more than 10 per cent of the voting stock in a Finnish firm. M&As may help sustain existing economic activity in Finland and preserve jobs, but this type of FDI does not expand the capital stock in Finland in the short term.

FIGURE A.2. Theoretical impacts of different types of FDI on jobs and GDP

Types of FDI	Direct impact on jobs / GDP	Indirect and induced impact on jobs/GDP	Spillovers on jobs/GDP
Reinvested earnings	+/*	+/*	(+/-)/*
Greenfield	+/**	+/**	(+/-)/*
Brownfield	+/*	+/*	(+/-)/*
M&As	0/0**	0/0**	(+/-)/*

Note: * Only permanent jobs are quantified but large construction greenfield projects may also have a positive impact on jobs and GDP in the construction phase.
 ** Over time, change in ownership may have an impact on employment in either increasing or decreasing direction.

Source: Copenhagen Economics

The theoretical impacts of FDI are summarised in Figure A.2. Reinvested earnings, greenfield investments and brownfield investment impact the direct number of jobs, the indirect and induced number of jobs and support jobs through spillover effects. The same occurs for the impact on GDP from these types of FDI. The impacts arise from increased economic activity in the supply chains and from the knowledge the foreign firm brings with it.

In the case of M&A investments, the impacts include only productivity spillovers as the direct, indirect and induced impacts to a large extent reflect takeover of exist-

ing jobs and production. Direct, indirect and induced impacts can be taken into consideration if the alternative to foreign takeover is a shut down of the Finnish firm.

Jobs created by reinvested earnings, brownfield and greenfield investments may also in some situations replace jobs in domestic firms. This is most likely to be the case in sectors where there is a shortage of labour with specific skills and competences, or in periods with very low unemployment. The risk of this type of crowding out by foreign firms can be reduced through structural reforms that increase the labour supply, education policies targeted skills that are in short supply, attracting foreign talent with the required competences, etc. The underlying assumption in this model is that there is no crowding out so that jobs created through greenfield investments are in fact additional jobs.

OVERVIEW OF QUANTIFICATION OF IMPACTS

The direct, indirect and induced impacts from greenfield investments come from increased economic activity. The direct impact arises when the foreign firm increases the production in the country, cf. Figure A.3. We quantify the direct impacts with the number of permanent jobs that the investment entails by the job figures reported by the foreign firms investing in Finland. The indirect and induced impacts are quantified with multipliers based on input-output tables from Statistics Finland.

Greenfield investments support jobs and GDP, through interlinkages in the Finnish supply chains. We quantify these linkages based on the foreign firm's sector classification. The model quantifies the increased production the investment spurs in all sectors and translates this into jobs and GDP impacts. This is quantified from the number of direct jobs supported by the investment.

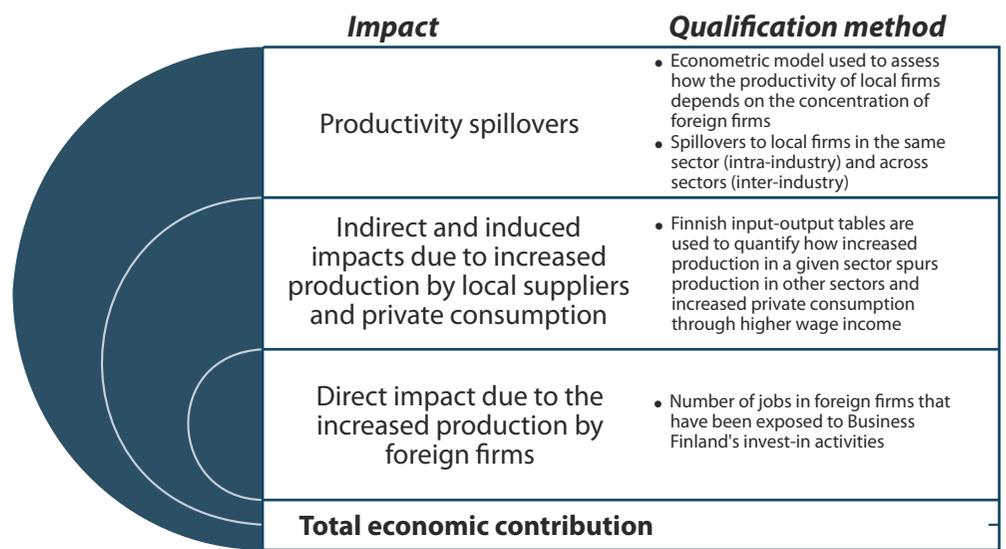
The productivity spillovers are quantified with econometric models.⁵⁶ The model estimates the effect on jobs and GDP from the concentration of employment in foreign firms within Finland. These spillovers are quantified for firms in the same sector (industry-specific spillovers) and across sectors (broader regional spillovers). The increase in direct jobs from greenfield investments and the number of jobs in the Finnish firm that have been acquired by a foreign firm through M&As can be calculated into an increased concentration of employment in foreign firms in Finland. From this, we can calculate the impact on GDP with the spillover estimates.

When applying the econometric model, we find spillover impacts on productivity and GDP from the concentration of foreign employment. The impacts vary across sector.⁵⁷ We do not find any measurable impact from concentration of foreign employment on jobs in local firms (i.e. the positive impacts net out the negative impacts). Therefore, we use the impacts as illustrated in Figure A.4.

⁵⁶ The empirical methodology is described in Copenhagen Economics (2018).

⁵⁷ The impacts are considered to have an impact when the p-value is less than 0.05 in the econometric model.

FIGURE A.3 Quantification methodology of measuring economic impacts of FDI



Source: Copenhagen Economics

FIGURE A.4 Empirical impacts of different types of FDI on jobs and GDP

Types of FDI	Direct impact on jobs / GDP	Indirect and induced impact on jobs/GDP	Spillovers on jobs/GDP
Reinvested earnings	↔/↔	-/↔	0/↔
Greenfield	↔/+*	↔/+*	0/↔
Brownfield	↔/+	/	0/↔
M&As	0/0**	0/0**	0/↔

Note: * Only permanent jobs are quantified but large construction greenfield projects may also have a positive impact on jobs and GDP in the construction phase.

** Over time, change in ownership may have an impact on employment in either increasing or decreasing direction.

Source: Copenhagen Economics

QUANTIFICATION OF DIRECT, INDIRECT AND INDUCED IMPACTS

We use the same overall method to quantify the number of jobs supported and the contribution to GDP. We have described the method below in terms of the number of jobs supported by Business Finland's investment promotion activities.

Business Finland records the number of jobs supported directly by the foreign firms, which Business Finland helps attract to Finland each year. We calculate the number of jobs supported via indirect and induced impacts based on multipliers for each sector, which contain information on the number of jobs supported among Finnish suppliers and in a broad set of sectors when wage demand increases.

The quantification is based on a national input-output table from Statistics Finland. Based on the input-output table, we have information on the turnover per employee across individual sectors in the economy. We use this information to estimate impacts.

The input-output model relies on several assumptions, including the assumption that the newly established foreign firm distributes its purchases of goods and services across other sectors in Finland in the same way as other firms within the same sector. It is further assumed that the firm uses the same amount of inputs per euro worth of turnover as the rest of the sector. However, from the academic literature on FDI, we know that foreign firms generally tend to be highly productive firms. It is therefore

likely that foreign firms have a higher turnover per employee than other firms in the same sector. This means that the impacts may be underestimated. However, it is also possible that foreign firms purchase a smaller share of their inputs in Finland than an average firm within the industry, in which case the indirect impacts on suppliers will tend to be overestimated.

The input-output table furthermore contains information on all individual sectors' purchase of goods and services from other sectors in the economy. Combined with information on the expected increase in turnover in a given sector due to a new investment, this allows us to calculate the number of jobs supported in other sectors which are called indirect jobs. Similarly, we calculate the induced multipliers based on the information contained in the input-output table on average wages in each sector and the use of these wages across all sectors.

The most recent input-output table from Statistics Finland is from 2014. This table has been extrapolated to 2017 with the overall development in nominal GDP and employment development 2014-2017.⁵⁸ The reason for the extrapolation is to take productivity changes and price developments into account to get most recent data as possible. All values are therefore measured in 2017 EUR.

The original input-output table has 173 sectors. However, some sectors have been grouped together with other sectors because these do not have any purchases in other sectors, which makes it impossible to calculate multipliers. We calculate multipliers for 154 sectors, covering the whole Finnish economy.

⁵⁸ Data from Statistics Finland.

Both the indirect and induced multipliers vary from sector to sector. Examples of employment multipliers are found in Table A1. 'Road maintenance' is the sector with the highest indirect employment multipliers. When 100 jobs are generated in this sector, an additional 2,800 jobs are supported in other sectors through the purchase of goods and services from suppliers (and the suppliers' suppliers). The number is extremely high because there are few employed relative to the size of 'Road maintenance's purchases in other sectors in Finland. The demand supported by the wages attributable to the 100 jobs in road maintenance and the jobs supported indirectly throughout the domestic supply chain help support an additional 1,220 induced jobs.

'Management consultancy activities' is an example of a sector with a medium-sized indirect multiplier. 100 jobs in this sector thus supports 70 jobs throughout the domestic supply chain. Finally, 'Manufacture of musical instruments' is an example of a sector with relatively low multipliers.

TABLE A.1. Examples of employment multipliers

Industry	Indirect employment per 100 direct employed	Induced employment per 100 direct employed
Road maintenance	2,800	1,220
Management consultancy activities	70	80
Manufacture of musical instruments	7	10

Source: Copenhagen Economics based on input-output tables from Statistics Finland

Induced impacts arise from the additional expenditure supported by the wages paid out by the foreign firms and their suppliers in Finland, while the indirect impacts arise from the foreign firms' purchases of goods and services from domestic suppliers (and their suppliers). The impacts arising from each of these channels can therefore be added without double counting.

We use the same overall methodology to quantify the GDP contribution. We calculate the direct GDP contribution per employee in every sector. This includes wage costs⁵⁹, profits⁶⁰, production taxes⁶¹ and VAT. The indirect multipliers indicate the GDP contribution per employee that can be assigned to the additional turnover, which purchases in other sectors and their suppliers generate in Finland. The induced multipliers in turn indicate the GDP contribution that can be assigned to the expenditure of the additional income.

QUANTIFICATION OF SPILLOVER EFFECTS

We quantify spillover impacts based on estimates from an econometric analysis.⁶² The estimates are based on firm-level data from 2015 for foreign and domestic firms in 11 Northern and Western European countries (Finland,

Denmark, Sweden, Norway, UK, Ireland, Holland, Belgium, Germany, Austria and Switzerland). Based on this data, we have estimated the impact of an increase in the concentration of foreign firms on labour productivity⁶³ among local firms within:

1. The same industry and NUTS3 region (industry-specific spillovers)
2. The same NUTS3 region, regardless of industry (broader regional spillovers)

In the first case, we measure the concentration of foreign firms as the share of all employees working in a foreign firm, within a given industry and region. In the second case, we measure the concentration as the share of all employees working in a foreign firm, within a given region. In both cases, we control for several other firm-specific and regional factors, which can also impact on productivity among local firms. The methodology and the control variables used have been selected based on a review of the existing empirical literature on spillover effects.

Figure A.5 illustrates the concept of both industry-specific and regional spillovers and depicts a given NUTS3 region, where there is a total of three different industries with a foreign investment in industry A only. The investment leads to productivity spillovers to domestic firms within the same industry (industry-specific spillovers), as well as to domestic firms in industry B and industry C (broader regional spillovers).

⁵⁹ Including pension and social benefits paid by the employer.

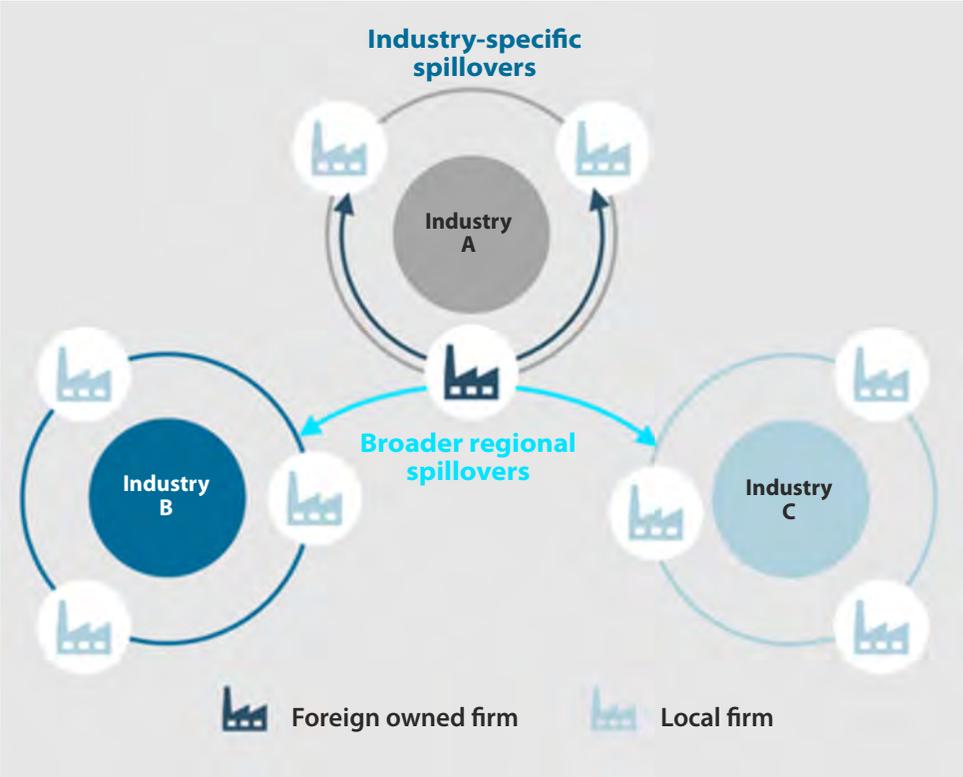
⁶⁰ Profits include operating surplus and depreciation of capital.

⁶¹ Production taxes account positively, and subsidies account negatively.

⁶² Copenhagen Economics (2018).

⁶³ Labour productivity is approximated by turnover per employee.

FIGURE A.5. Industry-specific spillovers and broader regional spillovers in a given NUTS3 region



Note: The figure illustrates industry-specific and broader regional spillovers within a given NUTS3 region.
 Source: Copenhagen Economics

The results from the analysis shows that, on average across all industries and regions, labour productivity among:

- Local firms in the same industry and region increases by 0.3 per cent, when the share of em-

ployees working in a foreign firm within the same industry and region increases by one percentage point (industry-specific spillovers)

- Local firms in the same region increases by 1.1 per cent, when the share of employees working in a foreign firm within the same region increases by one percentage point (broader regional spillovers)

While there is significant variation in the magnitude of the estimates across sectors, the impacts of the broader regional spillovers exceed the impact of the industry-specific spillovers in all cases. This suggests that spillovers especially arise across sectors and underlines the importance of strengthening the integration of foreign firms into local value chains. Based on the industry-specific and broader regional spillovers, we quantify the GDP contribution and the gross tax revenue that arise from spillover effects from greenfield and M&A investments that Business Finland help attract to Finland.

Spillovers are quantified based on regions because proximity reinforced different spillover channels.⁶⁴ Knowledge spillovers are expected to decrease with distance and therefore the spillover are strongest close to the knowledge centre. Distance also creates increased costs. The foreign firm is thus more likely to prefer nearby suppliers, improving the vertical linkages in proximity of the foreign firm.

⁶⁴ For a full explanation, see Copenhagen Economics (2018).

QUANTIFYING THE GDP CONTRIBUTION FROM SPILLOVER EFFECTS IN FINLAND

In order to quantify the GDP contribution arising from *industry-specific* spillover effects, we employ the industry-specific spillover estimates, which are estimated across all regions for each industry. We calculate the GDP contribution from the industry-specific spillovers in three steps:

1. Using information on the direct number of jobs among newly established foreign firms within a given industry, we calculate the percentage point change in the share of employees among foreign firms in the industry in Finland as a whole.
2. We calculate the per cent change in labour productivity in a given industry by multiplying the percentage points change in the share of employees among foreign firms in the industry in Finland as a whole (from step 1) with the industry-specific spillover estimate from the econometric analysis.
3. We obtain the change in the industry's GDP contribution by multiplying the per cent change in productivity (from step 2) by the industry's current GDP contribution.

To quantify the GDP contribution arising from broader spillover effects, we employ the broader regional spillover estimates, which are estimated across all regions for each industry. We calculate the GDP contribution from the broader regional spillovers using a similar methodology:

1. Using information on the direct number of jobs among newly established foreign firms within a given region (defined at the NUTS 2 level), we calculate the percentage point change in the share of employees among foreign firms in each region as a whole (i.e. across all industries). In order to avoid double counting the impacts of newly established foreign firms in the same industry, we subtract the number of direct jobs generated among newly established foreign firms in the same industry and region based on information on the location of the newly established foreign firms (postcodes). The change in the share of employees among foreign firms in each region therefore still varies across industries.
2. We calculate the per cent change in labour productivity in a given industry, which is due to broader regional spillovers, by multiplying the percentage points change in the share of employees among foreign firms (from step 1) with the broader regional spillover estimate from the econometric analysis.
3. We obtain the change in the industry's GDP contribution by multiplying the per cent change in productivity (from step 2) by the industry's current GDP contribution within the given region.

We quantify the impact on gross tax payments, based on the quantified GDP contributions that arises from both industry-specific and broader regional spillovers, and the relation between the GDP contribution and gross tax payments within a given industry.

APPENDIX B. OVERVIEW OF FDI DRIVERS

Multinational companies invest abroad to maximise the long-term profit and value of the company. Economic theory suggests that if foreign investors expect that they can earn more profit by establishing a foreign affiliate (e.g. instead of exporting) or expanding their business by acquiring an existing foreign company, they will do so. They will make their investment in the location that promises the highest long-term profit. The FDI attractiveness of a location should therefore be seen relative to the attractiveness of other locations as well as the attractiveness of other modes of entry.

The decision to invest abroad and the mode of entry is an important one for most companies and a long range of factors go into the decision process. Some decision parameters are company specific and specific to the concrete investment project. Others are determined by macroeconomic development (e.g. the financial and economic crisis) that have an influence on the global business climate. The location decision thus depends on the underlying motive.

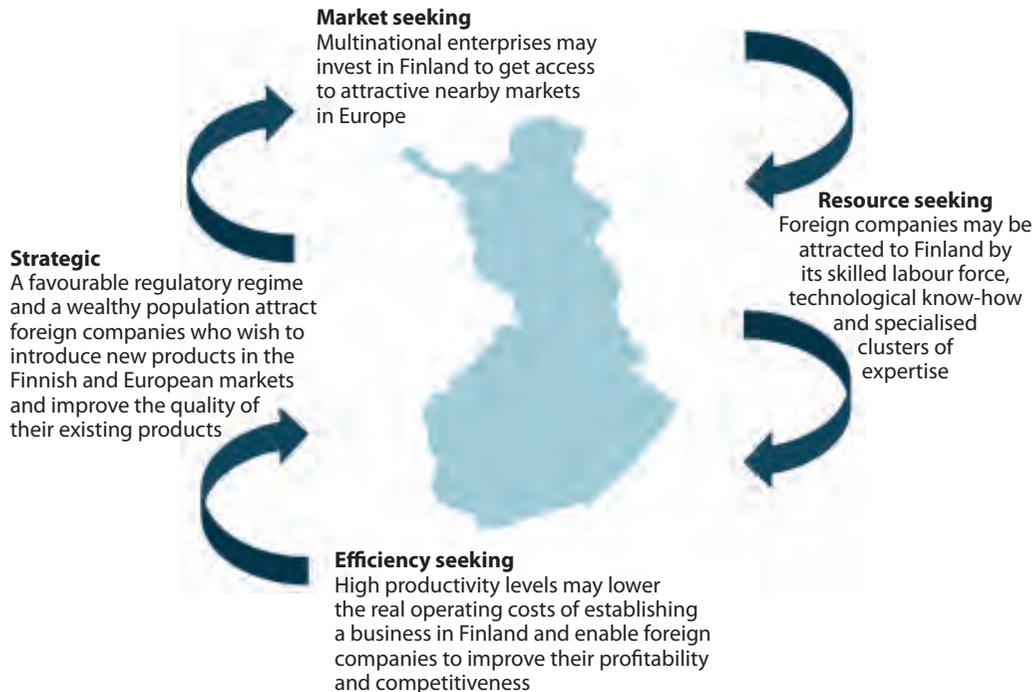
MOTIVES FOR UNDERTAKING FDI

The location of foreign investors will invariably be guided by the firm's motive for engaging in FDI in the first place. To form an expectation of how various factors will impact the FDI location of foreign firms, we therefore first consider why firms invest abroad. In the literature, it is common to distinguish between:

- Market seeking FDI
- Efficiency seeking FDI
- Resource seeking FDI
- FDI motivated by strategic reasons

These four types of FDI are all motivated by different underlying factors and respond differently to different types of drivers, cf. Figure B.1.

FIGURE B.1. Motives for investing in Finland



Source: Copenhagen Economics based on Copenhagen Economics (2016)

Market seeking FDI

Firms that engage in market seeking FDI do so to sell their products in the local or nearby market instead of exporting from their home country. Firms will therefore choose the location that offers the best access to the largest market at the lowest cost of transportation.

The factors which should be particularly relevant for this type of FDI are: Market size or other measures of

demand, population density, geography (e.g. border situation and landlocked), the dominance of incumbent firms, and accessibility. The market size is expected to influence the location choice positively as larger markets are more attractive to investors wishing to sell their products locally. Similarly, population density can also be an indicator of market attractiveness, especially for services such as, e.g., wholesale and retail activities. However, a high population density may also be correlated with high land and rent costs and may thus also be negative.

Geographical features, such as national borders, tend to be more attractive to foreign investors as they provide easy access to other countries' markets. However, a country border may also limit the size of the local market. If consumer tastes are inherently different across the border or if barriers (e.g. language or regulatory differences), it will make costlier for firms to sell their goods or services across the border, and investors will tend to locate more centrally within the local market. Border locations may therefore be both more and less likely than other locations to attract foreign firms.

Highly dominant incumbent firms will, all else equal, make it more difficult to enter the market and are therefore expected to make it less likely that foreign firms will choose the location.

Accessibility is found to influence the location choice positively as the costs of transporting intermediate and final goods will be lower. Likewise, good accessibility facilitates easier travel to and from the company's headquarters.

Efficiency seeking FDI

Firms that engage in efficiency seeking FDI do so to improve the profitability of their production by increasing their productivity. Among the factors that will matter especially to this type of FDI are factors such as access to human capital, cost-competitive wages and labour abundance. The factors that should be of particularly relevant for this type of FDI are thus: Educational level, labour abundance, industry clusters and agglomeration economies, and wage costs.

The education level is a proxy for access to human capital and is expected to influence the location choice positively.

A high unemployment rate may be positively associated with the location decision of foreign investors as it can signal the availability of a large pool of labour. A high unemployment rate may also raise efforts among a company's employees, as it can make it more difficult to find a new job if one gets fired. A high unemployment rate may, however, also deter FDI as it can be a sign of rigidities and mismatch in the labour market.

Industry clusters and agglomeration economies have been found to be key factors of attraction. The tendency to locate near similar firms is not specific to foreign firms but is a general tendency among firms, as evidenced by the existence of many localised industry clusters and broader agglomerations of economic activity. Several positive externalities arise when similar firms locate together, and these externalities make individual firms more productive. In areas with clusters of similar

firms, pools of specialised labour will often be available, and new ideas and innovation may spread across firms, either via direct exchange of knowledge or via labour movements. Specialised inputs may also be more easily available, and the market for the firms' final goods may be larger.

Resource seeking FDI

Firms that engage in resource seeking FDI do so to access specific resources that are available in a given location. This can be natural resources such as oil and minerals, but can also be human capital resources, R&D and innovation. A high educational level or deep local industry clusters can therefore also be especially attractive to this type of FDI. The factors that should be particularly relevant for this type of FDI are thus: Educational level, level of innovation and industry clusters.

Locations in which there is a high level of innovative activity are, all else equal, expected to be more attractive to foreign firms than locations with lower levels of innovation, as the scope for acquiring new knowledge and hiring R&D workers is greater.

FDI motivated by strategic reasons

Firms that engage in FDI for strategic reasons do so because they believe it will benefit them in the long run by sustaining or advancing their global competitiveness. This type of FDI can be driven by very firm-specific motivations. This can for example be the acquisition of a foreign firm to strengthen the acquiring firm's global

portfolio of physical assets and human competencies, or to weaken those of their competitors (Dunning et al., 2008).

The factors that should be particularly relevant for this type of FDI are therefore more difficult to point to but could include factors such as: Level of innovation, educational level and the dominance of incumbent firms.

Higher innovation and educational levels increase the likelihood of a location being home to innovative firms that are interesting acquisition targets for foreign firms. Local markets with a weak dominance of incumbent firms offer greater opportunities for foreign firms to build up a strong market position in the longer run. A dominant incumbent firm may, however, also be attractive to acquire so this factor can be either positive or negative.

Cross-cutting issues

Regardless of the underlying motive, foreign firms will have less knowledge of locations abroad and will tend to locate in locations where other foreign firms are already located. One reason for this is what is commonly referred to as 'signalling', where existing FDI projects in a location send a signal of profitability to potential investors.

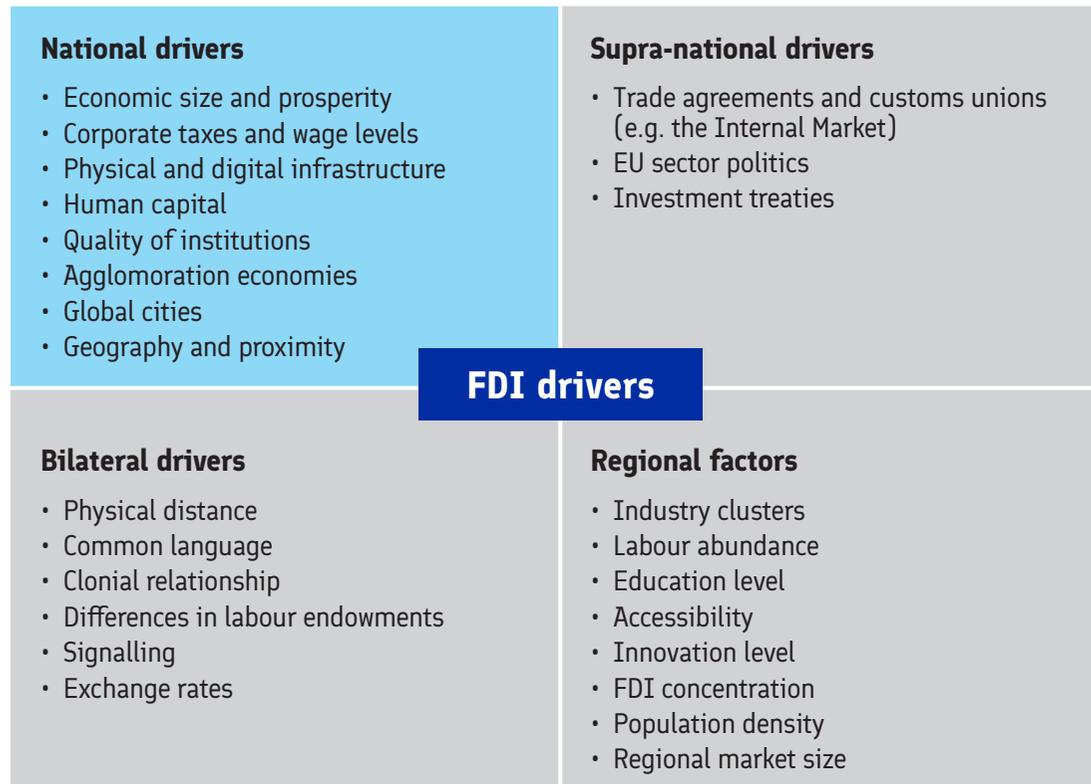
Finally, the availability of financial investment incentives, such as, e.g., direct grants or cost sharing schemes, can also be of importance to the attractive-

ness of a location. However, such incentives in most cases cannot compensate for the lack of market attractiveness, resources or specific strategic assets but may have an impact if an investor is deciding between two or more equally attractive locations. In that situation, it is likely that such incentives can help push investors towards a specific location.

OVERVIEW OF FDI DRIVERS

Although the location decision of foreign firms is a complicated one, studies across many sectors and countries over time have provided a knowledge base about common factors that have a positive and significant impact on the attraction of FDI and which can help explain the location pattern of foreign firms. These factors may be determined at the national, supra-national (in this context meaning mainly the EU level), bilateral or regional level, cf. Figure B.2.

The distinction between the different levels is not always this clear, and some FDI drivers are influenced at several levels. The overall education policies in a country are generally decided at the national level, whereas the availability of a skilled labour force in a specific location can be influenced by regional policies.

FIGURE B.2. Overview of FDI drivers

Source: Copenhagen Economics based on literature survey

SUPRA-NATIONAL DRIVERS

A country's membership of regional trade agreements or a customs union can be an attraction factor for investors as they gain access to larger markets with low trade friction. Within Europe, the Internal Market and the Customs Union are thus significant attraction factors as they allow non-European investors to locate their business in one Member State from which to serve the rest of the EU. Likewise, a high level of investment protection (e.g. guaranteed by investment treaties) will also make a country more attractive. In some countries, these agreements are negotiated at the national level, but for most countries in Europe such agreements are negotiated at the EU level.⁶⁵

EU sector policies also have an impact on the attractiveness of European countries relative to other countries. This could be EU transport policies that improve accessibility and the interconnectedness of individual countries or EU strategies to improve education levels among European citizens and funds directed to building common research and innovation capacity in Europe.⁶⁶ Other examples include EU agricultural and energy policies. Likewise, EU cohesion policies provide financial

⁶⁵ The Lisbon treaty has also brought investment policy under the sphere of policy developed at EU level. Findings regarding the impact of so-called bilateral investment treaties on FDI are however inconclusive, with several studies finding no significant effect of such treaties on FDI.

⁶⁶ An example is Europe 2020 – A strategy for smart, sustainable and inclusive growth, which set goals for both R&D investments, early school leavers and the level of tertiary education for the younger generation.

resources for convergence and competitiveness in Europe and thus have an impact on the attractiveness of different locations in Europe.

BILATERAL DRIVERS

A common finding in the literature is that bilateral factors, i.e. factors that characterise the relationship between the host (where the investment takes place) and the home country (the origin of the investor) are important FDI determinants.⁶⁷

All else equal, physical distance is typically found to lower FDI, which implies that foreign investors tend to favour locations that are closer to their home country. In contrast, a common language and historical ties are typically found to increase FDI. The absence of a language barrier reduces transaction costs and makes it easier to set up and run a business abroad, and historical ties (e.g. through colonial relationships) may also be associated with large diaspora populations and increase the awareness of the host country among potential investors in the home country.

Differences in skilled labour endowments between the home and host country have also been found to be of importance and are commonly discussed in relation to so-called vertical FDI, where a company sets up an affiliate in a country with a higher share of unskilled labour to access low-cost labour. Finally, evidence also shows

that the presence of investors from a given origin in a given host location tends to attract even more investors from the same home country, as it signals profitability and puts the region or city on the map. Within Europe, evidence for this is found by e.g. Crozet et al. (2004) who analyse the location pattern of FDI in France and find that investors from some countries, including Japan and the US, are more likely to locate in regions where other investors from their own home country are already located.

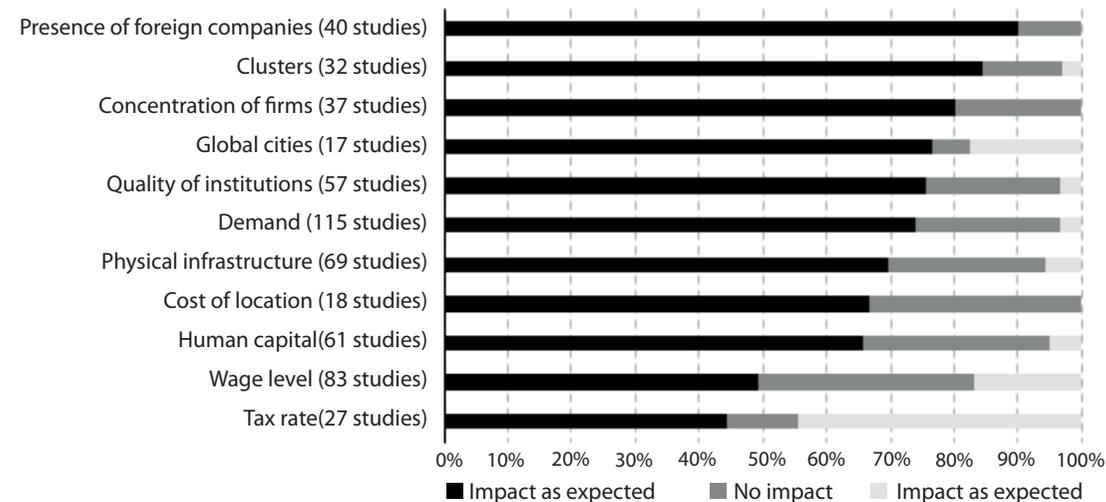
There is also evidence suggesting that exchange rate movements can influence FDI patterns by increasing the likelihood of M&As, as a depreciation of the host country's currency can reduce the cost of acquiring assets in that country for foreign investors (Blönigen, 2005).

NATIONAL DRIVERS

There are several preconditions that are necessary for a location to attract and maintain FDI. A recent literature survey identifies the determinants of the locational choice of foreign investors across countries that are most often used in the extensive literature on FDI drivers, cf. Figure B.3. These factors include both fundamental drivers (e.g. demand, quality of institutions, concentration of firms and global cities) that are difficult for policy makers to influence in the short to medium term as well as policy drivers (e.g. tax rates, wage levels, physical infrastructure, human capital, clusters

⁶⁷ Based on bilateral data on FDI stocks across OECD countries, Blönigen and Piger (2014) test the robustness of many FDI determinants frequently included in empirical studies of FDI location determinants. They find that physical distance, common language, colonial relationships and the (squared) skill difference between the home and host country are among the most robust FDI determinants.

FIGURE B.3. Summary of main national drivers of FDI location



Note: The literature survey covers 154 empirical studies of FDI location. "Impact as expected" means that the impact quantified in the empirical study has the expected sign, "No impact" means that the impact is not significant, and "Impact not as expected" means that the impact had the opposite sign than expected.

Source: Copenhagen Economics based on Nielsen, Asmussen & Weatherall (2017)

and cost of location) that can be used more actively in investment promotion activities.

An attractive national market is an important location factor for many investors – in particular, investors seeking to sell their products locally. The size and growth of the national market and the purchasing power of the consumers are therefore among the factors that are most frequently found to influence the location decision of foreign investors.

The cost of location includes factors such as rents and land costs. This type of cost will be particularly impor-

tant for greenfield investments where a company sets up a new production facility. Although the business case for acquiring a company will also depend on cost commitments of the existing company.

Furthermore, the presence of so-called global cities (characterised by global interconnectedness, cosmopolitanism and abundance of advanced producer services) also attracts FDI to a given host country as they help foreign investors overcome the costs of establishing a business abroad (Goerzen et al., 2013). Investors therefore sometimes chose between cities – not countries.

These constitute **fundamental factors** that can rarely be changed in the short to medium term. **Policy factors**, such as corporate tax rates and wage costs are also frequently pointed to as being of importance for the location of FDI. Lawless et al. (2015), for example, find evidence of lower tax rates being a factor of importance for the location of FDI in Europe, albeit with large variations across sectors, with investments in the financial sector being especially sensitive to taxes.

A country's physical infrastructure integrates the country with the rest of the world and makes the country more attractive for multinationals that seek to optimise their supply chain across different locations or locate in one country with the purpose of serving markets in nearby countries. Transport and logistics infrastructure is also found to be the third most important location factor for international investors in an investor survey undertaken by E&Y (E&Y, 2015).

Furthermore, access to human capital has been found to be of importance for investors choosing which host

country to place their investment in. A highly qualified labour force with innovative competences attracts companies that compete in global markets and which continuously need to improve their competitiveness. From a policy perspective, a focus on public R&D, including close collaboration between industry and universities, can thus help attract investments. In Copenhagen Economics (2016), such ties were for example found to be particularly important for investments in the chemical and pharmaceutical sectors in Europe.

Agglomeration economies are also among the factors, which have most frequently been found to attract FDI. Agglomeration economies include industry clusters and concentration of firms as well as the presence of foreign firms. Clusters of firms in the same or related industries are often associated with increased productivity, due to a concentration of specialised labour, inputs and perhaps even specialised infrastructure, such as for pipeline networks. The presence of foreign firms furthermore sends a signal to potential investors about the given host country being a profitable investment location.

Finally, the quality of a country's public institutions matters. FDI typically involves large fixed investments (e.g. in buildings, production plants and equipment), and investors are therefore sensitive to any factors that can cause a risk to their investment, such as political instability or an ineffective legal system (Berden et al., 2014). A stable political, regulatory and legal environment reduces the risk of undertaking FDI and has been found by EGY (2015) to be the most important factor for investors when choosing a location.

REGIONAL DRIVERS

The pattern that emerges in the literature related to regional fundamental FDI drivers is, as expected, very similar to that seen under national drivers. A common fundamental driver includes the significance of regional demand, with local GDP used extensively as a proxy for market size, potential and development. Relative population density also plays a major part in firm's decisions to locate on a regional level relative to a national level.

In a similar vein, territorial characteristics and agglomerated economies are found to play a major role in firms' FDI decision-making process. *Border regions* on average appear to be disadvantaged because barriers to doing business across borders limit the size of the local market. Looking across different types of regions, the negative impact is driven mainly by urban regions, whereas capital metropolitan regions can in fact benefit from being a border region.⁶⁸

The role of policy FDI drivers are found to be significant in that regions with a more *concentrated industry structure* are less likely to host non-European owned firms. Highly dominant incumbent firms are found to deter FDI in both advanced and less advanced regions.

Of the regional FDI drivers, the strength of industry clusters, presence of other foreign firms and low dominance of incumbent firms are particularly important.

⁶⁸ See Copenhagen Economics (2018).

APPENDIX C. INVESTOR PERSPECTIVES ON THE ROLE OF BUSINESS FINLAND

As part of the study, FDI Center has conducted interviews with 10 foreign investors in Finland to determine the additionality of Business Finland's support in the investment decisions of these companies. The interviews also addressed the reasons for the companies to select Finland as an investment location as well as their experiences of operating in Finland.

APPROACH

FDI Center conducted 10 telephone interviews with existing foreign investors in Finland during November 2018. The aim of the interviews was to determine the role of Business Finland in attracting these companies to the country and the degree to which the support provided by the agency affected the decision-making process of the selected companies, particularly with respect to the scope, size and timing of their investments.

The project started at the end of October, when 12 companies were selected out of a list of 35 projects supported by Business Finland in recent years. The selected companies consisted of large multinationals, medium-sized privately held enterprises and start-ups from different sectors including advanced materials, automotive, electronics and energy.

Business Finland provided the contact details for the 12 selected companies, of which 10 agreed to be interviewed by FDI Center. A list of these companies and their investment projects is provided on the following page.

The questionnaire used to guide the telephone interviews is provided below. The interviews focused on three main topics: decision, additionality and impact, and reflect the key criteria for analysing the role and impact of Business Finland in attracting foreign direct investment to the country. The interviews were conducted as open discussions and not all questions were covered in every interview.

TABLE C.1. List of foreign investors that were interviewed as part of this study

Company	Country	Industry	Year of initial investment	Location of initial investment	Investment mode	Business activity
Allianz Capital Partners (ACP)	Germany	Financial services – Cleantech	2015	Jouttikallio	Acquisition	Wind energy
Altair Semiconductor	Israel / Japan	ICT & Digitalisation	2016	Oulu	Greenfield	R&D center
Behr-Hella Thermocontrol (BHTC)	Germany	Automotive – ICT & Digitalisation	2016	Tampere	Greenfield	R&D center
Denso Automotive	Germany / Japan	Automotive – ICT & Digitalisation	2017	Helsinki	Greenfield	R&D center
Geyser Batteries	Russia	High-Tech Battery production – Cleantech	2018	Vaasa	Greenfield	Pilot manufacturing line
Imagine Intelligent Materials	Australia	Advanced materials – ICT & Digitalisation	2018	Espoo	Greenfield	R&D center & European HQ
Landis+Gyr	Switzerland	Energy – ICT & Digitalisation	2006	Jyväskylä	Acquisition	R&D center
Paladin	China	ICT & Digitalisation	2017	Espoo	Greenfield	R&D center
PowerVision Technology	China	Robotics – ICT & Digitalisation	2016	Tampere	Greenfield	European HQ & R&D center
Rolls-Royce Group	United Kingdom	Maritime – ICT & Digitalisation	1999	Rauma	Acquisition / Greenfield	R&D center for autonomous ships

Source: FDI Center

KEY FINDINGS

All the companies that we interviewed were aware of the advantages that Finland has to offer before making their investment. Four out of ten companies were considering other countries (mainly the Netherlands, Norway, Germany and Sweden) in their decision-making process, while the remainder stated that Finland was the only location considered for the investment. The main reasons behind the selection of Finland as a destination for the new projects were:

- **Access to qualified labour**, which was highlighted by almost all the interviewed companies (excluding Allianz Capital Partners who has no employees in Finland) as the main reason to establish a presence in Finland. Many of the companies we interviewed identified Finland as an ideal location for setting up research and development activities. Several companies referred to the “Nokia effect” or “Nokia legacy” as a chance to access qualified employees with the expertise and experience to lead new research and development projects. Furthermore, several companies mentioned that salaries in Finland are competitive, particularly compared to other Nordic countries, while employees tend to be loyal and stay in companies longer than in other countries with higher staff turnover rates. This is key because high turnover translates into constant training and reorganisation leading to inefficiency and higher expenses. Denso Automotive also mentioned that Finland represented an opportunity for bringing an alternative

perspective to the company with people that could bring fresh and unique ideas.

- **Strong public-private-academia cooperation** was emphasized by all the companies interviewed for the analysis as an important factor for investing in the country. The possibility of easily creating a reliable network of partners that could help to develop a successful investment project in Finland was perceived essential.
- **Acquisition of an existing company** was the chosen entry mode of Landis+Gyr, Allianz Capital Partners and Rolls-Royce Group, who entered Finland by acquiring an existing business. These companies have since expanded their presence in the country by opening or acquiring additional operations in Finland.
- **Political and economic stability** in Finland was also mentioned as a key factor for establishing new operations.

Market access is usually one of the main drivers of new investment projects worldwide. However, the companies we spoke to mentioned that this was not a factor in their decision-making process for Finland. This reflects the relatively small size of the Finnish domestic market but may also be a function of the interview sample, which was focused on technology-oriented investments (such as R&D centres), for which market size is not a key consideration.

Regarding the selection of location within Finland, the companies we interviewed are spread across Fin-

land. In some cases, the site selection decision was the result of an acquisition, while in other cases the location was selected based on the ecosystem in the area. Geysler Batteries, for example, selected Vaasa due to access to a network of talented people, industry partners and investors for the energy sector. The most important factor for site selection within Finland was said to be local talent availability, such as in the case of Rolls-Royce in Turku, Imagine Intelligent Materials in Espoo, PowerVision in Tampere, Denso Automotive in Helsinki, Behr-Hella Thermocontrol (BHTC) in Tampere, Imagine Intelligent Materials in Espoo and Altair Semiconductor in Oulu.

All the companies interviewed recognized Business Finland as a one-stop agency for enterprises interested in investing in Finland. The companies mentioned that the services provided by Business Finland were clearly communicated from an early stage in their decision-making process and suggested that either the size (e.g. Landis+Gyr, Allianz Capital Partners, Altair Semiconductors and BHTC), scope (e.g. Denso Automotive, PowerVision and Rolls-Royce) or timing of the project (e.g. Geysler Batteries, Paladin and Imagine Intelligent Materials) was positively impacted by Business Finland's support. In addition, Business Finland was acknowledged as having a highly qualified team that met the companies' expectations. In some cases (such as Landis+Gyr and Paladin), the services provided exceeded the companies' expectations. None of the companies interviewed was proactively contacted by Business Finland in the first place; rather the companies established

an initial contact with the agency themselves. In some cases, like Paladin and Geysler Batteries, the contact was established via foreign consulates or offices. In other cases, the contact was made through a personal connection and introduction to Business Finland.

It is important to note that due to the mergers of different agencies in recent years that have resulted to the creation of Business Finland, different companies may be referring to different parts of Business Finland, depending on which organisation/s they engaged with at the time of making their investment. A couple of companies also mentioned the positive support received from local agencies in Tampere and Oulu.

The support provided by Business Finland was described as focusing mainly on the following aspects:

- **Data collection and opportunity analysis** was mentioned by almost all the companies as an important service received from Business Finland. In the case of Landis+Gyr, the company was seeking to consolidate 35 research and development centres around the world into four locations worldwide. During this process, the company received support from Business Finland to understand the key advantages of establishing a research centre in the country (e.g. salary costs, talent pool availability, identification of possible partners for research cooperation projects). This provided the company's headquarters in Switzerland a broader perspective about Finland as a location for the project, without which the company's representative believes the size of the project

could have been considerably smaller. A similar experience was highlighted by BHTC, who stated that the information the company received regarding the talent pool in Finland and the process for setting up a new operation enabled the executive board in Germany to analyse the possibility of investing in Finland. A couple of companies suggested that it would be very useful to have a detailed “newbie entrepreneurs guide” and a “check list” of important aspects to consider when investing in Finland, in the form of a practical step-by-step guide with recommendations for each step in the process. Although such a guide exists, the companies may not have been aware of this.

- **Networking opportunities and introductions** was the most prevalent type of support highlighted by the companies we spoke to. Rolls-Royce mentioned that during the decision-making process for the establishment of a centre for remote control and autonomous ships, Business Finland arranged key meetings with governmental authorities like the Ministry of Transport and Communications and the Ministry of Employment and the Economy. These meetings together with a Letter of Intent (LoI) were essential to demonstrate the government’s commitment to developing this sector in Finland. Another example was provided by Denso Automotive, a Japanese company that has invested in three different projects in Finland, including an investment in the Finnish company MaaS Global, which was introduced to them by Business Finland.
- **Funding service** stands out as an important aspect, especially for SMEs. Some of the SMEs interviewed received funding for research and development projects, to participate in international trade fairs or to hire qualified personnel, but for large companies, it is sometimes not worth applying for these due to the effort involved relative to the size of the funding. Furthermore, the Slush event was highlighted by a couple of companies as an ideal venue to gain access to investors and acquire capital for the development of their projects. One suggestion was that a list of venture capital companies and angel investors by sector would be useful for companies looking for new capital.
- **Site selection** was also stated as an important service delivered by Business Finland. For instance, BHTC pointed out that the agency helped them to identify what type of premises were available.
- **Visa support** was also highlighted as important, particularly for companies investing from outside the European Union like PowerVision or for foreign start-ups like Geyser Batteries, who had access to the start-up permit (a newly introduced residence permit designed for people establishing a start-up in Finland). This residence permit together with Business Finland’s ongoing support were essential to develop Geyser Batteries’ project more quickly (and Geyser’s decision to select Finland over the Netherlands). However, some companies mentioned that after securing the residence permit, it takes some time to register with the local authorities and to have access to banking.

The companies interviewed considered that their original objectives for investing in Finland have been met. In terms of recruiting qualified employees for their operations, it has been easier to find the required people thanks to the “Nokia effect”. However, companies suggested that it might be more difficult now to find the necessary people (e.g. software developers), especially for start-ups and small companies that are not well known in the market.

Most of the companies interviewed agreed it is easy to find local suppliers because they do not require large amounts of inputs for their research and development activities. However, a company establishing a larger manufacturing operation in Finland may experience difficulties in sourcing suppliers since Finnish companies may not have the necessary scale.

In the context of collaboration with Finish universities and research institutions, several companies we spoke with mentioned that they were collaborating with local universities for research projects (e.g. Powervision and Rolls-Royce) as well as for recruitment activities like Denso Automotive in Helsinki, who has partnered with local universities to hire interns and recent graduates and to sponsor PhD students. Other companies mentioned the role of VTT Technical Research Centre of Finland as a vital partner for developing innovative research projects (e.g. Landis+Gyr, Imagine Intelligent Materials and Rolls-Royce).

Regarding the challenges experienced by companies while setting up and operating a business in Finland,

all the company representatives stated that there are no particular challenges. The processes are very straightforward. Rolls-Royce mentioned that they faced an “internal challenge” to justify the decision to invest in Finland rather than Norway or Singapore. Landis+Gyr revealed that there were some “cultural challenges” related to the way Finns work compared to how Swiss or Americans work, which meant the company had to invest in training programs for understanding the different cultural approaches. Landis+Gyr also mentioned that in terms of infrastructure there have been some issues with the flight connections from Jyväskylä to Helsinki due to the small number of passengers on that route.

Finally, we asked companies how their business activities have evolved in the country and if they would continue expanding their operations in Finland. All of the companies have recently expanded or have plans to continue growing in the country. Landis+Gyr revealed that their operations in Finland have substantially evolved over the last decade. They closed the manufacturing operations in 2011 and have since then focused on sales for the Nordic countries and research and development activities. In 2014, the company had only about 80 people working in these business activities and now have about 160 employees. As a result, the company is constructing a new facility, which will have a total capacity for 300 employees. The company has also opened a small office in Helsinki to meet with clients without having to fly to Jyväskylä and for those employees with special backgrounds that are not willing to move.

ADDITIONALITY PERSPECTIVES BY COMPANY

- **Allianz Capital Partners (ACP)** was mainly supported by Business Finland through information about the market opportunities for renewable energies in the country. The company's representative stated that thanks to Business Finland's proactive support and reliable advice, ACP was able to invest in more than one project and in a faster period than if they would have conducted a market analysis and approached potential business opportunities independently.
- **Altair Semiconductor** received information about skills and talent availability, salary levels, employment regulations, as well as support with a two-day visit to Finland for the management board. These services enabled the management in Israel to choose Finland for their next R&D project and increased the number of employees hired to 28 engineers (from an original plan of about 20 employees).
- **Behr-Hella Thermocontrol (BHTC)** stated that the support received from Business Finland from the early stages of their decision-making process allowed the board to make a faster decision to establish a R&D centre in Finland. Support included submission of relevant information, visit to the headquarters in Germany and organisation of a visit to Finland for BHTC's executives to get a first-hand impression of the opportunities available in the country,
- **Denso Automotive** perceives Finland as an easy place to do business and a leading country for innovation and change, in part, thanks to Business Finland's support in organizing meetings for them with relevant partners and institutions and providing information about the country's advantages. The company believes that the scope of their investments was positively impacted by the introduction of Business Finland to a Finnish company called MaaS Global, one of the three projects in which they have recently invested.
- **Geyser Batteries** was analysing Finland and the Netherlands for the establishment of their pilot manufacturing line and R&D activities. The project was located in Finland thanks to the continuing support delivered by Business Finland, which was perceived to be more valuable than the fiscal benefits available in the Netherlands.
- **Imagine Intelligent Materials** was interested in strengthening its presence in Europe, where its main (and possible future) customers are established. To this end, the company established contact with Business Finland, who provided information on topics relevant to the company, including Finland's research in the fields of advanced materials and talent pool. This enabled the project to commence earlier than planned.
- **Landis+Gyr** received support from Business Finland to develop a strong business case to establish one of the four global R&D centres contemplated by the company in Finland. The support obtained from Busi-

ness Finland helped the management to impartially take the decision for Finland instead of other European countries. According to the company's representative, the support has exceeded the company's expectations and the project could have been significantly smaller without Business Finland's assistance.

- **Paladin** has received support from Business Finland since 2017 for the establishment of three projects (Pexraytech, Kindhelm and DymimLabs) in Finland. The company stated that the agency's support was key to the faster implementation of Paladin's investments in the country.
- **PowerVision Technology** was looking for a suitable location to establish their European sales operations and regional headquarters. During this process, the company established contact with Business Finland, who provided an overview about the advantages that the country offers, including the local ICT expertise, office space, legal services as well as research projects in the area of drones and robotics. As a result, the company decided to establish their sales and regional HQ operations in Finland, followed by a research and development centre that would allow them to have access to R&D resources to improve their product.
- **Rolls-Royce Group** stated that the scope of the company's business in Finland was able to evolve over the years thanks, in part, to Business Finland's support to justify to the management and the main shareholders why Finland was an ideal location for the establishment of a R&D centre instead of Norway, UK or Singapore.

CONCLUSION

The following are the main conclusions, based on the ten interviews conducted:

- Talent availability and networks were the key drivers for companies to select Finland. This may reflect the selection of projects included in the interviews, which predominantly included research and technology-oriented activities.
- The companies all identified and selected Finland independently and were not approached by Business Finland (or a predecessor agency). However, the support provided by Business Finland played a role in helping some of the companies to select Finland over other locations and to justify the choice of Finland to their management.
- Business Finland's support also contributed to the implementation of companies' investment projects, in some cases allowing companies to set up their investments more quickly and even at a larger scale (i.e. with more employees) than originally planned. All the companies interviewed were satisfied with the support received from Business Finland as well as other government agencies in the country.
- The companies interviewed reported favourable experiences of operating in Finland and have since expanded in the country and/or are planning further expansion. Many of them are working with local universities and therefore strengthening their ties to the Finish knowledge system. Supplier requirements

for R&D oriented companies tend to be low, which means the impact in terms of local suppliers is not significant.

- It is important to note that the conclusions are based on a small sample size and may also reflect an inherent bias in the selection of companies for the interviews. This includes a focus on technology-oriented investment projects as well as companies that were suggested by Business Finland who may therefore have a more favourable perception of the agency's support.

THE QUESTIONNAIRE USED IN THE INTERVIEWS

Decision

- When did your company first establish a presence in Finland?
- What were the original reasons for your company to invest in Finland?
- What was the mode of investment for your original entry to Finland (e.g. greenfield, acquisition, JV)?
- Where did you establish your first operation?
- Have you invested in other Finish locations since then?
- How familiar were you with Finland's advantages before your investment?

- Were you considering other countries as alternatives to Finland?
- If yes, what were the decisive factors in Finland's favor?
- Was the selection of your location influenced by third party stakeholders (e.g. JV partner, customer, government)?
- What were the main challenges in setting up your operation in Finland?
- What should foreign companies investing in Finland for the first time be aware of?

Additionality

- Which institutions have been most helpful?
- What type of support has your company received?
- At what stage of your investment process did the support begin?
- Was the availability and nature of the support clearly communicated to you in advance?
- Would the investment project have taken place without the support? If not, what would have happened?
- How else did the government's support impact your investment (e.g. size, scope and timing of the project)?
- Did the support that you received meet your expectations?
- What other support could have been helpful during your investment?

Impact

- To what degree have your original objectives for investing in Finland been met?
 - How easy or difficult has it been to recruit qualified employees?
 - How easy or difficult has it been to find Finnish suppliers?
 - Are you collaborating with any Finnish universities or research institutions?
- How has the Finnish business environment developed since you first invested?
 - How has the nature of your activities in Finland changed over this time?
 - What are the main challenges to operating in Finland?
 - What do you see as the biggest opportunities in Finland for foreign companies?
 - Are you planning any expansions in Finland?

APPENDIX D. METHODOLOGY TO ASSESS ECOSYSTEMS

This appendix provides a detailed description of the methodology used to assess the payback time for funding of the Traffic and Mobile Games ecosystems.⁶⁹

Relocating one worker from an average firm into the ecosystems increases the annual value added per person employed by around EUR 10,000. We do not know from which firms, the new employees come, and we assume that the productivity of these firms equals the average productivity of the Finnish economy. The average productivity of the Finnish economy is EUR 69,000 and the average productivity in the Traffic and Mobile Games ecosystems is around EUR 79,000, cf. Figure D.1 in the main text.⁷⁰

On average, support from Business Finland creates close to three jobs annually in the supported firms. This has been computed from the estimation coefficients re-

ported in Business Finland (2018a), which analyse the effects of funding SMEs up to six years after the funding was received. The effect from funding from Tekes appears to be increasing across time.⁷¹ It is highly likely that this trend continues after the sixth year. Computing the compound annual growth rate for the number of full-time equivalent jobs created by the Tekes funding and extrapolating the growth to the seventh year after the funding implies that the effect in the seventh year following the funding equals 11.2 full-time equivalent jobs, cf. Figure D.1.

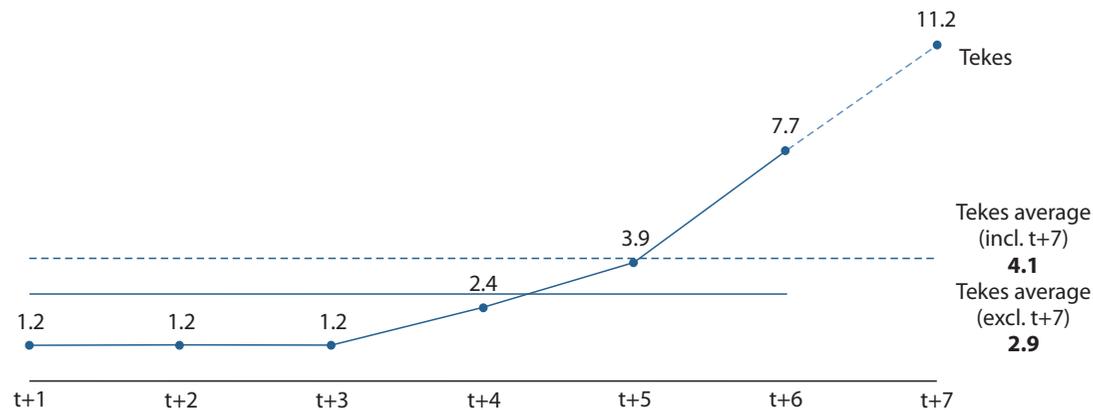
The average annual effect of the funding from Tekes is 2.9 full-time equivalent workers if only considering the first six years for which estimations exist. However, including the seventh year implies that the average annual effect is 4.1 full-time equivalent jobs. Since we do

⁶⁹ Considering the composition of firms in the ecosystems, we find that the effects on these firms are most likely to be representative for effects in the MaaS and Mobile Games ecosystems. This is the case as these two ecosystems mostly consist of SMEs for which we have statistically significant impact results. Large firms are much more predominant in the Marine and Health ecosystems.

⁷⁰ The productivity estimate for the Finnish private sector is calculated based on the OECD STAN database. The productivity estimates of the ecosystems are based on data provided by Business Finland.

⁷¹ The effects used in this assessment include the support of both Tekes and Finpro, since these are part of Business Finland today. Business Finland (2018a) indicates that the employment effect is larger per EUR million invested via Finpro than Tekes. However, most funding is provided through Tekes.

FIGURE D.1. The impact on employment from funding from Tekes and potential future effects



Note: The x-axis refers to the time since the firm received the funding, e.g. t+3 indicates three years after the firm received funding or support.

Source: Business Finland (2018a) and own calculations

not have information on the full history of employment effects, we calculate the payback time both including and excluding the extrapolated effects in the seventh year.⁷²

The effect of the funding is based on average funding for the firms of around EUR 200,000.⁷³ This implies that the funding creates between 14 and 17.5 jobs per million EUR invested depending on whether the extrapolated effect in the seventh year is included.

In 2017, the Traffic and Mobile Games ecosystems received funding worth combined EUR 16.5 million. This level of funding is expected to create between 230 and 290 full-time equivalent jobs annually in the more productive ecosystem firms. The funding is expected to increase the Finnish value added by EUR 2.3-2.9 million annually. This is based on the finding that the Traffic and Mobile Games ecosystems generate around EUR 10,000 value added per employee compared to the average Finnish firm.

This calculation considers the following three important aspects:

1. The funding of Business Finland is tax financed, which implies that there is a cost associated with collecting the funds.⁷⁴ The distortive effects of tax financing implies that the benefits of funding ecosystems by EUR 16.5 million needs to surpass EUR 19 million before it breaks even.
2. The expected flow of benefits has been discounted to take the net present value of future flows into account. A discount rate of 4 per cent has been used.
3. Productivity growth is higher in the ecosystems than the average firms. Business Finland is careful in choosing the firms they fund and seek to cherry-pick the firms with the highest potential to receive the funding, cf. Tekes (2012). Further, the value added

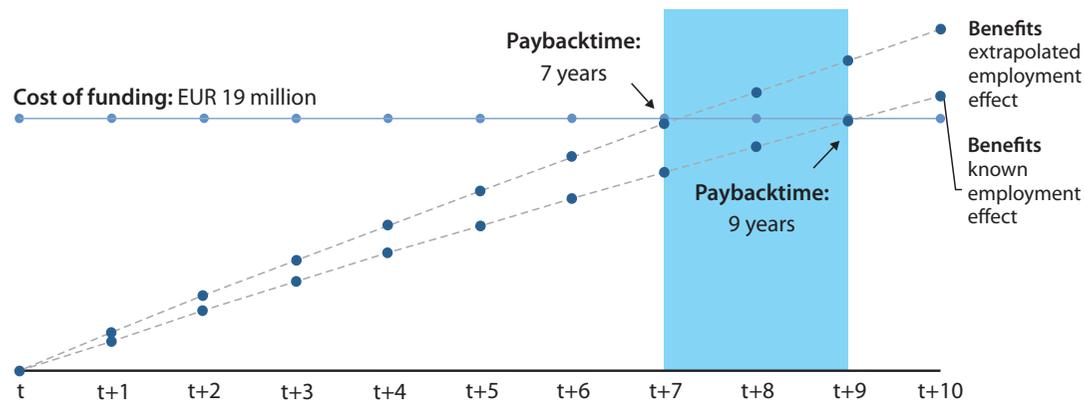
⁷² Business Finland (2018b) shows that a positive and significant effect through funding by Tekes for start-ups are persistent and increasing across a ten-year period. The effect of the support via Finpro seems to be fading out after the first six years, cf. Business Finland (2018a).

⁷³ Based on Business Finland (2018a) and additional funding data supplied by its authors. The average funding per firm is much smaller under Finpro than under Tekes. The average Finpro-funded firm receives EUR 17,000, while the average Tekes-funded firm receives EUR 335,000.

⁷⁴ This is the case since taxes are distortive and affect decisions on labour supply, retirement, investments etc. This is a cost to society that should be considered and will decrease the return to funding the ecosystems. An estimate is that it costs 15 cents for every euro collected via taxes.

in the industries containing the ecosystems have grown by 2.6 percent annually since 2012 compared to 0.8 per cent in the Finnish private sector.⁷⁵ The difference in growth implies that the increased benefit in value added of EUR 10,000 is increasing across time. If recent growth rates persist, the difference is going to be EUR 12,000 in ten years.

FIGURE D.2. The payback time is estimated to be between seven and nine years



Note: The x-axis refers to the time since the firm received the funding, e.g. t+3 indicates three years after the firm received funding or support. The costs include a tax distortion factor. The stream of benefits has been discounted and the historic larger growth in the ecosystem industries has been assumed to continue. The known employment effect uses only the estimates from Business Finland (2018a), the extrapolated employment effect considers the potential longer duration, cf. Figure D.1.

Source: Copenhagen Economics

Comparing the annual benefits in the years following the funding, we compute the expected payback time. The payback time is the number of years it takes before the benefits of the funding exceeds the initial costs. Discounting the future stream of annual benefits and including expected productivity growth yields an accumulated stream of benefits as depicted in Figure D.2 “*Benefits (known employment effect)*”. After nine years, the benefits exceed the initial costs, implying that the payback time is nine years. Considering the extrapolated employment effect to the seventh year reduces the expected payback time to seven years. This is highlighted by the fact that the “*Benefits (extrapolated employment effect)*”-line surpasses the costs after seven years, cf. Figure D.2.

To conclude, the payback time is estimated to be between seven and nine years depending on the size of the employment effects and the productivity growth in the ecosystems. The estimated payback time is illustrated by the turquoise box in the figure.

⁷⁵ Based on data from the OECD STAN database. It is assumed that the Traffic ecosystem is comprised of the industries 49 “Land transport and transport via pipelines” and 62 “Computer programming, consultancy and related activities” using the ISIC rev. 4 classification. It is assumed that the Mobile Games ecosystem is comprised of the industries 58 “Publishing activities” which includes software publishing and industry 62.