Nordic Countries in Global Value Chains

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Nordic Countries in Global Value Chains

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Address:

Statistics Denmark
Sejrøgade 11
DK - 2100 København Ø

Telephone: +45 39 17 39 17

e-mail: dst@dst.dk
www.dst.dk

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Preface

Set against a backdrop of slowing trade, and growing concerns that globalisation may be increasing inequalities in many countries, the need for improved statistics on the inter-relationships between trade, investment and production, and ultimately well-being, has never been stronger.

Providing new insights for policy makers based on an international collaboration between the OECD, Statistics Denmark and Statistics Finland, Statistics Norway and Statistics Sweden, this report attempts to respond to those concerns by shedding new light on the role of SMEs and MNEs within global value chains.

The report, part of the project *Positioning Nordic countries and enterprises in Global Value Chains* coordinated by Statistics Denmark and made possible by financial support of the Nordic Council of Ministers, also illustrates how these important insights can be gained through better use of existing firm level statistical information held in Nordic statistical offices; in other words without increasing the response burden on enterprises.

In this respect the report is also designed to accelerate momentum in the development of national statistical information systems and, in particular, illustrate the feasibility and importance of developing international integrated economic accounting systems that better reflect the reality of 21st Century global production.

The main contributors to the report are Nadim Ahmad, Fabienne Fortanier, Oscar Lemmers and Guannan Miao (OECD); Peter Bøegh Nielsen (chairman), Michael E. Nielsen, Niels Jon Mortensen and Flemming von Hadeln Løve (Statistics Denmark), Henri Luomaranta (Statistics Finland), Øyvind Hagen (Statistics Norway) and Andreas Poldahl (Statistics Sweden).

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Jørgen Elmeskov, Director General, Statistics Denmark

Martine Durand, Chief Statistician and Director of the OECD Statistics Directorate

Peter Bøegh Nielsen, Head of Division, Statistics Denmark

Nadim Ahmad, Head of Division OECD Statistics Directorate

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Executive Summary

Global value chains, and more generally globalisation, have been a dominant feature of the global economy in recent decades. Fostered by significant technological change and the widespread adoption of policies aimed at reducing trade costs, coupled with investment liberalisation, economies today are more integrated than they have ever been.

This has transformed the nature of global trade and investment and helped to pull millions out of poverty across the world, as firms slice and dice previously integrated production processes into a chain of tasks. For low income economies with an abundance of cheap labour, GVCs have provided access to chains through specialisation in tasks where they have comparative advantages, such as assembling activities, but they have also provided a first step on a ladder that, through spillovers and knowledge transfers within a supportive policy framework, can often lead to higher steps and higher value added tasks. For developed economies, GVCs have provided opportunities for productivity gains through specialisation in higher value, higher skilled, tasks, including in research and development, design, and marketing, with commensurate benefits for consumers, not just through higher incomes but also through cheaper products.

But with greater interconnectedness comes greater complexity. In the same way that declining trade related costs have implicitly shrunk the space between countries to create global production networks, they have also increased the space between producers and final consumers, particularly for economies at the upstream part of the value chain, meaning, for example, that it is much harder today, using conventional statistics, to understand how changes in demand in one country impact on countries at the beginning of a value chain. Fully understanding the nature of GVCs and global dependencies requires therefore a global view of production and consumption. Set against a backdrop of slowing trade, rising calls for protectionism, as well as increasing digitalisation and automation, it is perhaps as important today as ever that such a view takes shape, in order for countries to respond to these new challenges. But, by design, national statistical information systems, whose architecture is still largely shaped by a pre-GVC era, are on their own, not able to provide that view. National systems still largely view the 'Rest of the World' as an 'of-which' 'catch all' item to which goods and services are sent or purchased, and, where data on trade with specific countries are included, they are only seen through the prism of trade and not production.

The OECD-WTO Trade in Value Added (TiVA) initiative was the first initiative, at an official level, that sought to bridge the gap between national statistical information systems and the global view that was needed, meaning that, for the first time, countries could better understand the nature of global production, and in particular the direct and indirect interactions between industries across the world and between industries and consumers. In the same way, therefore, as GVCs have transformed global production, TiVA has helped to transform our understanding of the relationship between trade and production and especially the way that we view imports. But TiVA has been as much about understanding the importance of domestic value chains as it has been global value chains; a recognition that export success is as much about the competitiveness of upstream domestic suppliers as it is the competitiveness of the exporter those firms supply. Key in this regard has been the spotlight that TiVA has been able to shine on the important role played by upstream service providers in driving export growth. This has helped policy makers and analysts alike recognise that GVC policy making requires a 'whole of supply' approach that is as much about creating the right policy environment for non-exporting firms as exporting firms.

But it is important to note that TiVA, in its current form, cannot provide all of the necessary insights. The challenges to GVC integration, whether as a direct exporter or indirectly as an upstream supplier within domestic value chains, do not impact on all firms equally; especially for SMEs who typically face larger barriers to trade than larger firms, and who often struggle to meet the regulatory standards required by the larger firms they supply, or seek to supply. And on this TiVA is silent. Similarly TiVA does not provide insights on the role played by MNEs in value chains, and so is also silent on the trade-investment-production nexus. Providing these views is essential if we are to better understand the nature of GVCs.

This report, which reflects the work of a close collaboration between the OECD and Nordic Statistical Offices, attempts to do just that, through the development of an extended TiVA dataset that splits current TiVA industries into new categories of firms, including SMEs and MNEs, providing important new insights on the nature of GVC integration within the Nordic region. Key highlights from the report:

High import content and large domestic linkages go hand in hand

While imports are often seen as direct competition to domestic suppliers, this report shows that firms with a high import content of exports – typically large firms that are strongly engaged in imports and exports – also generate the most domestic backward linkages for each unit of value added that they produce and export, highlighting complementarities between imports and strong domestic supply chains that can drive export success.

SMEs are responsible for over half of the domestic value added in Nordic exports.

Although 94 per cent of firms in the Nordics do not export, these firms can play an important role through their upstream integration in domestic supply chains. More than half the domestic value added content of Nordic exports originates in SMEs – around three-quarters of which reflecting services – and half of this value reflects upstream integration in supply chains typically controlled by large enterprises providing gateways to emerging and growing foreign markets.

Dependent SMEs are more export oriented than independent SMEs, and are important channels of indirect exports

An important distinction made in this report is between dependent SMEs (that are part of a larger enterprise group) and independent SMEs. Dependent SMEs differ from independent SMEs on a number of fronts: they are typically much more export-orientated (direct and indirect exports); their exports are more geared towards Europe, likely reflecting their integration into the wider regional production network of their (domestic or foreign) parents; and they also generate greater upstream spill-overs in the wider economy than independent SMEs, despite their higher import intensity.

Domestic MNEs generate significant backward linkages and are a key export channel for upstream domestic enterprises

Domestic MNEs headquartered in Nordic countries have well developed domestic supply chains that provide an important channel to export markets for upstream suppliers. In Denmark and Finland for example, domestic MNEs generate 1.1 to 1.6 units of additional upstream value added for each unit they produce themselves, compared to 0.6 units for foreign owned firms; in part reflecting the fact that foreign investment in the Nordics is more orientated towards services and serving domestic markets (as upstream suppliers).

1. The Nordic countries in Global Value Chains

1.1 Introduction

The rise of Global Value Chains means that traditional indicators of international trade may give misleading signals on global production

Driven by technological change and policies aimed at trade and investment liberalisation, recent decades have seen an increasing fragmentation of global production, as firms have sought to exploit and capitalise on the new opportunities they provide. This has seen firms outsourcing or offshoring those parts of production they previously conducted themselves to firms and countries with comparative advantages in the outsourced 'stage in production' or 'task', whilst also providing opportunities for specialised new entrants, and indeed new investment, to enter particular stages of production. This process, often referred to as the 'second unbundling', is now commonly referred to as global value chains, and indeed more broadly globalisation, and has been an important driver of global growth in trade and investment, with both significantly out-pacing global GDP growth; at least until recent years.

The advent of these chains has helped to redraw the map of global production. A large part of this new map has seen a shift eastwards towards Factory Asia, and China in particular, as firms, including outside of Asia, have looked to exploit the relative abundance, and cheapness, of labour, to move up value chains and specialise in higher-skilled and higher-value tasks, such as research and development, marketing and design, but very few places have been unaffected.

The Nordics, among the most open (and developed) economies in the world are no exception in this regard. Indeed, while it is clear that larger economies with an abundance of cheap labour have been important beneficiaries of GVCs, so too have smaller economies with skilled and highly educated work-forces, which have been able to enter various stages of value chains, such as in the automotive, aeronautics, and ICT sectors, where the entry costs would previously have been prohibitive. Indeed it is no coincidence that during this period the share of exports in Nordic GDP, notwithstanding the dip at the height of the recent financial crisis, grew almost continuously from around 30 per cent in the 1970s and 1980s to around 45 per cent in recent years.

However, this does not tell the full story. The rise of Global Value Chains, and the splicing and dicing of production into specific tasks, also means that traditional indicators on international trade may provide a misleading picture of global production. Currently, up to two-thirds of the volume of international trade is accounted for by intermediate products. Traditional trade statistics count these intermediate goods at their full value each time they cross borders, including when they are subsequently embodied in other goods that are in turn exported, thus attributing the full commercial value of the product to the last country of origin even if that country's additional value (value-added) was only marginal. This 'multiple-counting' effect of gross trade data means that traditional trade statistics can paint a misleading picture of the benefits of exports to economic growth and employment, distort our understanding of the role of skills and the factors of competitiveness; resulting in sub-optimal policy making. But at the same time they may also paint a misleading picture of the role of imports, especially as imports, within GVCs, are increasingly required to produce exports.

But Trade in Value-Added (TiVA) based indicators that decompose trade flows into the value added by each country can overcome these shortcomings…

The OECD–WTO Trade in Value-Added (TiVA) initiative addresses this issue by considering the value added by each country in the production of goods and services that are consumed worldwide. The TiVA indicators are designed to better inform policy makers about the size, relevance and implications of global value chains, and to provide new insights into the commercial relations between economies. The database describes the engagement and integration of countries in global

production by identifying the contributors and ultimate destination of the value embodied in final products. As described in more detail below, this new approach has already provided important new insights on GVCs, highlighting for example, the importance of imports for export success, the need for well-developed domestic services industries that support manufacturing exports, and the changing relative importance of trading partners when looking at the ultimate sources and destinations of trade, rather than the immediate counterpart.

However, important though these insights are, like conventional gross trade data, TiVA too has its limitations. For example it (currently) is only able to provide a breakdown of activities into 34 industries, and so cannot provide insights into the types of firms within industries that engage, or not, within GVCs, as it necessarily assumes that all firms with a given sector behave the same. This shortcoming (averaging effect) clearly has an impact on the results of TiVA, as the available evidence shows that firms' engagement in value-chains differs considerably depending on their size and whether they are part of an MNE[1], as well as their capital and skill intensity.[2] Indeed, directly integrated firms, i.e. exporting firms, typically import more and often have higher labour productivity than non-exporting firms (with the causality between higher labour productivity and exports working both ways); partly explaining why only a minority of firms are able to successfully enter and survive in international markets. This means that current estimates of important TiVA indicators are conservative, with the import content of exports, a key measure of the scale of integration, often referred to as backward participation, understating the true nature of that integration.

But the prudent nature of TiVA is not its only limitation. The differences between large and small enterprises, between foreign owned firms and domestically owned firms, and between exporting enterprises and non-traders, matter not just because of their impact on TiVA estimates but also because they each provoke a different set of policy questions and indeed policy responses. Increasingly for example there is a realisation that GVC policy making requires a 'whole of supply' view; a view that recognises the interconnection between trade, investment and production. For example, increasing policy demands gravitate around a better understanding of the role of investment in facilitating the integration of smaller and non-exporting firms into global value chains, as upstream suppliers in domestic value chains. These issues matter not just because they are instrumental in fostering growth and employment but also, and increasingly, because they are central to notions of inclusive growth.

For example, as the report *Services and Goods Exports from the Nordics – Strongholds and profiles of exporting enterprises* (produced in parallel with this publication)[3] indicates, large firms and MNEs tend to be more frequently engaged in international trade compared to small firms. This raises concerns about whether SMEs, and their employees, are less able to benefit from GVCs, and more exposed to the challenges and, so, too, whether the benefits of GVC integration accrue equally to all in society.

This report responds to the shortcomings described above. By breaking each activity in the TiVA database down into firm based characteristics that better reflect the heterogeneous nature of GVC integration - including by size, e.g. SMEs (dependent and independent); ownership, i.e. foreign and domestically; owned enterprises; and trading status, i.e. trading and non-trading companies - the report

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[1] See also Nielsen, P.B. and Upadhyaya, S.: *Increasing fragmentation and globalization of manufacturing production processes and the impact on industrial statistics. The European context*, UNIDO Working Paper 11/2016.

[2] See also See Bernard, A.B et al.:Firms in International trade, NBER Working Paper No. 13054, 2007

[3] Nordic Council of Ministers et al.: *Services and Goods Exports from the Nordics – Strongholds and profiles of exporting enterprises,* 2016

provides new insights on GVC integration and responds directly to the policy questions raised above and many others. The analysis focuses both on the economic impact (i.e. the value added produced) as well as the employment consequences of GVCs (how much employment in the Nordics depends on GVC involvement), and further reveals the importance of domestic value chains, and the role of foreign investment in driving domestic supply chains, both upstream and downstream. The report highlights, throughout, the differences across key industries within the Nordic economy.

This report presents the first ever cross-country TiVA based comparison broken down by specific, and GVC relevant, category of firms

This report is the first of its kind to present such a detailed, cross-country and cross-industry comparison of the role of different types of firms in GVCs. The unique and innovative data presented in the report build upon standardised national linked micro datasets in four Nordic countries (Denmark, Finland, Norway and Sweden), and a shared SAS program that ensures identical calculations are performed across all four countries, without the microdata having to leave the National Statistical Offices.

Methodological approach

The results presented in this report are derived from a combination of harmonised databases developed and stored at Statistics Denmark, Finland, Norway and Sweden with the OECD Inter-country Input output (ICIO) tables. The harmonised databases allow linking statistical registers such as Business Register, Structural Business Statistics, International Trade in Goods Statistics and Foreign Affiliates Statistics, holding observed or imputed variables, at micro level. The ICIO is constructed by combining national Supply and Use and Input-Output tables, with a balanced view on international trade in goods and trade in services statistics, to arrive at a global table that describes the production and consumption relationships among 61 countries (+rest of the world) and 34 industries. The model allows for estimating for instance the magnitude and impact of indirect export from domestic upstream suppliers or the magnitude of services exports at industry level. The Annex to this report describes the methodology in more detail.

The remainder of the report is organized along the three main firm characteristics relevant for an improved analysis of globalisation and GVCs. Chapter 2 presents results broken down by size class of firms, with a particular focus on differences between dependent SMEs – those SMEs that are part of a larger enterprise group – and independent SMEs. Chapter 3 presents results broken down by firm ownership, identifying the role of foreign owned enterprises in Nordic countries, as well as Nordic Multinational Enterprises (MNEs), i.e. Nordic firms with affiliates abroad. Chapter 4 differentiates between trading and non-trading companies, and Chapter 5 provides concluding remarks[4]. First however, and to help shape the narrative for the following chapters, section 1.2 below, provides an overview of the main messages already available in the OECD-WTO TiVA database regarding the role of GVCs in the Nordics.

1.2 The Nordics in GVCs

Around one-third of economic activity in the Nordics is dependent upon foreign demand

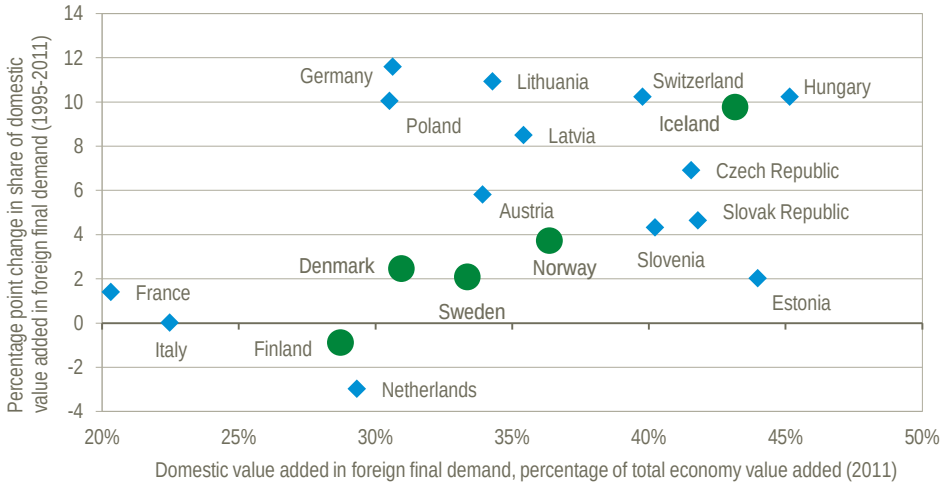
Like many other small, developed and open economies, the OECD-WTO Trade in Value Added database shows that all five Nordic countries, including Iceland, are strongly integrated into Global Value Chains (GVCs). Across all Nordic countries around one-third of total economic activity was dependent on consumers in foreign markets (Figure 1.1), with shares remaining broadly stable over the last two decades.

[4] Note however, that there will be slight differences between the estimates in each chapter for total value added and total employment related to exports due to the different splits of underlying input output tables.

Among Nordic countries only Iceland has seen a strong increase in its export orientation in recent decades, with the share of total economic activity dependent on foreign final demand increasing by 10 percentage points between 1995 and 2011 to over 40 per cent. However, while still relatively significant, strong improvements in export orientation have not been observed in other Nordic countries, certainly when compared with former transition economies in Eastern Europe and the Baltics. Indeed Finland's export orientation fell over the period; partly reflecting the Nokia effect (the export orientation of Finland's ICT sector for example fell 17 percentage points between 2008 and 2011). This partly reflects a catch-up effect and integration into Germany's export chain, but other developed economies such as Switzerland and Austria have also outperformed Nordic countries over the period (Figure 1.1).

That being said, Nordic economies still outperformed other mature developed economies such as France, Italy and the Netherlands; although it's important to note that larger economies typically have lower overall export orientation shares than smaller economies. Shares in the United States, Japan and China for example were 11, 13 and 18 per cent respectively in 2011.

Figure 1.1 Export orientation in the Nordics compared to other European countries



Imports are increasingly important for Nordic export success…

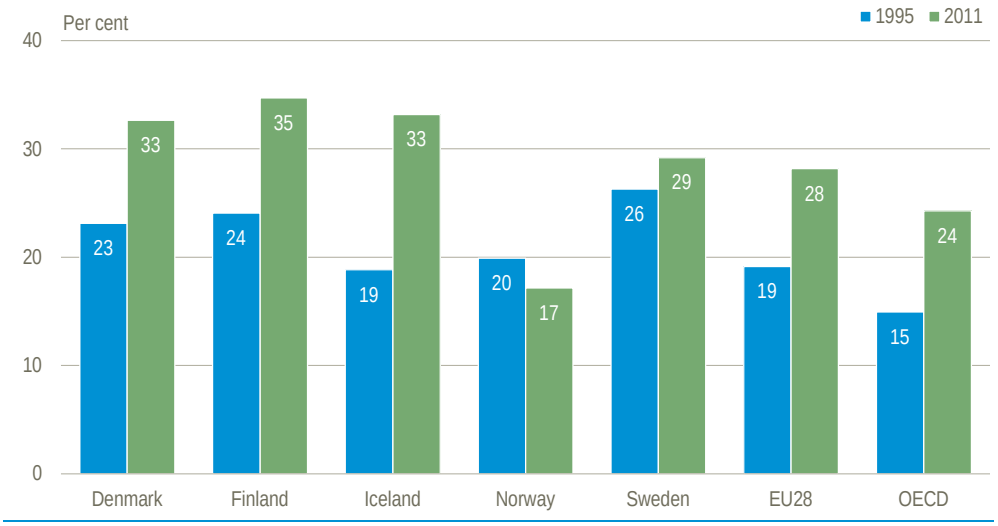
Notwithstanding the relatively muted improvement in performance over the last two decades, it's important to recognise that the level of export orientation has remained broadly stable and relatively high, despite a significant increase in the foreign content of exports over the period (Figure 1.2). Indeed, arguably, export orientation has remained high precisely *because* imports have provided opportunities to Nordic firms to specialise and integrate in parts of the value chain (tasks) where they have comparative advantages. This illustrates how imports are vital for export success, as they allow Nordic firms to compete effectively in international markets by being able to access and use the best (in terms of quality and price) inputs from around the globe.

This has been a defining characteristic of GVCs, and as Figure 1.2 illustrates, the 'foreign value added content' in exports has grown substantially across OECD economies in general, since the mid-1990s, from on average of 15 per cent in 1995 to 24 per cent in 2011. This is even more pronounced in the Nordics, where around one-third of exports consist of foreign value added, comparable with other small and open economies and significantly higher than most OECD or EU countries. For Iceland, the foreign content of exports has nearly doubled since 1995.

An exception is Norway, where the foreign value added content of exports stood at 17 per cent in 2011, reflecting a high dependency on oil exports, which as an up-

stream industry requires relatively little additional intermediate inputs (domestic or foreign) compared to other activities. Other major oil exporters such as Saudi Arabia and Colombia have significantly lower shares.

Figure 1.2 Foreign Value Added in exports as per cent of gross exports



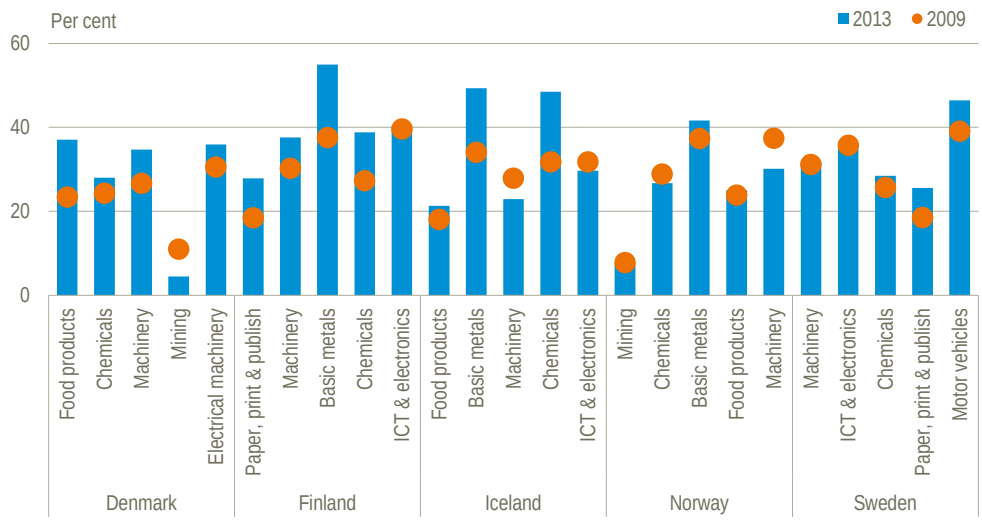
...often even more so for key Nordic exporting manufacturing industries

Moreover, looking at whole economy shares can mask the true importance of imports for exports of manufactured goods, and the real underlying scale of integration in specific value chains. In many Nordic economies, for example, in particular Sweden and Denmark, integration has increasingly focused on service based tasks in global value chains, which typically have relatively little import content (see also below).

Figure 1.3 better illustrates the importance of imports for export success by showing import shares of exports for the Top 5 (ranked by the absolute value of exported domestic value added) manufacturing industries in each Nordic country. For example, the Food and beverages industry has the largest share of manufactured exports in value added terms in Denmark and the success of the industry requires heavily on access to intermediate imports, which make up 37 per cent of the value of the sector's exports. In Finland, Wood & Paper products are the largest source of value-added exports – even if significant diversification into other activities has occurred over the last two decades towards e.g. Machinery and Business services – but, even in this relatively upstream industry, intermediate imports still contribute nearly 30 per cent of the overall value of gross exports by the industry. This reflects in large part upstream foreign services providers; who were responsible for over half of the total foreign content in Finland's exports of wood and paper products.

Other Nordic key exporting industries that rely heavily on imports are Basic metals in Finland, Iceland and Norway, and Chemicals (including pharmaceuticals) in all five countries. In Sweden, just under one third (29 per cent) of total exports reflected foreign content, but shares are higher in ICT & electronics (35 per cent), as well as in other export industries, such as Basic metals (47 per cent) and Motor vehicles (46 per cent). Firms in these industries use global value chains extensively to procure goods and services that are more efficiently produced elsewhere (or, in the case of raw materials, not available in the Nordics). Figure 1.3 illustrates that even with a large share of imports and consequentially a smaller share of domestic value added in exports, an industry can generate a very large volume of domestic value added, contributing to economic development.

Figure 1.3 Import content of exports of Top5 value added exporting manufacturing industries as per cent of exports

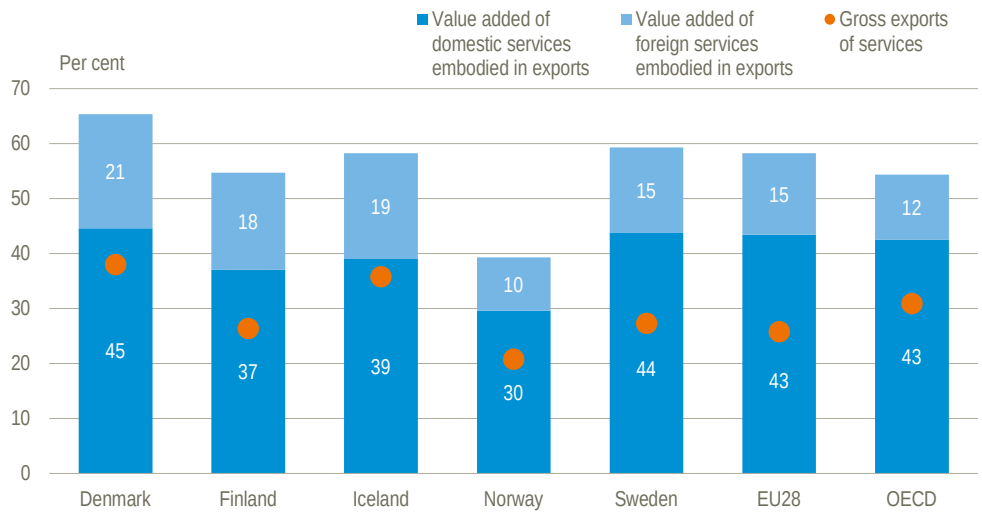


Services matter…

Given that many services require the physical proximity of buyers and suppliers, cross-border trade in services generally represents a relatively small share (30 to 45 per cent) of a country's total trade, compared to their share in total economic activity (66 to 80 per cent) in Nordic countries. However, from a value added perspective, as shown in Figure 1.4, services are significantly more important in international trade. For example, for OECD countries, gross exports of services account for only 31 per cent of gross exports, but services account for more than half of exports in value added terms. In Denmark, Sweden and Iceland this is even higher, and even in Norway, dominated by its mining industry – which requires few additional inputs, including services – services account for nearly 40 per cent of total exports in value added terms, almost twice as high as the share in gross terms.

This illustrates the upstream role of (domestic) services industries through their provision of efficient transportation, wholesale and retail services, and also financial and other business services. It also illustrates the important role that the services sector can have in driving the competitiveness of goods exports, and as such the need to focus on the 'whole of supply' when developing policies for export success. Highly regulated, inefficient and closed transportation sectors for example, and indeed poor infrastructure (roads, networks), can be significant impediments to integration in global value chains.

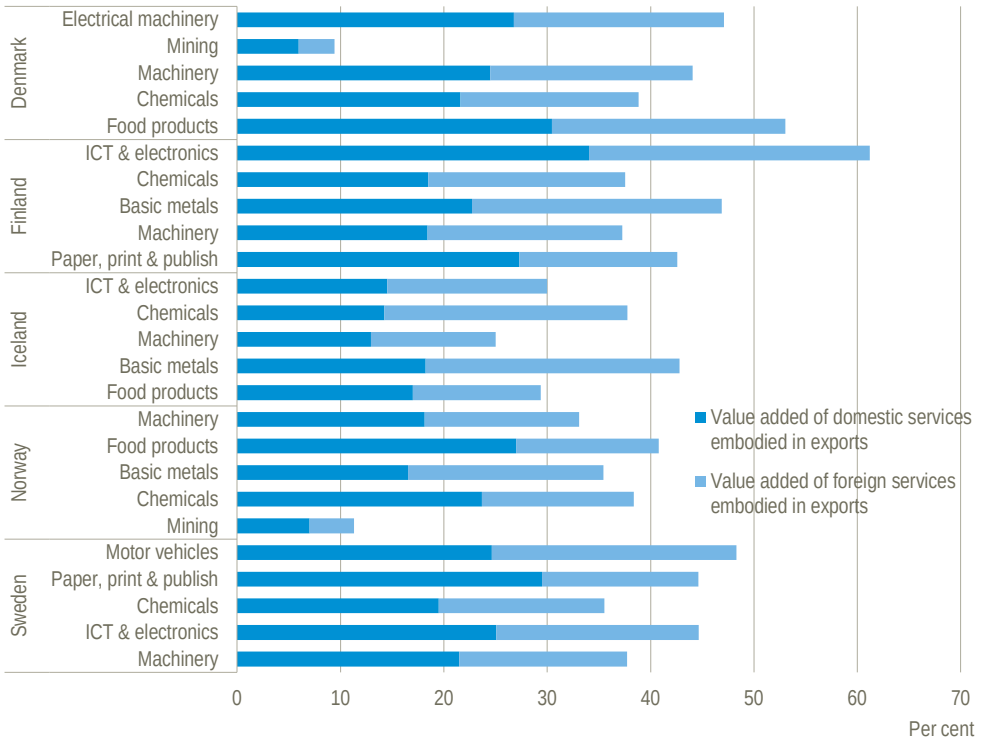
Figure 1.4 Gross exports of services and value added exports of services, as per cent of gross exports. 2011



…especially as they are embodied in goods

Figure 1.5 illustrates this more clearly by showing the contribution of upstream services to key exporters of goods. Upstream services – both domestically provided and imported – account for around 30 per cent of exported value added in industrial activities in the Nordics, and for more than half of exported value added in Danish food products (53 per cent) and Finnish ICT and electronics products (61 per cent). In Sweden, upstream services account for close to half of the value of gross exports by the Motor vehicles industry (48 per cent) and the ICT & electronics (46 per cent) industry, providing important insights on the upgrading process and in particular the significant scope for functional upgrading in GVCs.

Figure 1.5 Services value added content of gross exports of Top 5 value added exporting industrial sectors, as per cent of gross exports. 2011

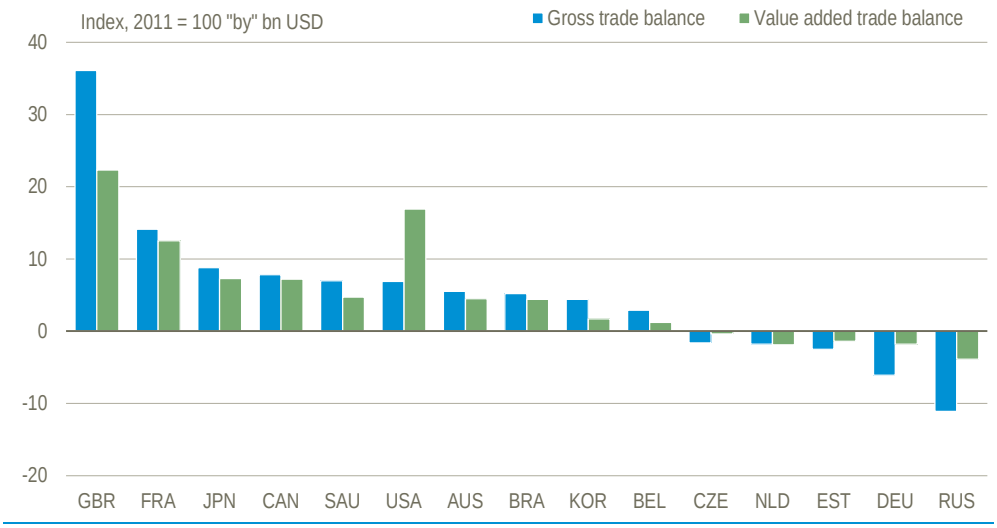


The United States is a significantly more important trading partner in value added terms

A Value Added perspective on international trade also changes the relative importance of bilateral trading partners, and provides insights into the ultimate country of origin of imports, and the ultimate destination (i.e. country of final consumption) of exports. For example, imports from China also incorporate value added that is produced upstream elsewhere (e.g. product design in the US, and parts and components from various other Asian countries). Typically, gross trade statistics overstate these relationships the closer the countries are (geographically) and understate them the further they are.

Figure 1.6 illustrates the combined trade balance of the five Nordic countries with their main trading partners. Especially striking is the trade balance (surplus) with the UK (virtually entirely due to Norway in gross terms), which is much less pronounced in value added terms, as intermediate exports from Nordic economies, such as petroleum and oil, are embodied in the UKs exports to other economies, such as the US. Indeed, looking at the export data alone, in value-added terms the importance of the US as a destination market for Nordic exports is significantly higher in gross trade terms (reflected across all Nordic countries). For example the US rises from the fifth most important destination market in gross terms in Denmark and Sweden, to 2nd in Denmark and 1st in Sweden. The negative trade balances with Russia (driven by Finland) and Germany (primarily caused by Sweden) are much less severe in value added terms, as intermediate imports from these economies are subsequently embodied in Nordic exports.

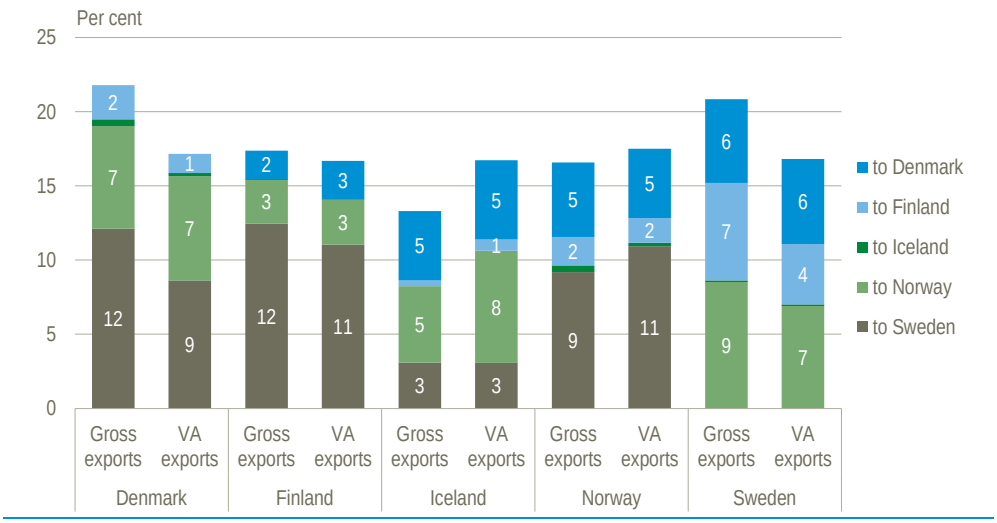
Figure 1.6 Nordic trade balances with top non-Nordic trading partners, in gross and in value added terms. 2011



Nordic final consumers are less important drivers of intra-regional trade in value added terms

Examining the intra-Nordic trade relationship, Figure 1.7 highlights that in terms of the final destination of value added, Nordic countries are less important to each other than in terms of gross exports. For example, 22 per cent of Danish exports are destined to the Nordics but only 17 per cent of Danish value added ends up in final demand in other Nordic countries, with particularly notable differences for relationships with Sweden. Only Iceland is considerably more dependent on its Nordic neighbours when compared to gross trade figures. Although this reveals a lesser dependency on final demand markets within the region, it also reveals the importance of integrated intra-regional value chains within the Nordics as drivers of export success to other markets.

Figure 1.7 Exports to other Nordic countries in gross and domestic value added terms, as per cent of total exports. 2011



2 Size matters: the role of SMEs in Global Value Chains

2.1 Introduction

SMEs may have difficulties accessing foreign markets directly…

While it is well-established that large enterprises – with 250 employees or more - are highly integrated in global value chains, either by direct exports or imports or both, the same is not generally true for Small and Medium sized Enterprises (SMEs), despite their relatively high share of total economic activity and employment. Nearly all firms – 99.8 per cent – in the Nordics are SMEs, and collectively, they are responsible for two thirds of employment and economic activity in the non-financial business economy[5]. However, with often more limited access to financing and greater marginal costs faced in relation to the various fixed costs of doing business abroad such as market research, overcoming language barriers, and conforming to regulatory barriers (certainly when compared to larger firms, who also have advantages concerning economies of scale), smaller firms are generally less (directly) involved in international trade. Where integration does occur therefore it is often through high-value and specialised activities, with high 'knowledge based' content. However, much can be done on the policy front to assist other SMEs in this regard, especially with regards to financing and also in dealing with red-tape, in order to allow improved penetration into, especially, high-growth emerging economies.

… but can play important roles as suppliers to larger domestic exporting enterprises

However these are not the only policy levers that can be pulled on to enhance participation. Despite their more limited role as direct exporters, SMEs can play a significant role as upstream suppliers to larger domestic exporting enterprises.

By integrating Nordic microdata on the value added, output, employment and trading patterns of SMEs within the OECD-WTO TiVA Framework, this chapter provides insights into the size and relevance of these upstream channels and a more comprehensive account of the role of SMEs in GVCs than is evident from traditional business or trade statistics. In addition, this chapter explicitly addresses, and separately identifies, the role of dependent SMEs – i.e. those that are part of a larger enterprise group and can therefore tap into larger resources – versus that of independent SMEs, that do not have such corporate ties (see Box 1).

This breakdown matters as the barriers (highlighted above) to trade will differ for dependent and independent SMEs. Looking at the SME population as a whole therefore may understate the extent with which these barriers impact on the population of independent SMEs; especially as these are generally smaller and because dependent SMEs, in many ways, resemble large enterprises in relation to access to finance and professional skills, but also with regards to economies of scale (notwithstanding access to free services, including intellectual property and know-how) that may be provided by their parent.

Independent and dependent SMEs

Independent SMEs are enterprises with less than 250 employees that are not part of either a domestically or foreign controlled enterprise group.

Dependent SMEs are enterprises with less than 250 employees that are part of either a domestically or foreign controlled enterprise group.

[5] In NACE Rev. 2 the non-financial business economy consists of industries B up to N minus K (financial and insurance activities), including S95. See Table A.3 for more details. The figures in sections 2.1 and 2.2 concern the non-financial business economy; figures in the rest of the chapter concern the market sector, defined as the business economy including agriculture and financial services.

This chapter is organised as follows. Section 2.2 presents the main descriptive statistics on SMEs and their direct involvement in international trade. Section 2.3 describes the indirect role of SMEs in GVCs. Section 2.4 provides a focus on services, and Section 2.5 examines the geographical orientation of value chains by firm size. Section 2.6 provides information on employment sustained by GVCs and 2.7 concludes. Throughout the chapter, SMEs are defined as enterprises with less than 250 employees, and are further broken down in to Micro (0-9 employees), Small (10-49 employees) and Medium (50-249 employees) sized enterprises.

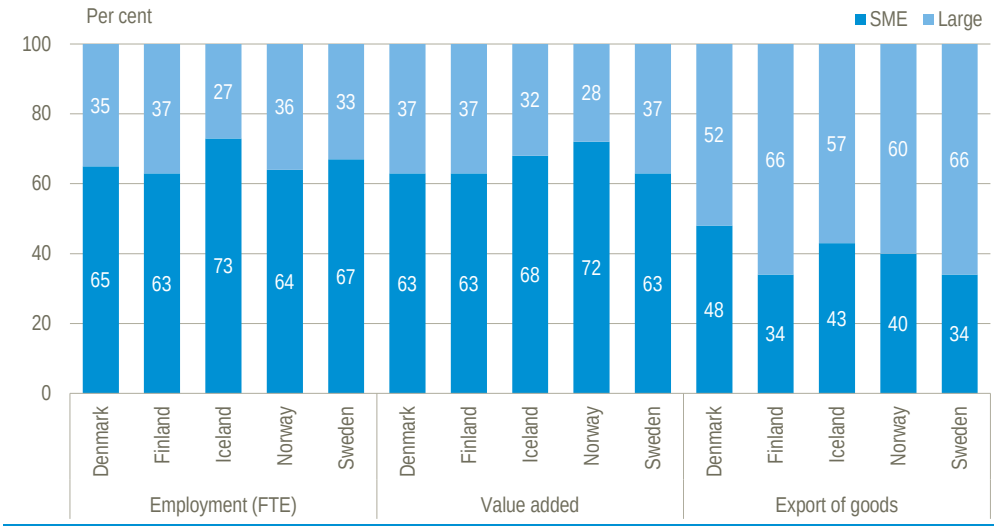
2.2 Dependent and independent SMEs in the Nordics

SMEs account for close to two-thirds of employment and economic activity in the business economy of the Nordics

In the five Nordic countries combined, 1.5 million SMEs were in existence in 2013, constituting the vast majority (99.8 per cent) of all enterprises in the region. SMEs also play an important – if less prominent – role in employment and value added. They account for close to two-thirds of total employment in the non-financial business economy – ranging from 65 per cent in Norway to 73 per cent in Iceland (see Figure 2.1). Similar levels are observed for value added, ranging from 63 per cent in Denmark, Finland and Sweden to 72 per cent in Norway.

With respect to direct exports of goods however, SMEs are significantly less important, and the majority of exports are accounted for by large enterprises with 250 or more employees. Large enterprises in Sweden and Finland accounted for 66 per cent of total exports of goods in 2013, and over half in Norway (60 per cent), Iceland (57 per cent) and Denmark (52 per cent).

Figure 2.1 Contribution to Employment, Gross Value Added and exports of goods by enterprise size, per cent, 2013



A small share of SMEs is 'dependent'…

When breaking down SMEs into the two main categories of dependent SMEs (that are part of a group) and independent SMEs (that do not have such ties), it is clear that the latter dominates in terms of number of enterprises. Between 76 per cent (Denmark) and 95 per cent (Finland) of all SMEs in the Nordics are independent, see Figure 2.2.

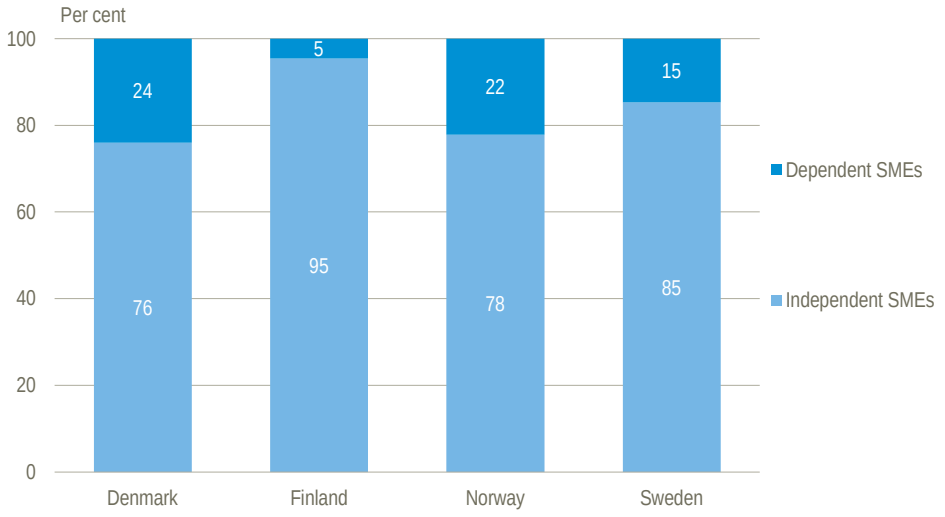
… but they account for a disproportionate share of employment and value added, and especially exports, of SMEs…

But despite their relatively limited importance in terms of number of firms, dependent SMEs account for a disproportionate share of employment and value-added by SMEs. In terms of employment, for example, dependent SMEs account for more than 60 per cent of all employment in Norway and Denmark. But only around one third of total employment in SMEs in Finland.

Dependent SMEs are responsible for more than 90 per cent of total exports of goods from SMEs in Sweden, and for close to 90 per cent of the exports from SMEs

in Denmark and Norway. Hence, independent SMEs only account for 26 per cent of total exports of goods in Finland, 14 per cent in Norway, and as little as 8 per cent in Finland and Sweden (Figure 2.3).

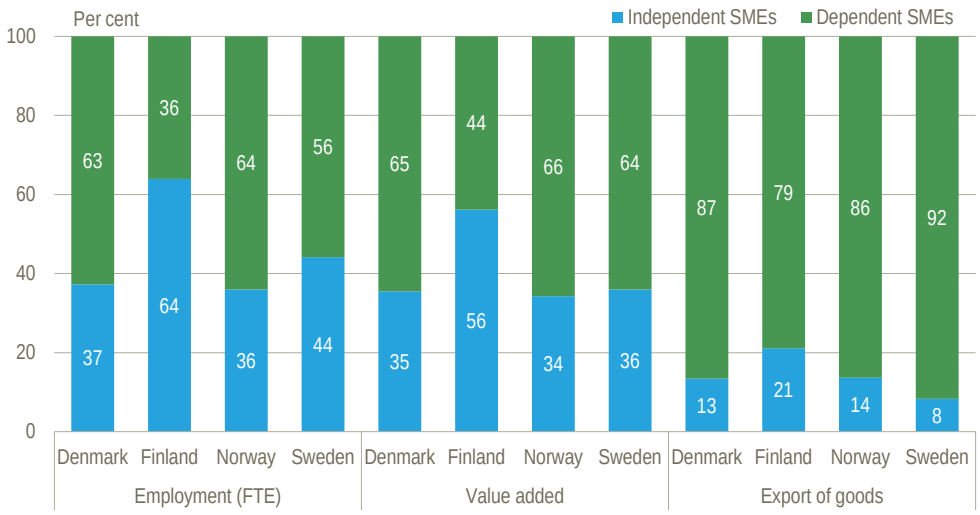
Figure 2.2 Independent and dependent SMEs, per cent of total number of SMEs. 2013



...and have higher labour productivity...

Moreover dependent SMEs typically have higher labour productivity than independent SMEs in Denmark, Finland, Norway and Sweden.

Figure 2.3 Independent and dependent SMEs, per cent of total employment, gross value added and exports of goods, of SMEs. 2013

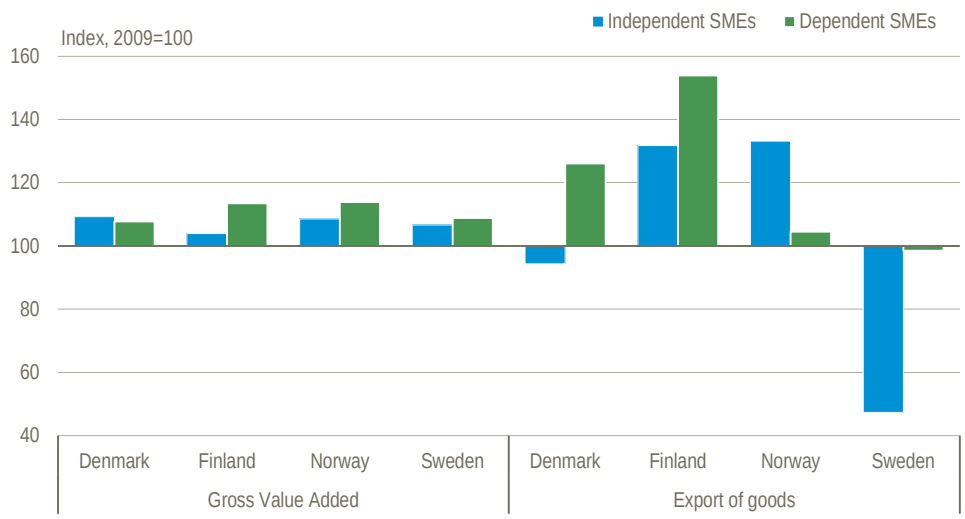


... and higher (post-crisis) labour productivity growth...

Dependent SMEs not only have high labour productivity however, they also have (at least post-crisis) significantly higher productivity growth (Figure 2.4). The highest growth (14 per cent) is in Norway followed by Finland (13 per cent). As dependent SMEs are also more engaged in exports as compared to independent SMEs, this result confirms the findings in academic literature that more productive enterprises are more likely to be engaged in exports.[6]

[6] See Bernard, A.B. *et al.*, *The Empirics of Firm Heterogeneity and International Trade*, NBER Working Paper No. 17627, 2011 for a recent literature review.

Figure 2.4 Growth in value added and exports of goods per FTE, by type of SME. 2009-2013



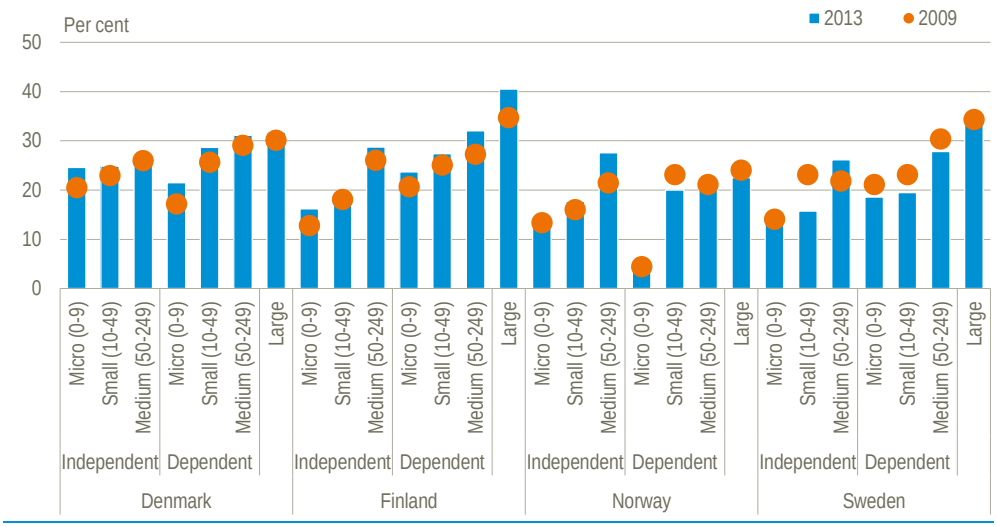
2.3 Direct and indirect domestic value added by SMEs and large firms

The smaller the enterprise the smaller the importance of imports for direct exports

Across the four largest Nordic countries, the overall import content of exports averages around 28 per cent. But as Figure 2.5 shows, the import content of exports is generally lower the smaller the enterprise, with dependent SMEs having higher import dependencies than similarly sized independent SMEs. The import content of exports by large enterprises is over 30 per cent in Denmark, Finland and Sweden. In general, the data provide evidence that the smaller the enterprise, the harder it is to overcome the fixed costs associated with imports, and integration into GVCs more generally, such as language barriers, finding a reliable supplier, and ensuring that the imported products have the right specifications.

Although dependent micro-sized firms in Norway have a very low value of import content of exports, this reflects a specialisation in mining (oil) companies, which typically have low import content. Of particular interest, meriting further investigation is the fact that import content across most categories of firms has declined in Sweden since the crisis.

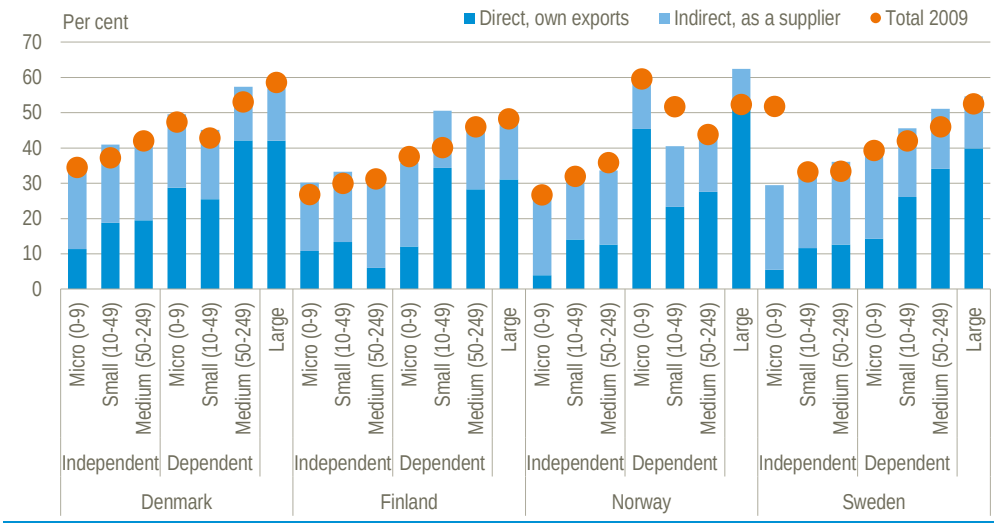
Figure 2.5 Import content of exports as per cent of gross exports, by size class



...but SMEs do have strong dependencies with foreign markets, by supplying larger enterprises that export…

Although SMEs have less direct engagement in exports, (Figure 2.6), they have important integration channels as upstream suppliers. Indeed, for some categories of firms, the value added due to indirect exports is larger than through direct exports. Overall, when accounting for indirect exports of value-added, foreign markets are at least twice as important for SMEs compared with traditional business statistics. For example, while only 5 per cent of total value added generated by independent Micro SMEs in Sweden is exported directly, an additional 24 per cent of their value added is indirectly embodied in exports. For large firms these differences are also significant, but they have more value added due to direct exports than to indirect exports: direct exports accounted for 40 per cent of the total value added of large enterprises in Sweden for example but an additional 15 per cent was indirectly embodied in exports. Nevertheless, despite the smaller indirect links of large firms, in general, SMEs have lower export orientation than larger firms, especially independent SMEs. Worthy of particular mention, if only to highlight the care needed in longitudinal analyses such as this, are the significant falls in export orientation in small dependent firms in Norway and micro independent firms in Sweden; which may reflect exit from one particular category to another, for example through a take-over, merger, growth, exit or contraction. Note that Figure 2.6 only shows estimates for the market sector. As a share of total economy value-added (or GDP) estimates of exported domestic value added vary from 28 per cent in Finland to 36 per cent in Norway.

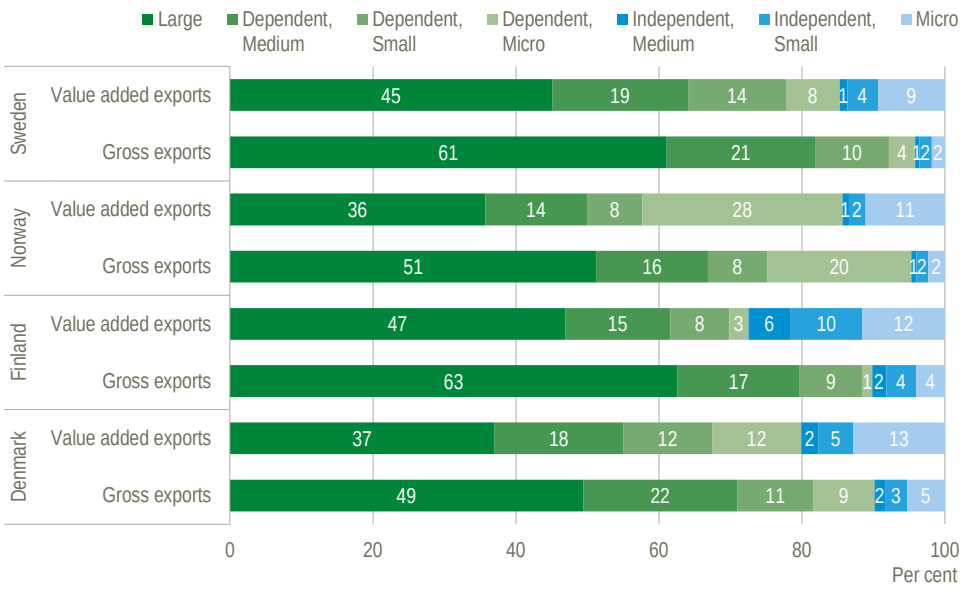
Figure 2.6 Exported domestic value added as per cent of total domestic value added. 2013



…so the contribution of SMEs to overall exports is larger than traditional statistics suggest

Because SMEs play a significant role as upstream suppliers to other enterprises, gross trade data based on who the direct exporter is do not reveal the 'real' contribution of SMEs to exports. Figure 2.7, for example, shows that the share of SMEs in exports by the market sector is 12 percentage points (Denmark) to 16 percentage points (the other countries) higher in value added terms compared to gross terms. Indeed over half of the value of exports in value added terms in the market sector is created by SMEs in all Nordic economies.

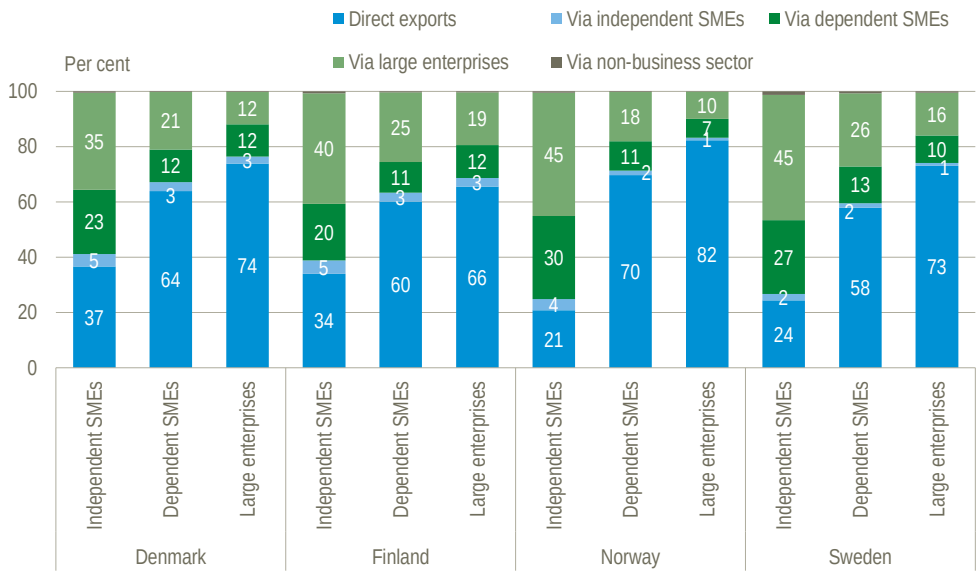
Figure 2.7 Shares of firms in gross exports and in exported domestic value added of the market sector. 2013



Dependent SMEs are particularly important as channels of indirect exports of other firms

Figure 2.8 provides an overview of the main channels through which output by different types of firms are linked to foreign markets. One striking aspect is the scale of dependent SMEs to act as conduits for independent SME. Indeed around one third of all indirect exports by independent SMEs is channelled through dependent SMEs in all four large Nordic economies.

Figure 2.8 Exported domestic value added, by firm type and channel to foreign markets. 2013

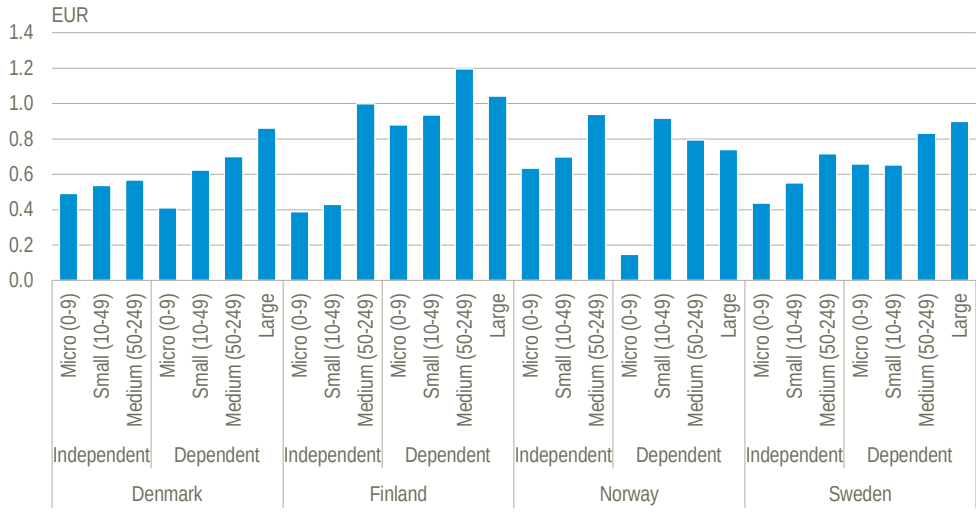


Upstream spill-overs from large firms are significant

Large enterprises have significant upstream supplier chains. In all four Nordic countries each unit of value added by large firms generates roughly the same amount of value-added in upstream suppliers (Figure 2.9). This partly reflects the stronger focus of large firms on their core business functions but also in part their position in value chains, which is typically downstream, at least compared to other firms in the economy. For each Euro of value added by large firms an additional 0.74 (Norway) to 1.04 (Finland) Euros of value-added is generated by upstream domestic suppliers. Smaller firms have much smaller multipliers, as they are less likely to outsource parts of production or auxiliary business processes: each Euro of value added produced by independent micro enterprises generates only an additional 0.39 (Finland) to 0.63 (Norway) Euro of upstream domestic value added. In

general the smaller the enterprise, the less value its exports generate in upstream suppliers, especially for independent SMEs. In this respect it's useful to recall that, typically, the larger the firm the larger the import content of their exports, so, in other words, higher import content of exports can go hand in hand with strong domestic supply chains.

Figure 2.9 Value added generated at domestic suppliers for 1 Euro of domestic value added at exporter, by firm type. 2013

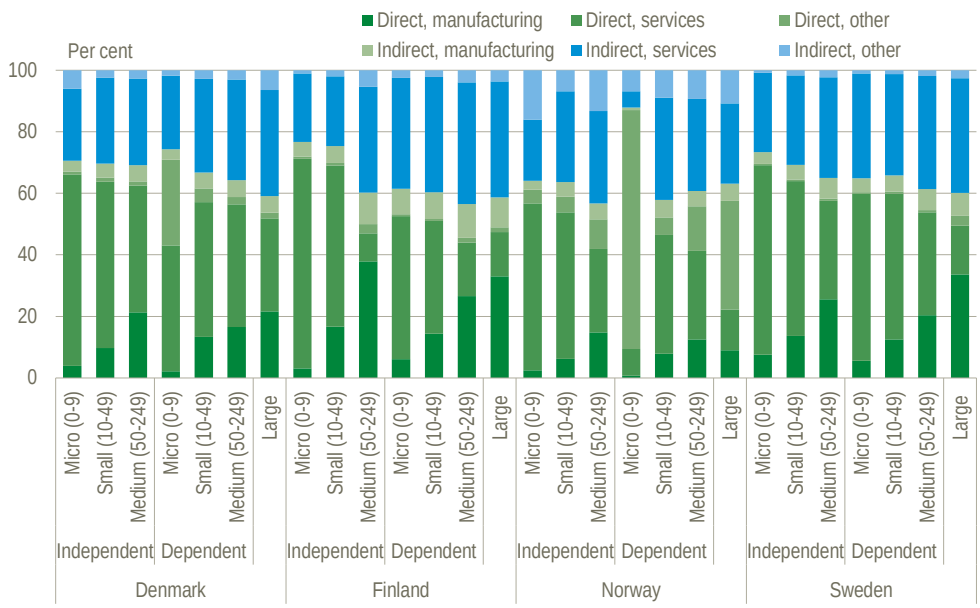


2.4 Manufacturing and services exports

Upstream services play a significant role in the value chain

As described in Chapter 1, services play a much more important role in exports than is evident from traditional gross trade figures. In the Nordics, services account for 41 per cent of gross exports of the main manufacturing industries, highlighting the importance of efficient logistic services providers, and specialised business services such as accounting and legal services for manufacturing exports. Figure 2.10, which decomposes the value added of exports of given categories of firms into the origin of the underlying value-added produced directly and indirectly in producing the exports, shows that the backward linkages and upstream services supply channels are significant for all categories of exporting firm.

Figure 2.10 Decomposition of domestic exported value added, by firm type. 2013



... and upstream services are important not only for services industries but also exports of goods

Figures 2.11a to 2.11d show that the (upstream) services content of manufacturing exports is significant for almost all categories of firm in the top 3 manufacturing export industries in each Nordic country; representing around one-quarter of the total value of exported domestic value-added in those industries.

Some care is however needed in interpretation, particularly for exports by smaller enterprises (where the numbers of exporting firms is typically small and can be volatile, for example, in 2013 only 41 Danish small enterprises in chemical manufacturing were involved in direct exports). Changes in sourcing strategies in one or a few firms, therefore, or simple enterprise dynamics (e.g. the birth or death of an enterprise, moving to a different size class, merger or acquisition) can have a large impact on the total outcome of the size class.

Figure 2.11a Domestic services value added, per cent of gross exports of Top 3 manufacturing industries. Denmark

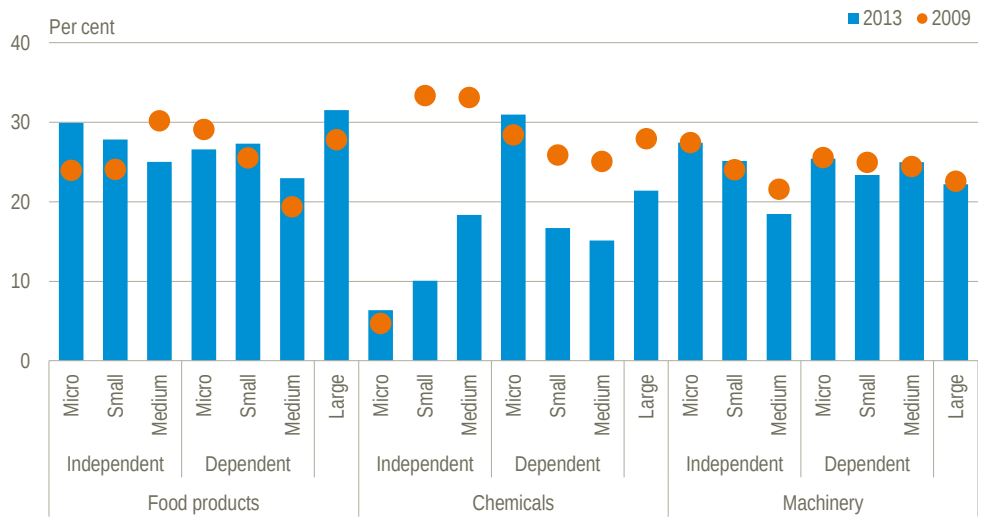


Figure 2.11b Domestic services value added, per cent of gross exports of Top 3 manufacturing industries. Finland

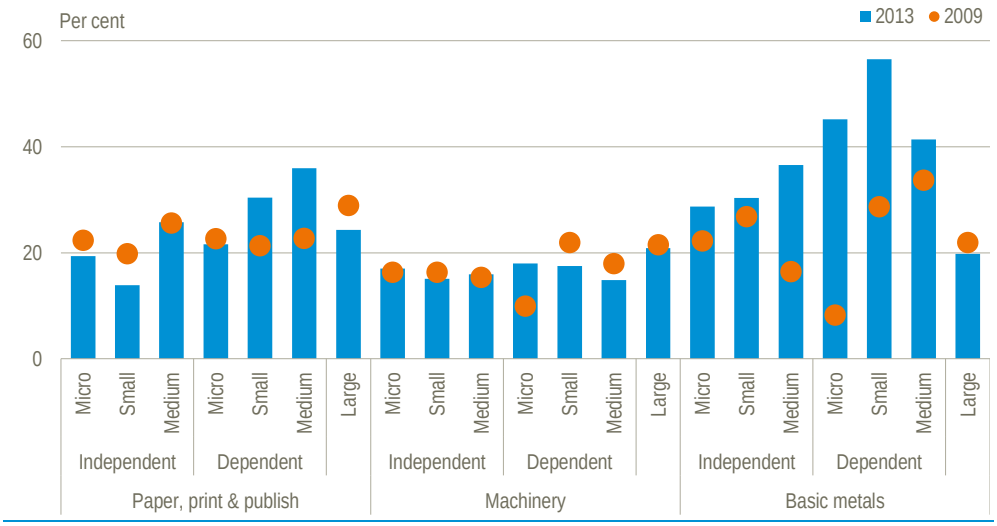


Figure 2.11c Domestic services value added, per cent of gross exports of Top 3 manufacturing industries. Norway

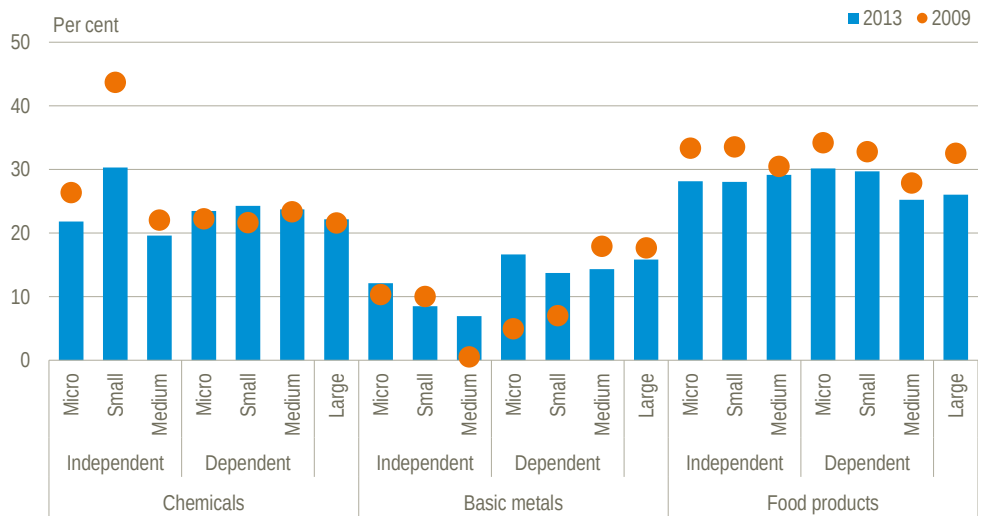
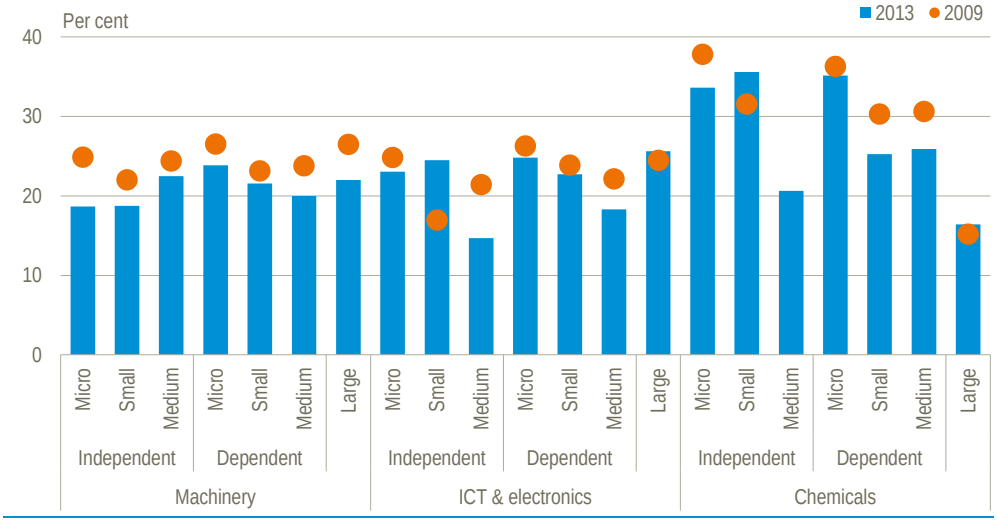


Figure 2.11d Domestic services value added, per cent of gross exports of Top 3 manufacturing industries. Sweden



2.5 Geographical orientation of GVCs: Nordic or global focus?

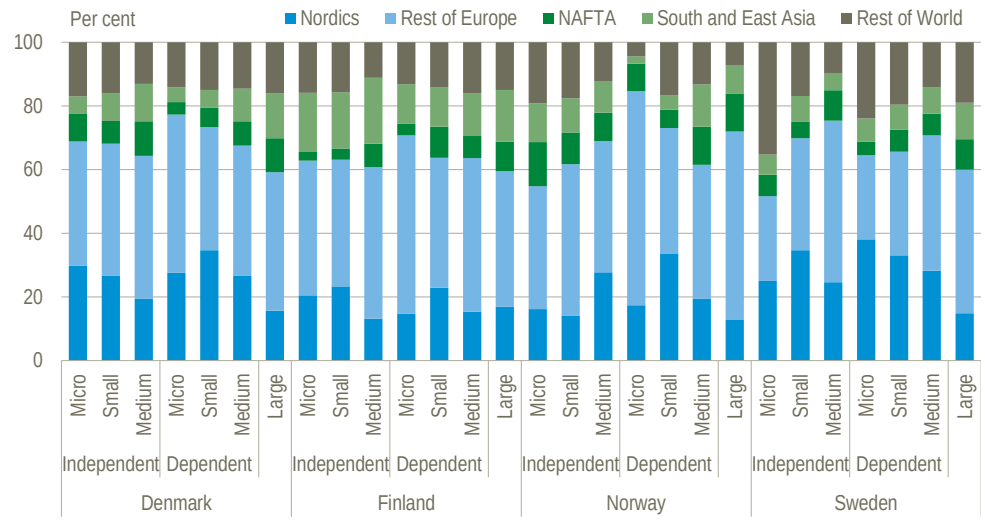
Larger firms export proportionately more to more distant markets than SMEs, particularly dependent SMEs

Geographical distance and the associated transportation costs remain an important factor in the shape of GVCs, which explains why most countries trade goods, predominantly with economies close to home. Figure 2.11 shows that this holds equally true for Nordic economies, with around two-thirds of gross exports destined for other Nordic countries or the rest of Europe. For most Nordic countries and category of firm, about 10 per cent of exports is destined for NAFTA[7].

That being said, the differences between large and small firms are not very significant. Around 40 per cent of large firms' exports go outside of Europe compared to around 1/3 for SMEs. But independent SMEs have a wider outreach than dependent SMEs, likely reflecting the integration of dependent SMEs into the wider regional production network of their parents.

[7] The North American Free Trade Agreement (NAFTA) includes Canada, Mexico and the United States of America.

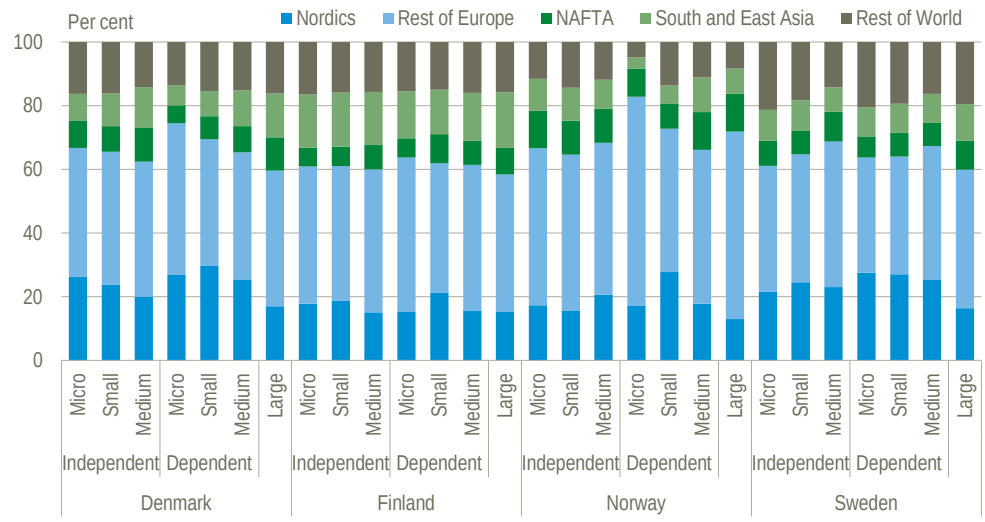
Figure 2.12 Geographical distribution of gross exports, by firm size, per cent of total exports. 2013



... but interdependencies with more distant markets are marginally larger in value added terms

When presenting the same graph from a value added perspective (Figure 2.13), a similar pattern emerges, although in most cases interdependencies with markets further afield are slightly stronger than in gross terms, as intermediate inputs pass through global supply chains on their way to final consumers. Nevertheless regional markets remain significant; around two-thirds of Nordic value added in exports are ultimately consumed in other Nordic countries and other European countries.

Figure 2.13 Geographical distribution of domestic value added exports, by firm size, per cent of total exports. 2013



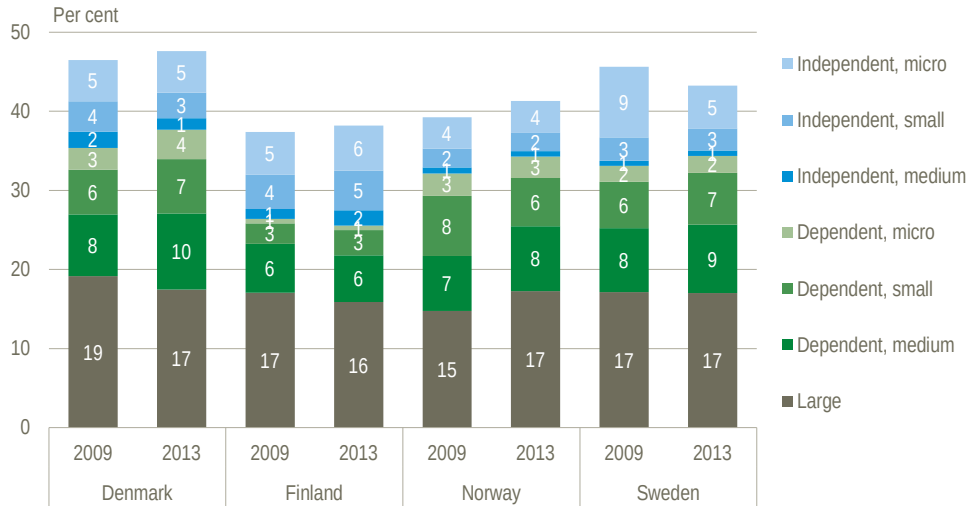
2.6 Nordic employment driven by GVCs

Over 40 per cent of employment in the market sector in the Nordics is dependent on exports

International trade and global value chains are not only important for economic production and value added generation in the Nordic economies, but also for employment. Overall, over 40 per cent of employment in the market sector of the Nordics is directly or indirectly dependent on exports. This translates to 1.3 billion hours worked in Denmark, 1.1 billion hours in Finland, 1.2 billion hours in Norway and 2.4 billion hours in Sweden. Figure 2.14 provides a breakdown of these export-dependent jobs by firm size, illustrating that: 17 per cent of total employment in the market sector reflects export dependent jobs in large firms, 16 per cent in dependent SMEs and 10 per cent in independent SMEs. Note that non-market activities are not included in Figure 2.14. As a consequence, employment dependent on ex-

ports as a share of total economy employment is lower, varying from 28 per cent in Finland to 32 per cent in Denmark.

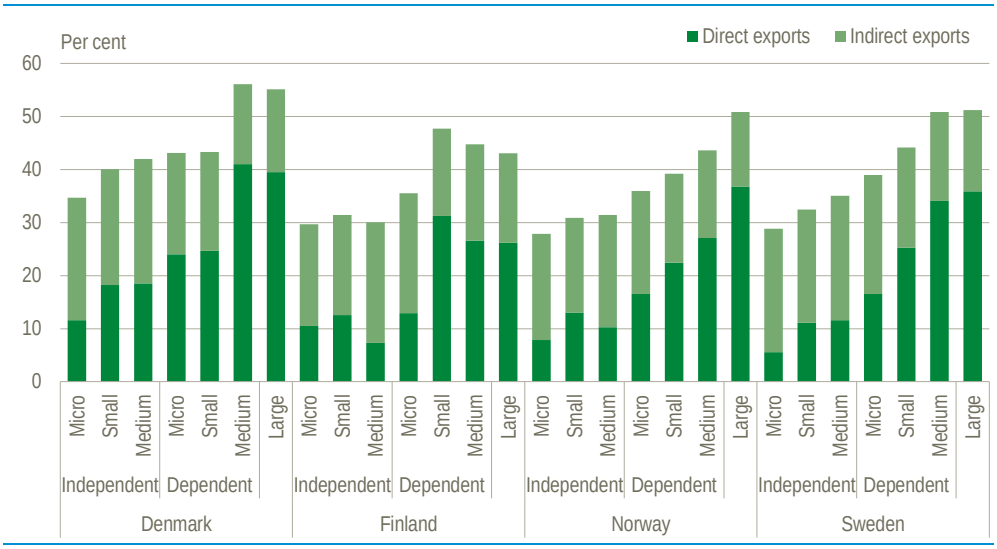
Figure 2.14 Employment embodied in exports, by firm type, as per cent of total employment in market sector



Two-thirds of all export-dependent jobs in independent SMEs are driven by indirect integration

The importance of foreign markets for employment differs significantly by firm type as shown in the Figure 2.15. The larger the firm, the larger the share of employment that is dependent on exports – either directly, or indirectly. The share of employment sustained by exports at large enterprises varied from 43 to 55 per cent, across the four largest Nordic countries, compared with only 28 to 35 per cent in independent micro enterprises. Employment at dependent SMEs is also more likely to be sustained by foreign markets than employment at independent SMEs. However the relative importance of upstream integration is particularly significant for independent SMEs, with indirect channels typically sustaining more jobs than direct export channels. These findings reinforce the point that small and independent enterprises are more likely to be indirectly engaged in international trade, as suppliers to larger firms. This also reveals that 'traditional' data on the number of employees at exporting independent SMEs grossly underestimate the number of jobs at these firms that are dependent upon foreign final demand.

Figure 2.15 Share of domestic employment that is embodied in exports, by firm type, per cent of total employment. 2013



3 Foreign and Nordic multinationals in GVCs

3.1 Introduction

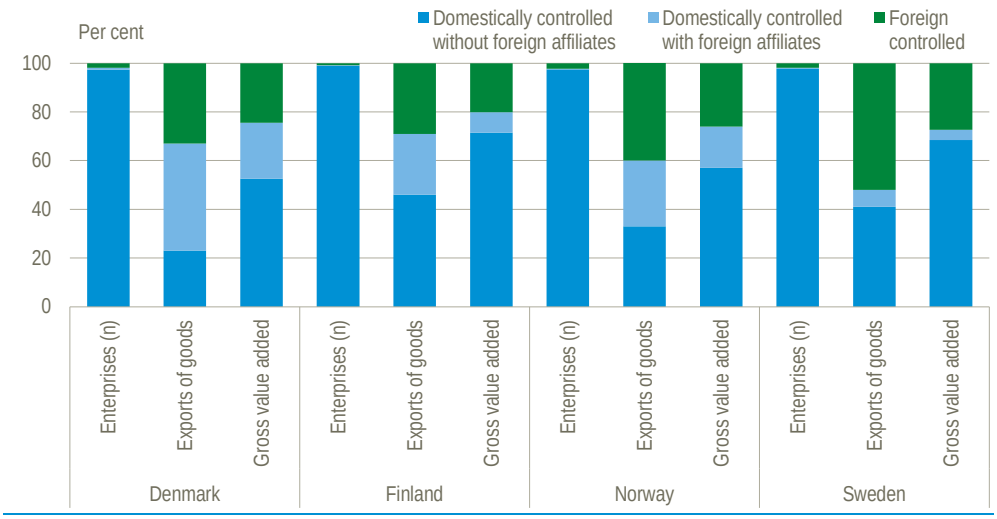
Foreign owned enterprises account for a substantial share of the economic activity in Nordic countries. This chapter analyses how these foreign owned enterprises also shape the role of Nordic countries in GVCs and describes the interrelationships between foreign investment and international trade, and importantly the size of spill-overs generated by MNEs.

3.2 Foreign owned enterprises and Nordic Multinationals

Less than 2 per cent of all enterprises in the Nordics are foreign owned, but these firms account for 20 per cent of employment and on average a quarter of economic activity in the business economies of the Nordics

Foreign owned enterprises only account for 1.7 per cent of the total population of enterprises within the non-financial business economy[8] in the four Nordic countries where data are available – Denmark, Finland, Norway and Sweden – ranging from under 1 per cent in Finland to 2.3 per cent in Norway. However, foreign owned enterprises are of considerable importance in economic and employment terms, accounting for 21.4 per cent of total employment in these four countries – ranging from 17.2 per cent in Finland to 23.1 per cent in Sweden. Foreign owned enterprises also generate a considerable share of the total gross value added in the four Nordic countries, ranging from 20.1 per cent in Finland to 27.3 per cent in Sweden.

Figure 3.1 Foreign and domestic MNEs in the Nordics, per cent of type of firm in the business economy. 2013



Domestic MNEs are also few, but also important in employment and economic activity…

Figure 3.1 also shows that the number of Nordic multinational enterprises (domestically controlled enterprises with foreign affiliates) is even smaller, but that these enterprises, too, account for substantial shares in employment and value added – indeed, relatively more so than foreign owned firms in Denmark, where approximately 1,700 domestic multinationals (less than 1 per cent of the total enterprise population) employ nearly 20 per cent of employees and produce more than 20 per cent of Danish value added.

[8] In NACE Rev. 2 the non-financial business economy consists of industries B up to N minus K (financial and insurance activities), including S95. See Table A.3 for more details. The figures in section 3.2 concern the non-financial business economy; figures in the rest of the chapter concern the market sector, defined as the business economy including agriculture and financial services.

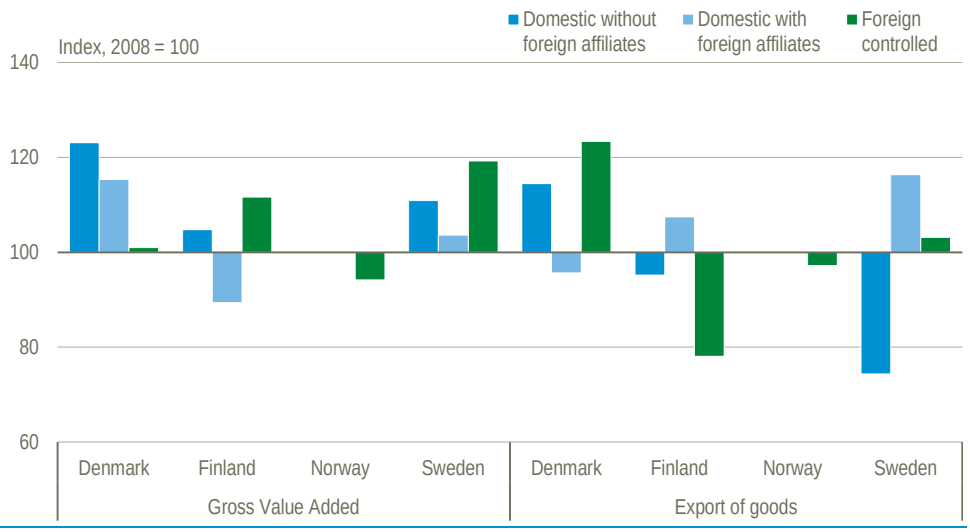
… as well as in exports, especially for national strongholds such as Danish pharmaceuticals… albeit with significant variability across countries

Foreign controlled enterprises are also responsible for a significant share of direct exports of goods in all countries; the majority in the case of Sweden (54 per cent). But significant differences exist across countries: it is 41 per cent in Norway, 33 per cent Denmark and 29 per cent in Finland. In Finland, nearly half of all exports is from domestically owned enterprises without foreign affiliates, while in Denmark the largest share of exports comes from domestic multinationals, driven in large part by Danish owned MNEs in the pharmaceuticals sector.

Post crisis performance by category of firm has been mixed across countries

Changes in value-added per employee over time provide potential insights into the upgrading process and indeed pointers to international competitiveness (after adjusting for exchange rates). Although some care is needed in interpretation when looking at the whole economy as this will mask structural shifts at the industry level, interesting insights emerge when comparing the relative performance of different categories of firms across countries. Of particular interest in this regard is the observation that improved labour productivity does not always translate into higher exports (in gross terms); as might occur for example if a firm outsourced lower productivity activities and chose to specialise in upstream parts of the value chain. Domestic owned firms without foreign affiliates for example saw an increase in value added per FTE in all countries. However, exports per FTE in this category of firms declined in Finland and in Sweden.

Figure 3.2 Growth in value added and exports of goods per FTE. 2008-2013

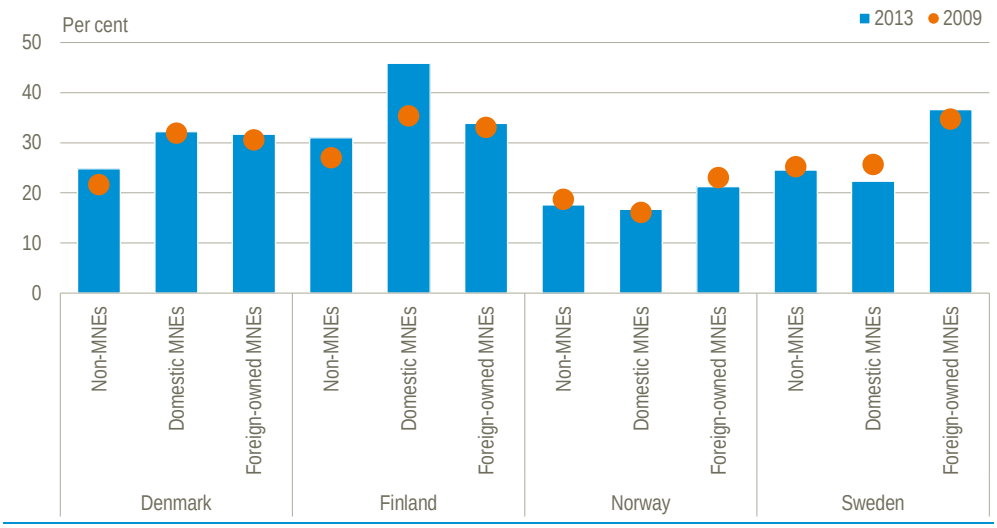


3.3 Direct and indirect domestic value added generated MNEs

Foreign-owned multinationals and Nordic MNEs use disproportionately more imports in production than non-multinationals

Enterprises that are involved in international investment, either as a subsidiary or as a parent, are typically highly integrated into GVCs. It is not surprising therefore that the overall import content of exports of foreign and domestic multinational enterprises is usually higher than that of other firms in each of the Nordic countries. For example, the import content of exports of foreign multinationals in Sweden is 12 percentage points higher than that of non-multinationals (Figure 3.3). Of particular note is the relatively high import content of exports of Finnish domestic MNEs, partly reflecting the high concentration of domestic MNEs in manufacturing chains, which use more imports than, for example, services.

Figure 3.3 Import content of exports as per cent of gross exports, by type of firm



Non-MNEs primarily participate in GVCs as suppliers to exporting enterprises (domestic or foreign owned MNEs)

The dependency of MNEs on international trade is also evident by looking at their share of overall value added that is destined for exports. Figure 3.4 shows that this is much higher for domestic and foreign MNEs (between 52 per cent and 84 per cent of the value added they produce is exported directly or indirectly) than for non-MNEs. For non-MNEs, only 35-41 per cent of value added ends up abroad, the majority of which is via indirect channels (i.e. as suppliers to multinationals).

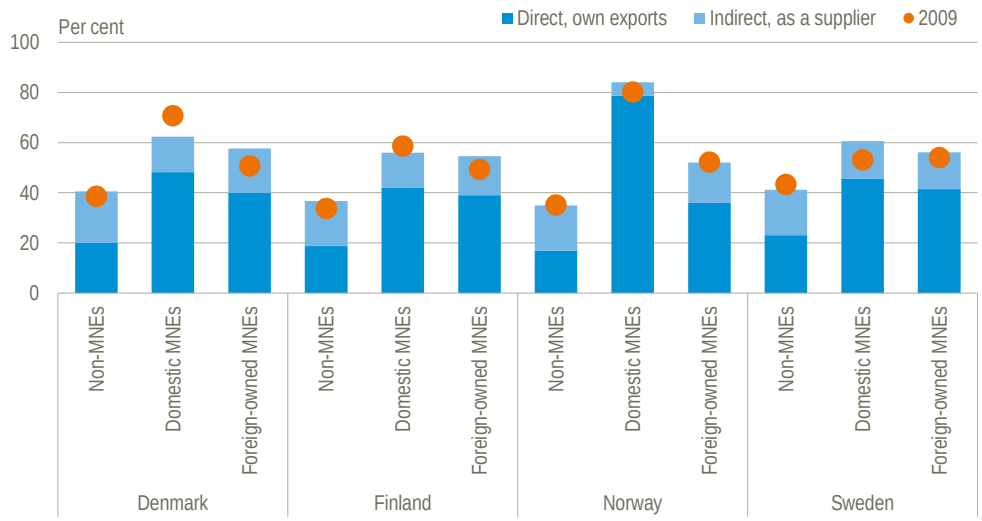
But at the same time, foreign investors in the Nordics produce for the local market: almost half of the value added they produce is consumed in the host country

The production of foreign MNEs in the Nordics is however *less* dependent on exports than that of domestic MNEs. Almost half of the value added that these firms produce (on average 45 per cent) is consumed in the Nordic country in which they invest, and not exported to other countries. This implies that while some foreign investors may use the Nordics as either a hub to export, capitalising for example on the availability of high skilled labour (and R&D), almost half of investment in the Nordics can be characterised as domestically orientated.

MNEs that are headquartered in the Nordics (domestic MNEs) form the group of enterprises that export most of the domestic value added they produce. Yet, with the exception of Norway, about 40 per cent of domestic production of these companies is consumed nationally. Only Norwegian MNEs are far more dependent on foreign economies than on their domestic market, with exported value added amounting to 84 per cent of the total value added that they produce – again the majority of these exports are products of the mining industry.

Note that Figure 3.4 only shows estimates for the market sector, and therefore excludes non-market activities. At the total economy level value added as per cent of total domestic value added varies from 29 per cent for Finland to 36 per cent for Norway.

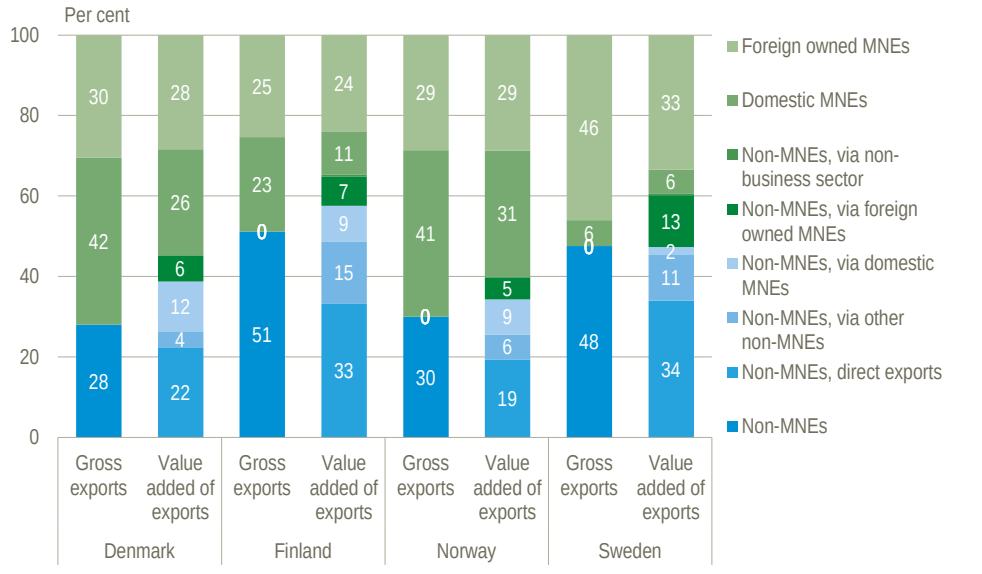
Figure 3.4 Value added due to exports as per cent of total value added. 2013



Domestic MNEs are a key channel to access foreign markets for domestic enterprises with no foreign affiliates

Partly because domestic MNEs have high export dependencies they also act as a key conduit to foreign markets for the value added produced by non-MNEs. In each of the Nordic countries the share of non-MNEs in value-added terms is 10 percentage points or more higher than in gross terms (Figure 3.5). Of particular note is the fact that the share of foreign owned MNEs is similar in Denmark, Finland and Norway in gross and in value added terms, reflecting, in part, an upstream contribution via downstream domestic MNEs. Figure 3.5 also shows foreign MNEs play a significant role in helping Swedish non-MNEs to access foreign markets, with 13% of total domestic value added exports in Sweden originating in non-MNE upstream suppliers to foreign MNEs.

Figure 3.5 Gross exports and domestic value added exports by firm type. 2013

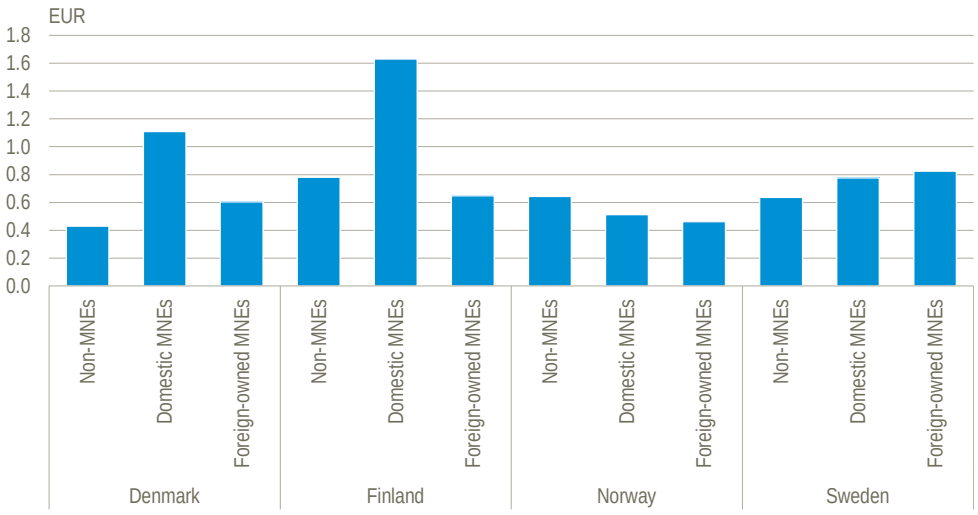


Foreign investors generate between 46 to 82 cents of additional domestic upstream value added for each Euro they produce but domestic MNEs have even stronger spill-overs

The greater role played by domestic MNEs in generating domestic backward linkages is further illustrated in Figure 3.6, which shows the amount of value added by upstream domestic suppliers for each unit of value added exported directly. In Denmark and Finland, domestic MNEs have strong domestic backward linkages, with 1.1 to 1.6 units of additional upstream value added generated for each unit of value added they produce themselves.

Foreign MNEs on the other hand generate significantly lower domestic backward linkages than domestic MNEs, between 0.46 to 0.82 units of additional value added for every unit of exported value added, partly reflecting their upstream, position in domestic value chains. Non-MNEs, particularly in Finland, Norway and Sweden, are also strongly embedded in national production networks, generating between 0.63 to 0.78 units of upstream value added in the three countries.

Figure 3.6 Value added generated at domestic suppliers for 1 Euro of domestic value added at exporter, by firm type. 2013



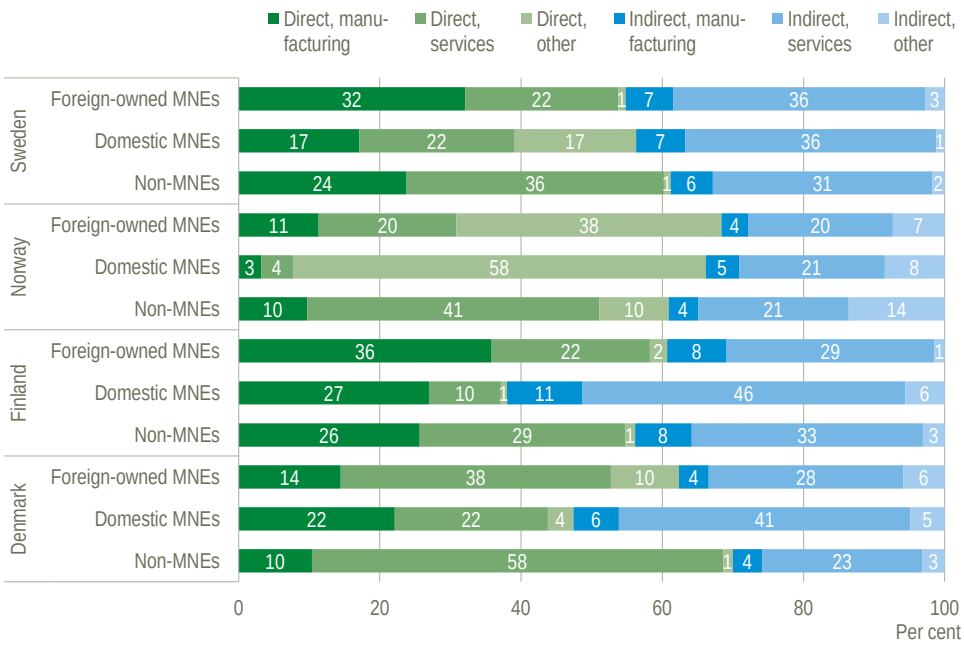
3.4 Upstream services suppliers to multinationals

Upstream services play an important role in all downstream firms, and provide important insights on competitive strength

As observed in Chapters 1 and 2, a large part of the upstream value added embodied in exports is produced by the service industry, highlighting that an efficient domestic services industry – involving logistics functions as well as a variety of business services – is an important contributor to the export success of manufacturing firms as well as other downstream services providers.

However the role of these domestic services providers varies by type of enterprises. For example, in Denmark and Finland up to 45 per cent of the domestic value added exported by Domestic MNEs consists of upstream services, but only around 25-30 per cent for foreign affiliates, Figure 3.7. This partly reflects differences in industrial structures. Foreign owned MNE exporters in Denmark, for example, are predominantly in the services sector, where upstream requirements are generally smaller. This also partly explains why differences are less pronounced in Sweden and in Norway, (reflecting in large part the mining industry).

Figure 3.7 Decomposition of exported domestic value added by firm type, per cent. 2013



That being said, examining the role of services in the Top 3 value added exporting manufacturing industries, provides a similar message; namely that, in general, domestic MNEs have larger upstream services chains than other firms; even if there is some variation across individual industries. In Denmark, the share of domestic upstream services in exported value added is higher for domestic MNEs than for foreign MNEs in all the Top 3 industries. In Finland, the use of upstream services by domestic MNEs in Basic Metals stands out, and again the value added exports of foreign MNEs tend to include less upstream domestic services. Value added exports by foreign MNEs in Norway and Sweden also include relatively fewer upstream domestically produced services. Exports by non-MNEs in Sweden also build strongly on local services suppliers, particularly in Chemicals and in ICT.

Figure 3.8a Domestic services value added, as per cent of gross exports of Top 3 manufacturing industries. Denmark. 2013

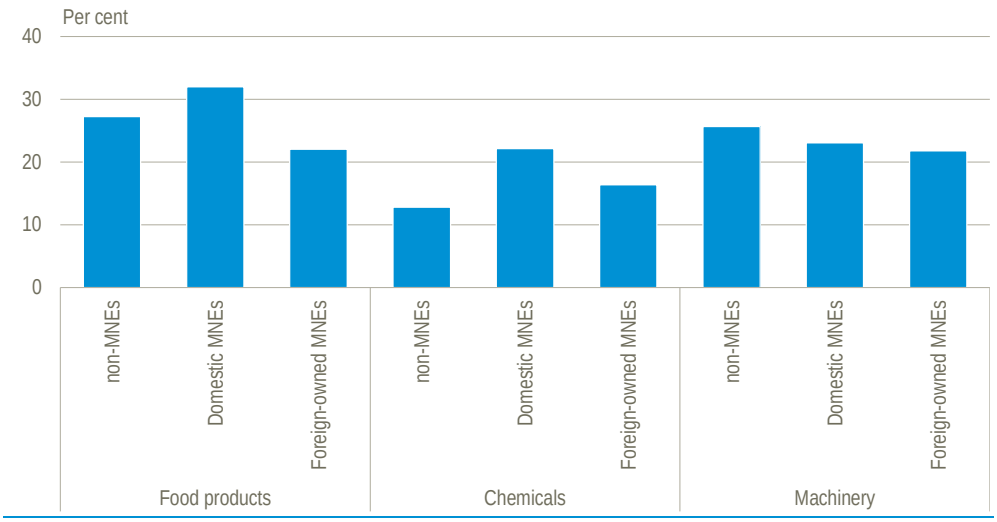


Figure 3.8b Domestic services value added, as per cent of gross exports of Top 3 manufacturing industries. Finland. 2013

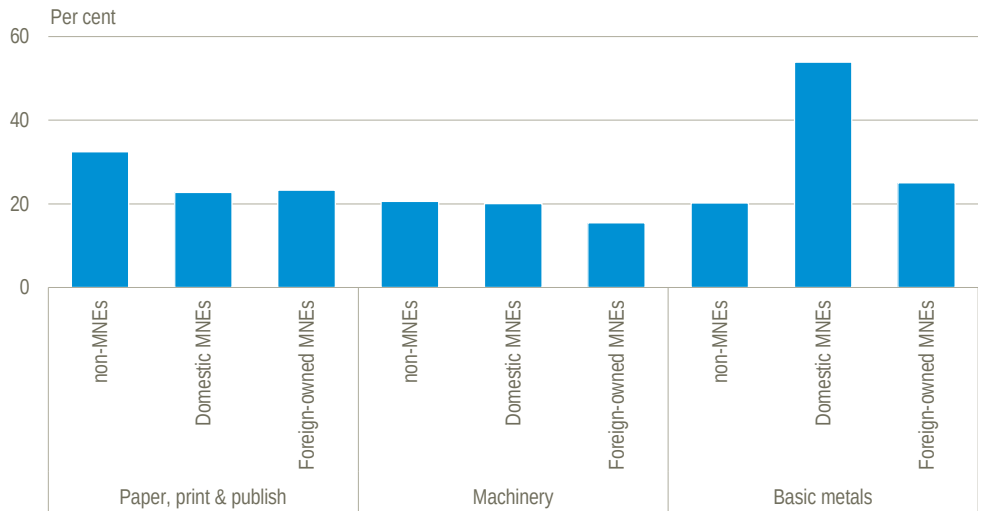


Figure 3.8c Domestic services value added, as per cent gross exports of Top 3 manufacturing industries. Norway. 2013

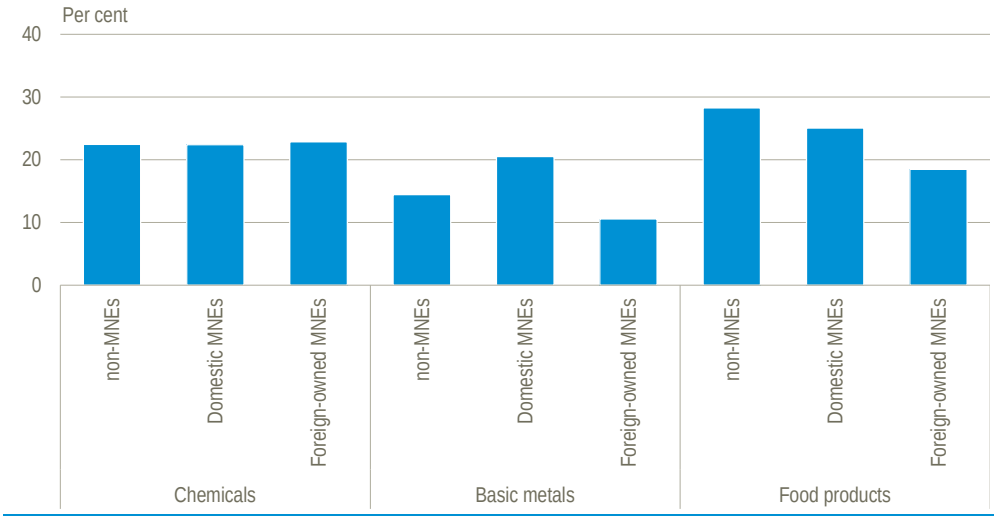
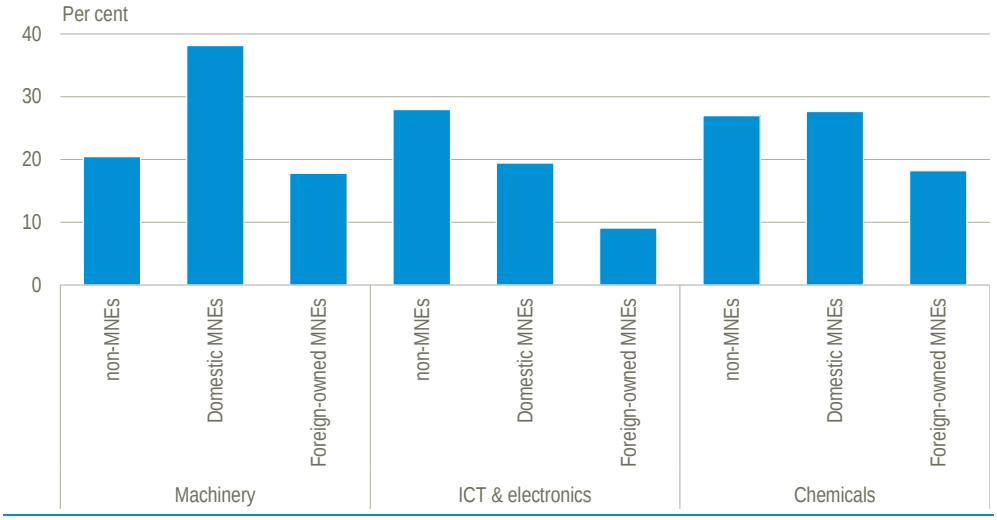


Figure 3.8d Domestic services value added, as per cent of gross exports of Top 3 manufacturing industries. Sweden. 2013



3.5 Geographical scope of GVCs: foreign owned MNEs as gateways?

Extra-regional trade patterns of domestic and foreign MNEs vary across Nordic countries

The geographical distribution of gross exports of the different types of enterprises in the Nordic countries differs across countries (Figure 3.9). Danish MNEs for example are strongly outward oriented with more than 40 per cent of exports directed to non-European destinations, while foreign owned MNEs in Denmark have a much greater focus (than Danish MNEs) on serving the Nordic region. In Finland, in contrast, domestic MNEs are slightly more regionally focused (Nordics and Europe) and nearly half of exports by foreign owned enterprises are destined for non-EU markets. Norwegian MNEs are very strongly focused on EU markets, whereas export patterns of the different types of enterprises operating in Sweden are remarkably similar.

Geographical patterns are broadly similar in value-added terms, although, in general, intra-regional trade is slightly less important for all categories of firm as value is passed through Nordic value chains on its way to final destination markets, typically in Europe and the NAFTA zone.

Figure 3.9 Geographical distribution of gross exports, by firm type. 2013

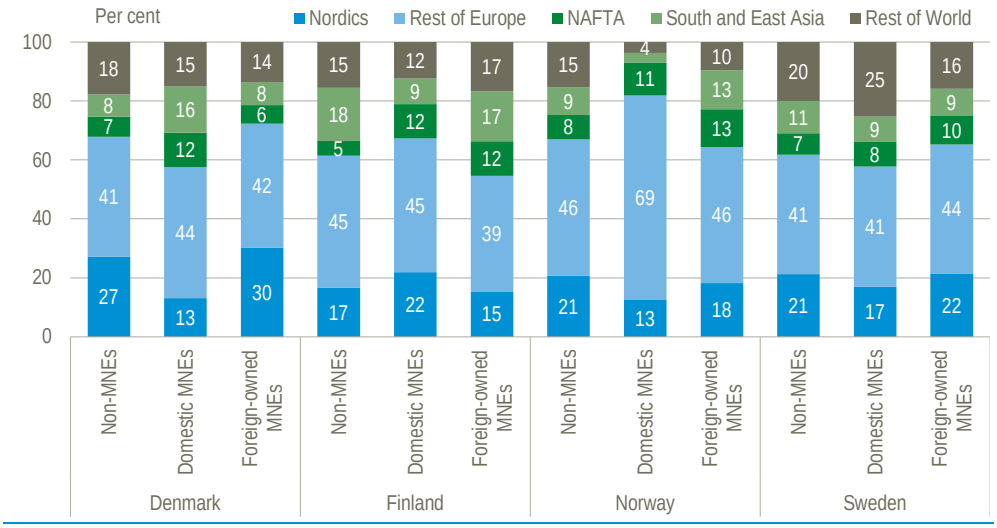
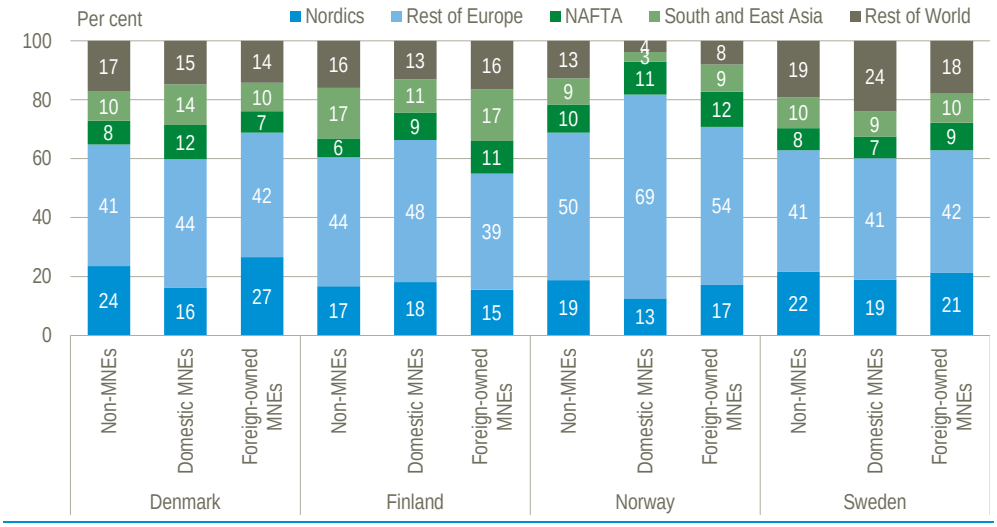


Figure 3.10 Geographical distribution of domestic value added exports, by firm type. 2013

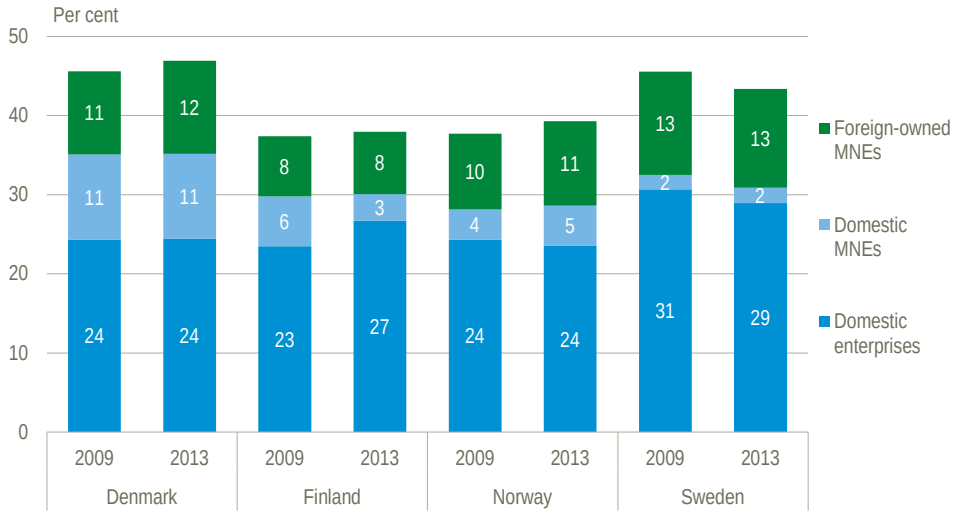


3.6 Employment in GVCs: dependency on foreign markets

The majority of jobs sustained by foreign final demand are in non-MNEs

Due to the strong ties of the Nordic countries with other economies, a large share of employment in the market sector is sustained by foreign final demand. Figure 3.11 shows that this varies from 47 per cent in Denmark to 38 per cent in Finland. Most of these employees work at non-MNEs, but a substantial share, around one quarter, of all jobs sustained by foreign final demand, is in foreign owned multinationals. Note that the figures below do not include non-market activities. As a share of total employment the number of jobs dependent on exports varies from 28 per cent in Finland and Norway to 32 per cent in Denmark.

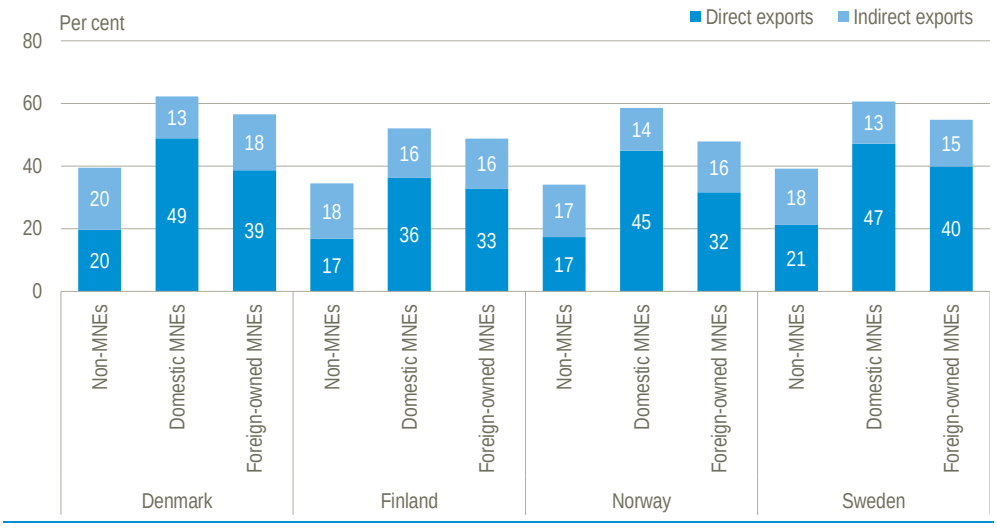
Figure 3.11 Employment embodied in exports, by firm type, as per cent of total employment in market sector. 2013



But more than half of employment at domestic MNEs is dependent on foreign final demand – a higher share than among foreign controlled MNEs and non MNEs

Although most jobs sustained by exports are in non-MNEs, workers in domestic MNEs have greater export dependencies. On average 37 per cent of total employment at non-MNEs is dependent on foreign final demand, compared to 58 per cent for domestic MNEs and 52 per cent for foreign controlled affiliates. Indeed the share of export-dependent employment at foreign controlled affiliates is lower than at domestic MNEs in all Nordic countries, illustrating again the higher export orientation of domestic MNEs. Interestingly, amongst non-MNEs, around half of all export-dependent jobs are sustained through indirect integration (i.e. as upstream suppliers in domestic value chains for exporting firms).

Figure 3.12 Share of employment embodied in exports, by firm type, as per cent of total employment. 2013



4 Non-trading enterprises: indirect insertion in GVCs

4.1 Introduction

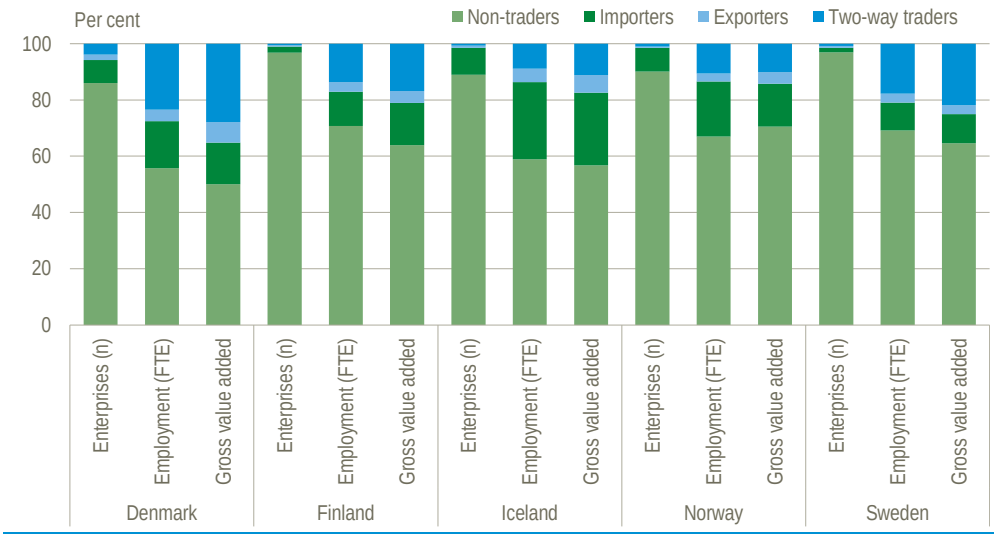
While the debate on firms engaged in GVCs generally focuses on large, multinational enterprises directly engaged in international trade and investment, the large majority of enterprises in any given economy tends NOT to trade internationally. However, this does not imply that these enterprises are not also engaged in GVCs, as was seen in earlier chapters highlighting the importance of upstream suppliers and domestic value chains to exporting firms. This chapter complements the earlier chapters by decomposing firms into four groups – those that only export ('exporters'), that only import ('importers'), that both import and export ('two way traders'), and those that do not trade internationally at all ('non-traders').

4.2 Trading and non-trading enterprises in the Nordics

Only 6 per cent of Nordic enterprises is engaged in trade, but these trading firms account for 34 per cent of employment in the business economy

Non-trading enterprises that are neither engaged in exporting or importing goods constitute by far the largest group of enterprises in Nordic countries accounting for 94 per cent of all enterprises, and 66 per cent of total employment in the non-financial business economy[9] (Figure 4.1). Two-way traders by contrast, account for only 1.2 per cent of all enterprises, but do account for 16.3 per cent of employment. Enterprises categorised as exporters (i.e. not engaged in import of goods) account for less than 1 per cent of enterprises and 3.4 per cent of employment, while importers (enterprises not engaged in exports) account for 4 per cent of enterprises and almost 14 per cent of employment. However, significant differences exist across countries. For example, in Iceland and Norway, importers account for around 20 to 25 per cent of employment.

Figure 4.1 Number of enterprises, employment and value added by enterprise type, per cent. 2013



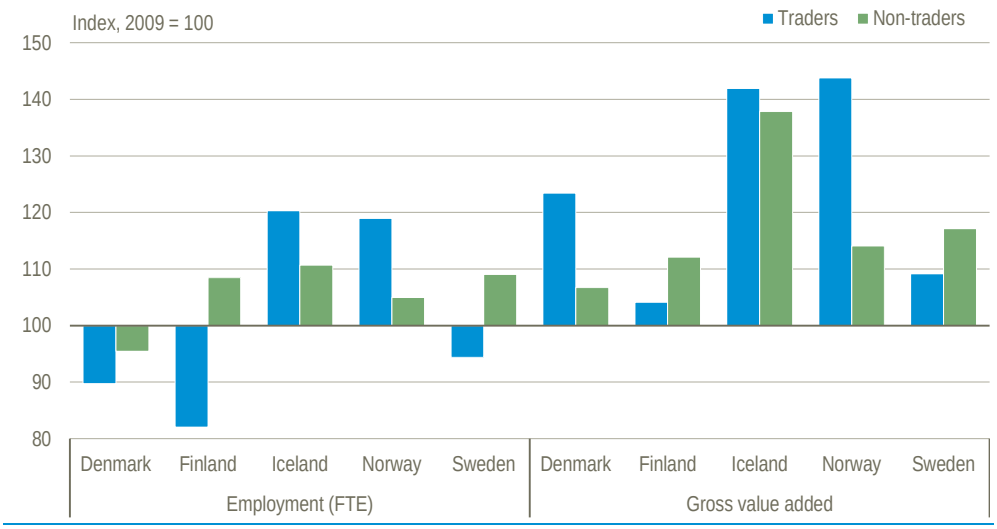
Trading enterprises rebounded strongly since the financial crisis… but not everywhere...

The height of the financial crisis saw a precipitous fall in trade, outpacing the fall in GDP. But in the years immediately following the crisis, value-added growth in trading firms recovered strongly and outpaced growth in non-trading firms in Denmark, Iceland and Norway (Figure 4.2). However value added grew faster in

[9] In NACE Rev. 2 the non-financial business economy consists of industries B up to N minus K (financial and insurance activities), including S95. See Table A.3 for more details. The figures in section 4.2 concern the non-financial business economy; figures in the rest of the chapter concern the market sector, defined as the business economy including agriculture and financial services.

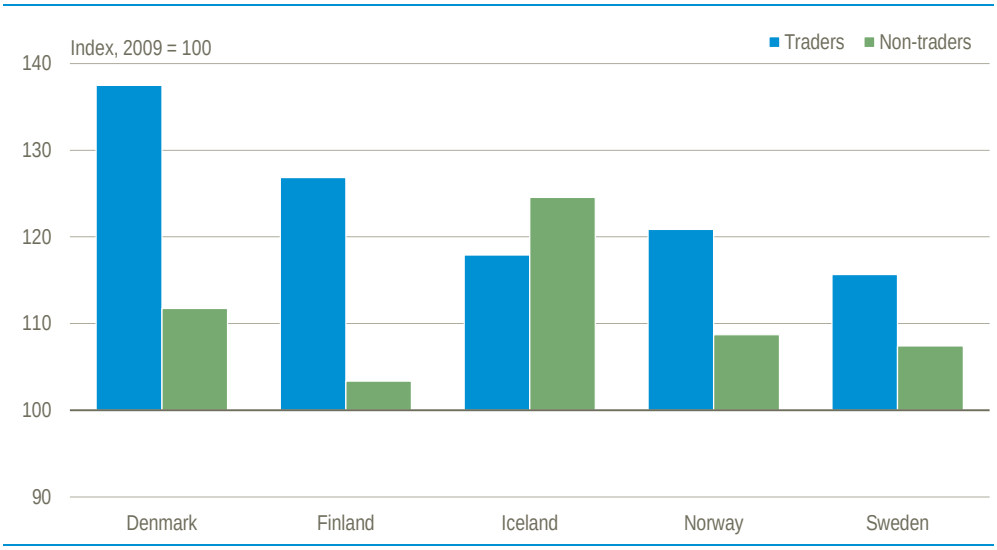
non-trading enterprises in Sweden and Finland. In addition differences also arise when looking at changes in employment. In Denmark, Finland and Sweden, employment at trading firms declined between 2009 and 2013, while employment in non-trading firms increased (or, in the case of Denmark, decreased less), and in Iceland and Norway, employment increased in both trader and non-trader enterprises, with growth amongst traders outpacing non-traders.

Figure 4.2 Growth in employment and gross value added per FTE, by enterprise type. 2009-2013



However looking at growth in employment and value added separately masks underlying changes in labour productivity, where strong messages emerge (Figure 4.3), revealing across the board growth in labour productivity (albeit in nominal terms) and, in particular, with the exception of Iceland, significantly higher productivity gains among traders compared to non-traders (although some care is needed in concluding causality and its direction).

Figure 4.3 Development in value added per employee, by firm type. 2009-2013



4.3 Trading and non-trading enterprises in global value chains

A quarter of value added of non-trading enterprises depends on foreign markets

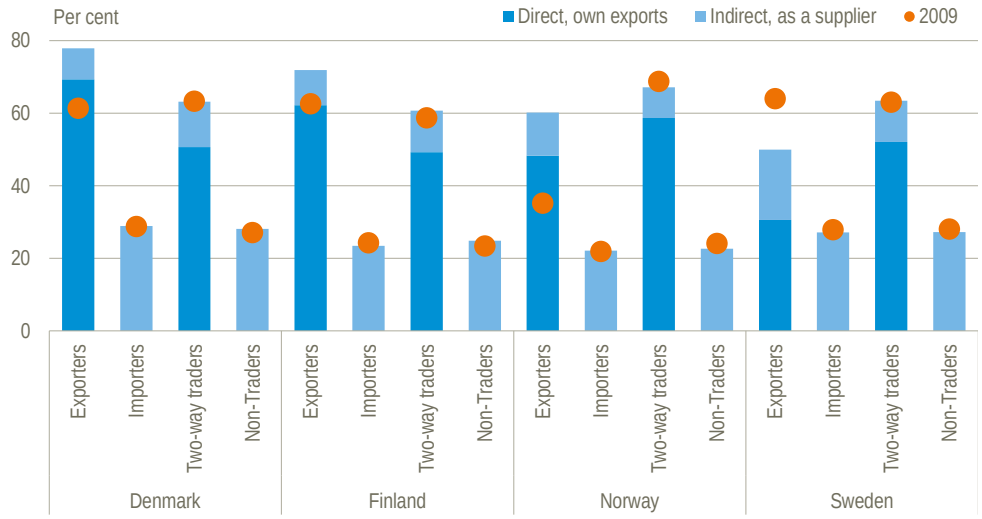
By definition, two-way traders are the enterprises most strongly and directly involved in Global Value Chains. As Figure 4.4 shows, on average, across the Nordics, approximately two-thirds of the value added produced by these enterprises is dependent upon exports, and the vast majority of this is also exported directly. Simi-

larly, a large share of output produced by exporting firms (that do not import) ends up in foreign final demand, again mostly via direct channels.

A key finding however, concerns the export-dependencies of non-exporting firms. Around 26 per cent of the total value added of enterprises that only import, or that do not trade at all, is dependent on exports, as these firms supply other enterprises that *do* export.

Note Figure 4.4 only shows estimates for the market sector, and not the non-market sector. Estimates of exported domestic value added as a per cent of total domestic value added vary from 28 per cent for Finland to 36 per cent for Norway.

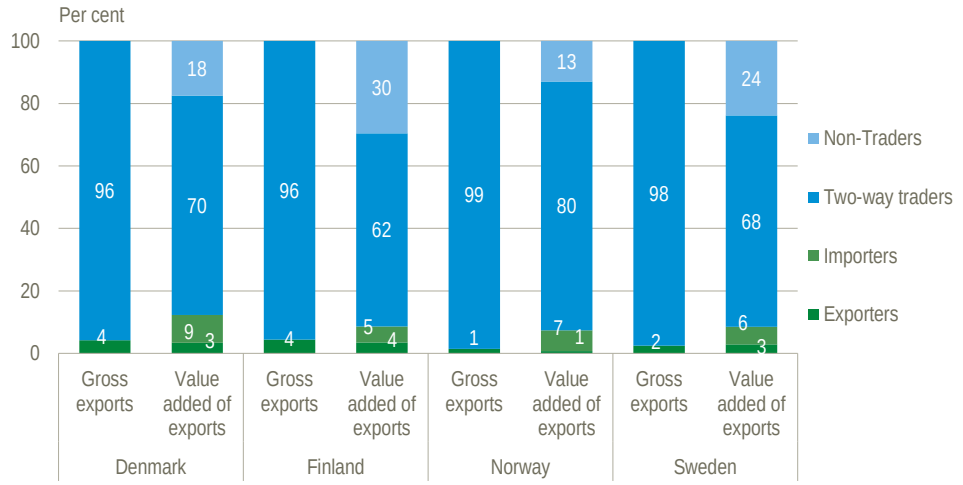
Figure 4.4 Value added due to exports, per cent of total value added. 2013



A quarter of exported domestic value added is produced by non-trading enterprises

The importance of the upstream role of non-traders can also be revealed when comparing the contribution of two-way traders to overall domestic value added exports. Although these firms are responsible for over 95 per cent of total exports in the Nordics, in value added terms they only account for between 60-80 per cent, with a large part of the difference reflecting the important upstream contribution of non-traders (Figure 4.5), ranging from 13 per cent (Norway) to 30 per cent in Finland, and around one-fifth of the total exports of domestic value added in the Nordics.

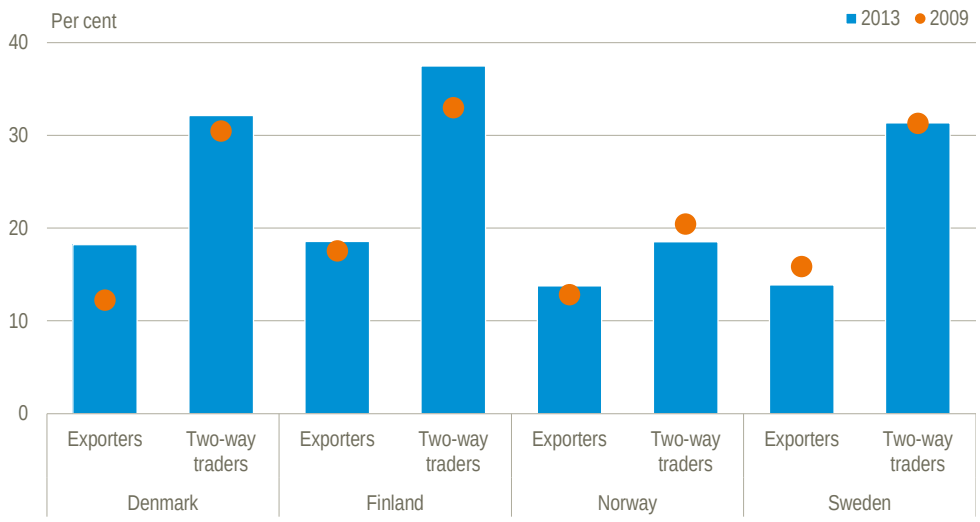
Figure 4.5 Gross exports and domestic value added exports, by firm type, per cent of totals market sector. 2013



Export success depends on imports

A large share of the domestic value added produced by exporting firms and two-way traders is destined for export markets. Such export success also depends on having access to high quality (and efficiently priced) imports, which firms can procure directly by importing themselves, or indirectly, by purchasing domestic intermediate products that in turn contain imported parts. Figure 4.6 illustrates the import content of exports of both two-way traders and of exporting firms (i.e. that do not import themselves). Evidently, the import content of exports is highest for two-way traders, ranging from 19 per cent in Norway to 37 per cent in Finland. But imports also account for between 14 per cent and 19 per cent of exports by pure exporting (only) firms, reflecting purchases through wholesale intermediaries as well as through more indirect channels, i.e. embodied in the intermediates provided by upstream domestic suppliers.

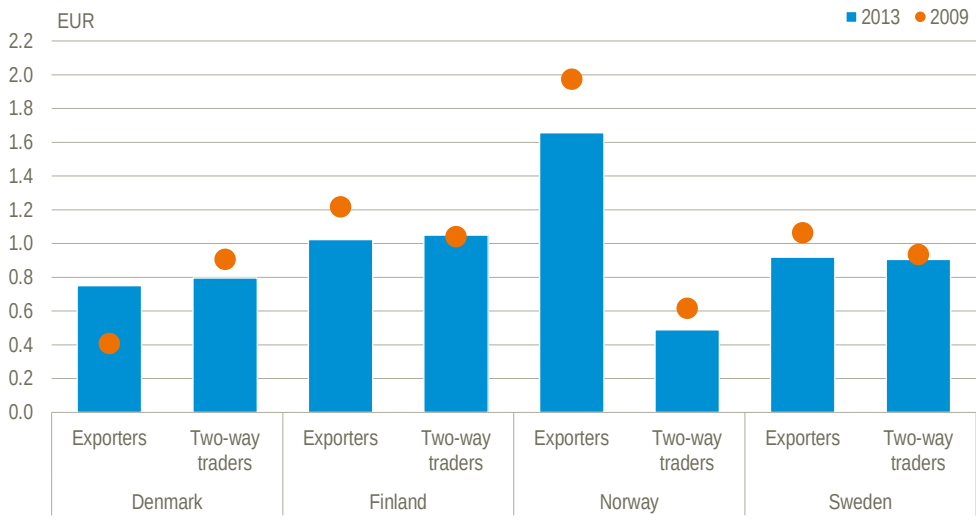
Figure 4.6 Import content of exports, as per cent of gross exports, by firm type



Two-way traders and exporters generate similar domestic backward linkages

Two-way traders and exporters generate similar backward domestic linkages (or domestic upstream value added) for each Euro of value added exported, as shown in Figure 4.7 (with Norway again an exception). Excluding Norway, for each Euro of value added that two-way traders produce (and export), they generate an additional 0.80 (Denmark) to 1.05 (Finland) Euros of value added in domestic upstream suppliers.

Figure 4.7 Value added generated at domestic suppliers for 1 Euro of value added at exporter, by firm type

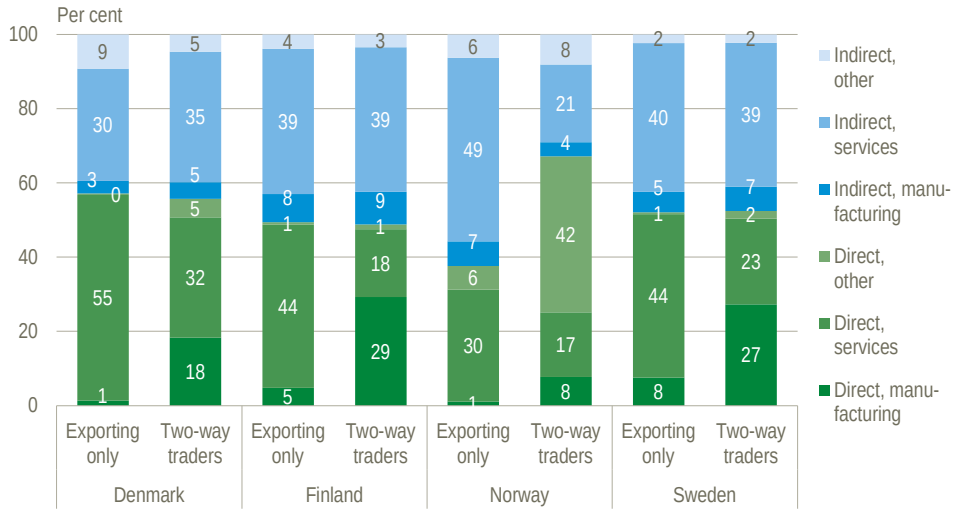


4.4 Goods and services embodied in exports

One-third of value added exported by two-way traders consists of upstream services

Figure 4.8 shows that a substantial part of the value added that is exported by two-way traders reflects the contribution from upstream service providers, accounting for more than one-third of the total domestic value added in exports by two-way traders in Denmark, Finland and Sweden. In addition, a large share of the directly exported value added by two-way traders consists of manufacturing (indicating that these firms are mostly active in this industry). In contrast, the directly exported value added in exports for pure exporting (only) firms is much more services oriented.

Figure 4.8 Decomposition of exported domestic value added, by firm type. 2013



However a focus on the whole economy picture can mask important messages at the industry level, which show that exporting firms in general make more intensive use of upstream services providers than two-way traders (Figures 4.9a to 4.9d).

Figure 4.9a Domestic services value added, as per cent of gross exports of Top 3 manufacturing industries. Denmark

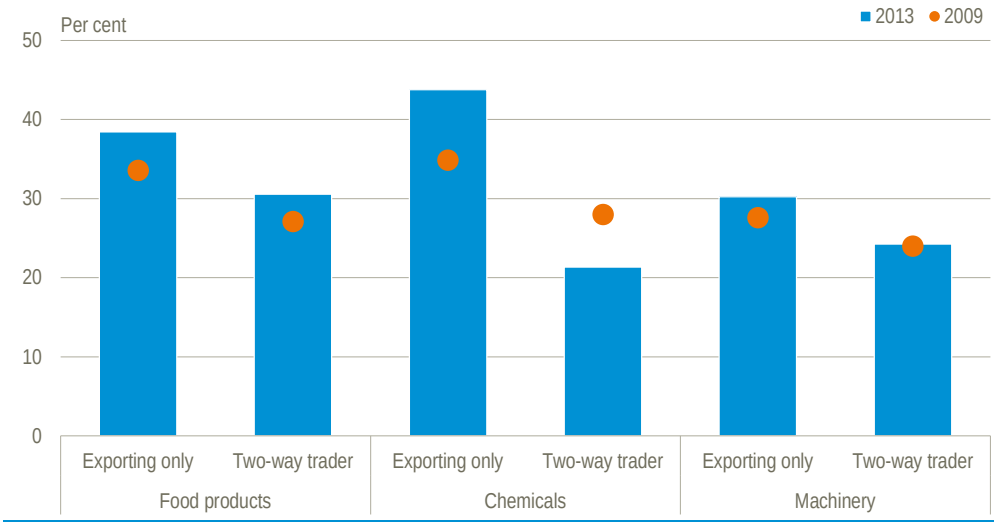


Figure 4.9b Domestic services value added, as per cent of gross exports of Top 3 manufacturing industries. Finland

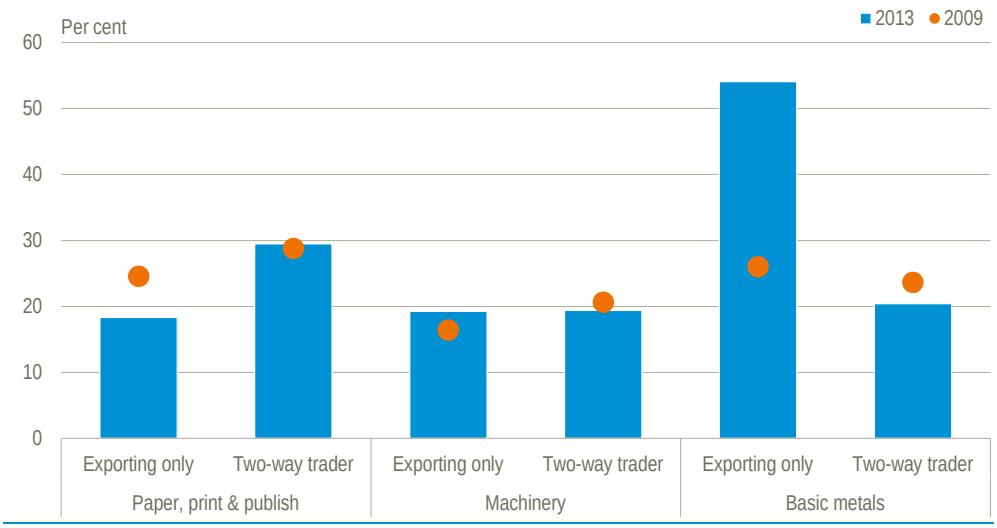


Figure 4.9c Domestic services value added, as per cent of gross exports of Top 3 manufacturing industries. Norway

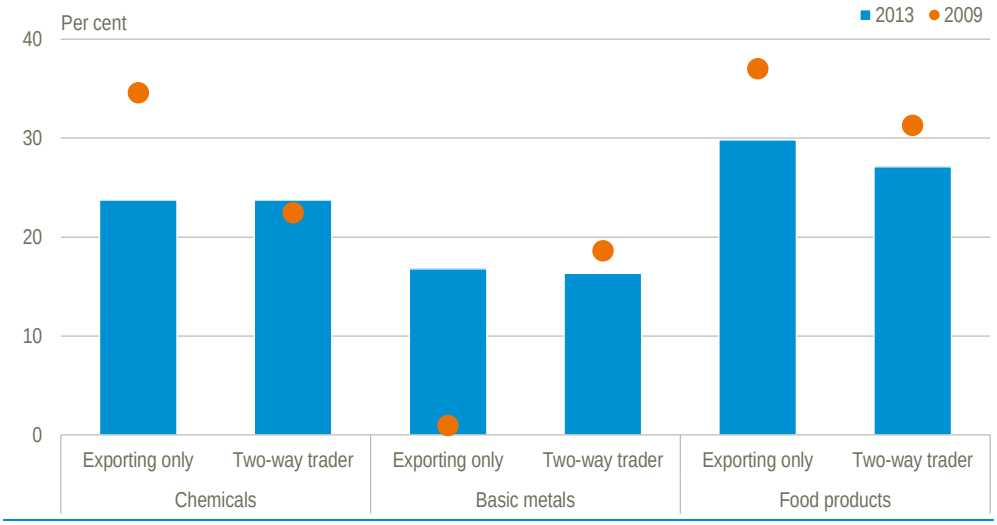
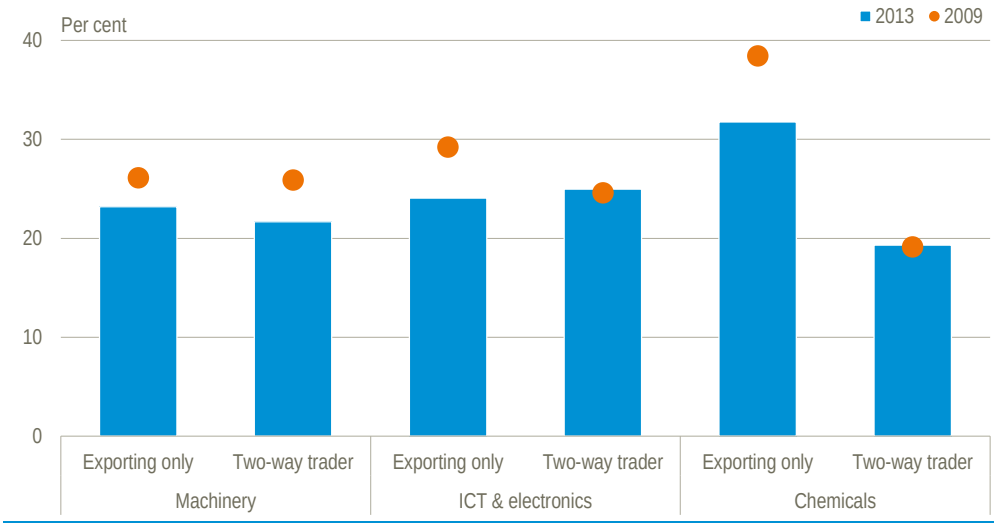


Figure 4.9d Domestic services value added, as per cent of gross exports of Top 3 manufacturing industries. Sweden

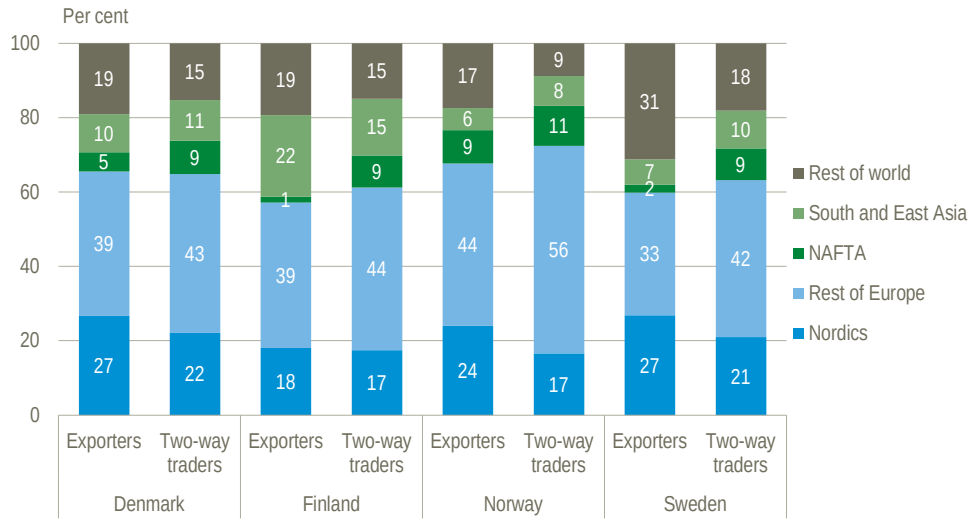


4.5 Geographic orientation of value chains

Trade dependencies of non-exporting firms follow those of two-way traders

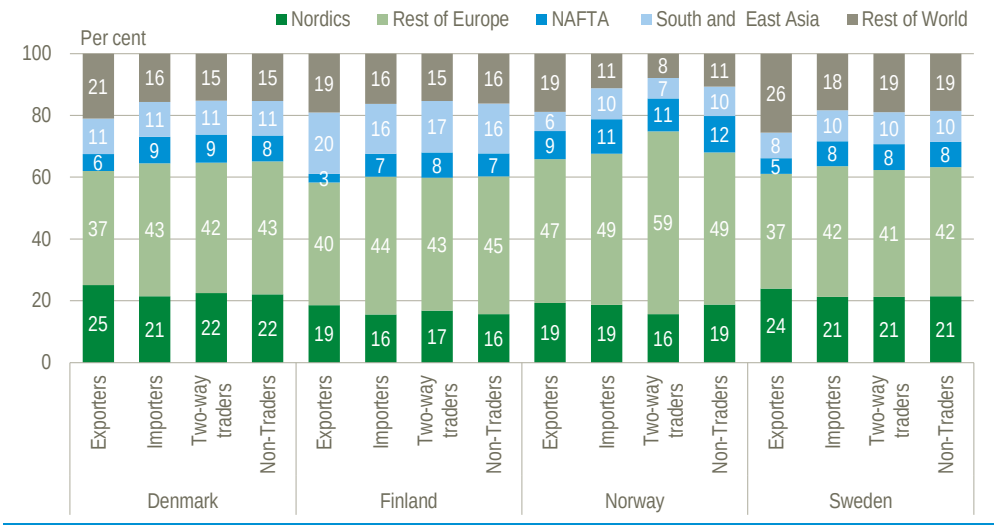
As mentioned in chapters 2 and 3, the gross exports of Nordic enterprises are predominantly oriented towards other Nordic countries as well as to the rest of Europe. In general about two thirds of Nordic exports are destined for countries in these regions, while an additional 10 per cent of exports are destined for NAFTA and another 10 per cent for South and East Asia. In general these relationships show relatively little difference between firm types, although two-way traders have slightly higher exposure to NAFTA, and Asia markets than pure exporters (Figure 4.10), possibly reflecting the likelihood that they are better equipped to cope with the costs related to exporting to foreign markets on the grounds that they are generally larger.

Figure 4.10 Geographical distribution of gross exports, by type of firm. 2013



Not surprisingly the trade dependencies of importers and non-traders in value-added terms follow those of, indeed are generally determined by, two-way trader, which act as the conduit for their indirect exports of value-added (Figure 4.11). . Of note are the differences in trade relationships between value added and gross measures, which reveal a lower importance of Nordic markets and higher importance of NAFTA for exporters but much smaller differences for two-way traders; possibility reflecting a higher proportion of exports of finished products, as opposed to intermediate exports.

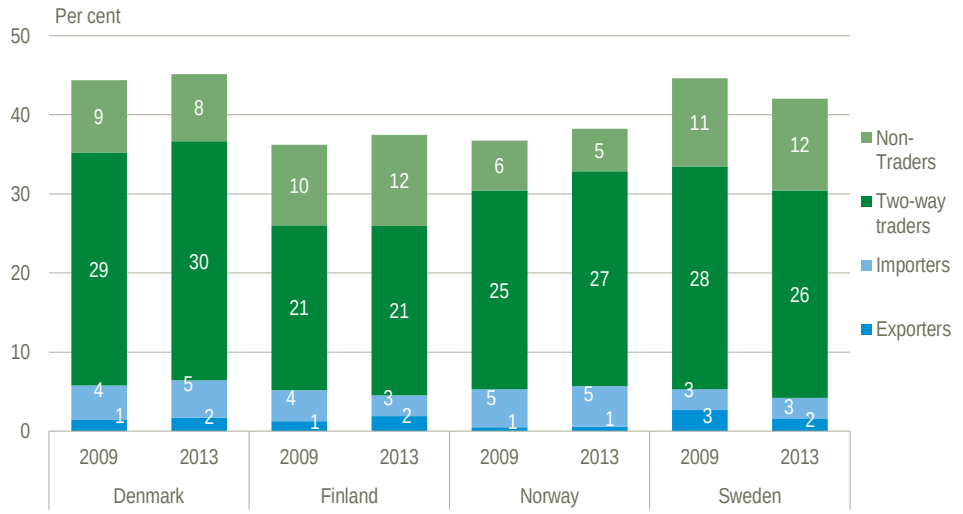
Figure 4.11 Geographical distribution of domestic value added exports, by type of firm. 2013



4.6 Employment in GVCs: dependency on foreign markets

A substantial part of employment in the market sector of the Nordic countries, varying from 37 per cent in Finland to 45 per cent in Denmark, depends on exports. The largest share of these employees work in two-way traders (about 15 to 20 per cent of all employment in the market sector), followed by employees at firms that are not directly engaged in trade at all, again illustrating the role of non-trading enterprises in supporting export success at other enterprises. Note that non-market activities are not included in Figure 4.12 below. As a share of employment in the total economy, employment dependent on exports varies from 28 per cent in Finland to 32 per cent in Denmark.

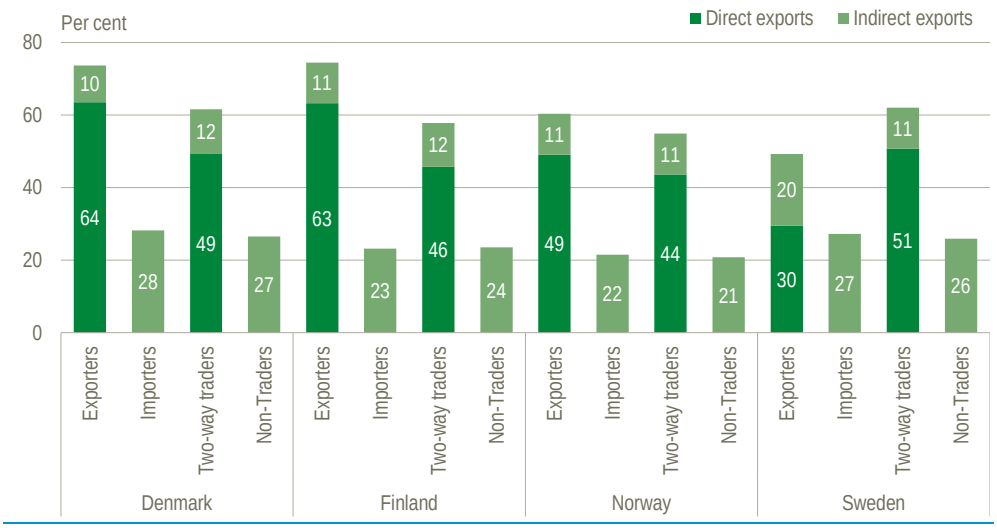
Figure 4.12 Employment embodied in exports, by firm type, as per cent of total employment in market sector. 2013



Up to 20 per cent of employment at non-trading enterprises is sustained by foreign final demand

Due to their indirect engagement in GVCs, 21 to 27 per cent of employment at non-trading enterprises in the Nordics is dependent upon foreign final demand, even though these firms do not engage in international trade. And in exporting firms and two-way traders, the shares are around one-half up to three-quarters of all jobs.

Figure 4.13 Share of employment that is embodied in exports, as per cent of total employment, by firm type. 2013



5 Conclusions

The rise of Global Value Chains means that traditional indicators of international trade may give misleading signals on global production. The OECD-WTO Trade in Value-Added (TiVA) is an attempt to overcome these shortcomings by decom-posing trade flows into the value added by each country and industry, thereby providing new insights into the integration of countries in Global Value Chains. TiVA data show for example that more than a quarter of economic activity in the Nordics is dependent upon foreign final demand, with the United States emerging as a significantly more important partner in value added terms, while intra-Nordic trade is less important in value added terms. TiVA indicators also illustrate that imports are vital for Nordic export success, as they allow Nordic firms to compete effectively in international markets by being able to access and use the best (in terms of quality and price) inputs from around the globe. Services, such as logistics services and business services, are also much more important in exports than evident from traditional trade figures, since they are often embodied in goods exports.

These insights from TiVA, which are currently available at the country and industry level, become even more meaningful when they also separately account for different types of firms in Global Value Chains, including SMEs, multinational enterprises, and trading firms. Recognising that firms' engagement in international trade differs considerably depending on these characteristics (partly driven by differences in capital and skill intensity, and productivity), impacting both on the quality of TiVA results, and on policy implications, has been the key motivation behind this report.

This chapter summarizes the main findings for each of these groups of firms, and reviews their implications.

5.1 Dependent and independent SMEs

Nearly all firms – 99.8 per cent – in the Nordics are SMEs, and collectively, they are responsible for two thirds of employment and economic activity in the non-financial business economy. But with often more limited access to financing and greater difficulties to offset the fixed costs of doing business abroad with economies of scale, smaller firms are generally less involved in international trade.

The results presented in this report confirm that smaller enterprises have a lower import content in their exports, and that value added and employment at SMEs are less dependent on exports than at large enterprises. However, this does not imply that SMEs are not engaged in global value chains. As suppliers of larger enterprises that do export directly to foreign markets, more than half the value added content of Nordic exports originates in SMEs, even if they account for only 40 per cent of total gross exports. Similarly, the share of employment in SMEs that is sustained by foreign final demand ranges from 28 per cent (at micro-sized independent SMEs) to more than 56 per cent (at larger, dependent SMEs). Especially in independent SMEs, these export-dependent jobs are largely sustained through indirect channels.

In the same way that SMEs benefit through indirect access to larger markets by supplying larger, down-stream firms that export abroad, large enterprises in the Nordics also benefit from having access to a solid network of smaller domestic suppliers, in particularly in the services sector. The services content of exports of large firms in the main manufacturing export industries in the Nordic ranges from between 20 to 30 per cent, with much of this originating in SME service suppliers. Indeed around three-quarters of all exports of value added by SMEs reflects services content (directly and indirectly).

In terms of geographical orientation, larger firms export proportionately more to more distant markets than SMEs, and interdependencies with more distant markets are marginally larger in value added terms. The exports of dependent SMEs are more oriented towards Europe than those of independent SMEs, likely reflecting their integration into the wider regional production network of their (domestic or foreign) parents.

5.2 Multinational enterprises

Multinational enterprises are an important feature and driving force of global value chains, which means that a solid analysis of international trade should also consider their international investments and activities. In the Nordics, fewer than 2 per cent of all enterprises are foreign owned, but these firms account for 20 per cent of employment and on average a quarter of economic activity in the business economies of the Nordic countries. Likewise, MNEs that are headquartered in the Nordics are few, but important in employment and economic activity, as well as in exports, and are often the embodiment of national strongholds.

The data presented in this report shows that both the affiliates of foreign multinationals and Nordic MNEs have a higher import content of exports than non-multinationals, confirming their anticipated higher extent of direct integration in GVCs as compared to non-MNE enterprises.

However, foreign owned subsidiaries in the Nordics do differ importantly from Nordic MNEs in a number of other dimensions. For example, foreign investors in the Nordics produce relatively more for the local market compared to domestic MNEs which are more oriented towards international markets. This is also evident in the employment figures: while almost 60 per cent of employment in domestic MNEs is sustained by foreign final demand, only slightly more than 50 per cent of jobs in foreign controlled affiliates are export-dependent, and more frequently indirectly.

Domestic MNEs in the Nordics also have much stronger domestic backward linkages with upstream suppliers, especially in Denmark and Finland. In these countries, domestic MNEs generate 1.1 to 1.6 units of additional upstream value added, respectively, for each unit they produce themselves, whereas foreign MNEs only generate between 0.5 to 0.8 units of additional upstream domestic value added. Domestic MNEs are therefore a more important channel to access foreign markets for other domestic enterprises than foreign affiliates.

Much of this upstream domestic value added (and employment) is generated in non-MNE enterprises that are active in services. The share of upstream domestic services in exported value added is especially high for domestic MNEs, and less so for foreign affiliates, implying that MNEs derive their competitive strength partly from suppliers in their home country. As a result of their importance as suppliers, the share of non-MNEs in exported value added is 10 to 20 percentage points higher than their share in gross exports.

5.3 Trading firms

Actively trading in international markets – via exports, imports or both – is often considered the prime way in which enterprises can engage in global value chains. This report highlights that by trading indirectly, firms can also play a role in, and benefit from, economic globalization. Such non-trading enterprises constitute by far the largest group of enterprises in the Nordic countries, accounting for 94 per cent of all enterprises, and 66 per cent of total employment in the business eco-

nomy. Two-way traders in contrast, account for only 1.2 per cent of all enterprises, but do account for 16.3 per cent of employment and virtually all gross exports.

Two-way traders, by definition, are much more dependent on imports than any of the other types of firms (exporters, importers, and non-traders), but even firms that only export are indirectly still dependent on imports (for example when their domestic suppliers use imports). Likewise, about two-thirds of employment and value added generated by two-way traders and exporters depend on foreign markets.

For non-trading enterprises, who predominantly serve as suppliers to firms that are engaged in trade, these percentages still amount to a quarter of their value added and employment. This is mainly due to the backward linkages generated by two-way traders, who export far more than the significantly fewer number of exporters and thus generate (in an absolute sense) more upstream domestic value added than exporters. This is mostly in services. As a result, around a quarter of exported domestic value added is produced by non-trading enterprises.

5.4 Implications

The results in this report reveal significant heterogeneity among different types of firms with respect to their integration in global value chains. While there may be differences across Nordic countries and across industries, some stylized facts emerge that can help inform policy making.

Given their large role in the Nordic economies and employment, encouraging exports of SMEs (which tend also to trade less and be less likely to be part of a multinational enterprise) has been a long-standing policy target. The findings in this report suggests that in addition to the more 'traditional' measures that facilitate SME integration in GVCs, such as removing red tape, special (export) financing schemes, and facilitating match-making with business partners abroad, policies that also foster upstream integration via domestic channels can be an important driver of export success for downstream firms, particularly with regards to specialized services providers.

Firms with a high import content of exports in the Nordics– typically large firms that are strongly engaged in imports and exports – also generate the most domestic backward linkages for each unit of value added that they produce and export. This implies that these firms not only have an extensive international, but also extensive domestic network of direct and indirect suppliers. Hence, imports and domestic linkages can go hand-in-hand. This is partly explained by the more downstream role of these large enterprises, as well as the fact that large firms are typically more focused on their core competences and more frequently outsourcing non-strategic tasks.

Finally, the findings presented in this report also underscore the importance of MNEs for the integration of national economies in global value chains. Domestic MNEs in particular not only export themselves, but are also important conduits to international markets for value added generated by non-MNE domestic enterprises, and generate important domestic backward linkages – more so than foreign owned affiliates. Likewise, domestic MNEs, often the flagships of national strongholds, derive important competitive advantages from a well-developed local business environment, particularly with respect to services.

Annex: Methodology

The results presented in this report, an innovative collaboration between the OECD and Nordic National Statistics Offices, are derived from a combination of linked micro-data developed at Statistics Denmark, Finland, Norway and Sweden, and the OECD Inter-country Input output tables. This annex describes the methodology in more detail.

1.1 Main data inputs

The two key inputs into this report are the OECD-WTO TiVA ICIO and a series of tables derived from the linked microdata developed by the Nordic NSOs.

The OECD-WTO Trade in Value Added Inter-Country Input Output table forms the core structure from which the TiVA indicators are derived. The ICIO is constructed by combining national Supply and Use and Input-Output tables, with a balanced view on international trade in goods and trade in services statistics, to arrive at a global table that describes the production and consumption relationships among 61 countries (+rest of the world) and 34 industries, resulting in a 2108*2108 country-industry intermediate consumption matrix (plus detailed final demand matrices and value added and gross output vectors). For this study, the ICIOs for 2009 and 2011 (the latest currently available) were used together with a projection of the ICIO for 2013. More information on TiVA, the indicators and the ICIO can be found at http://oe.cd/tiva.

The Nordic NSOs have been the first to develop a bottom-up, collaborative response to the increased policy questions regarding globalisation, building on a combination of official national data sources at the micro-level. Each Nordic country has set up a database that combines, among others, Structural Business Statistics, FATS and trade statistics, using harmonised variable codes and database structures. Given that administrative sources are widely available and used in the Nordics, these linked microdata generally cover nearly the entire universe of firms and trade transactions. More detailed descriptions of these datasets can be found in *Services and Goods Exports from the Nordics – Strongholds and profiles of exporting enterprises* (Nordic Council of Ministers et al., 2016, produced in parallel with this publication). For the purposes of this report, the Nordic countries each prepared a set of tables (that were kept within the confines of each statistical office and were not shared among the countries or with the OECD) that reflected the variables and characteristics displayed in table A1.

Table A.1 Overview of datasets prepared by the Nordic Statistical Offices

Dataset ID	Description
DSID_2	By 2-digit NACE code and by size class: Value added; output; employment; exports; imports; share of intermediate products in imports; share of intermediate products in exports
DSID_3	By 2-digit NACE code and firm ownership: Value added; output; employment; exports; imports; share of intermediate products in imports; share of intermediate products in exports;
DSID_4	By partner country and trading status: Imports and exports
DSID_5	By partner country and size class/control: Imports and exports
DSID_6	By partner country and ownership: Imports and exports

Breakdowns by enterprise characteristics (trading status, size class, and ownership) were developed as described in table A2.

Table A.2 Breakdowns used in the datasets prepared by the Nordic Statistical Offices

Firm characteristics	Subgroups
Size class	Independent SME, with 0-9 employees (micro)
	Independent SME, with 10-49 employees (small)
	Independent SME, with 50-249 employees (medium)
	Dependent SME, with 0-<9 employees (micro)
	Dependent SME, with 10-<49 employees (small)
	Dependent SME, with 50-<249 employees (medium)
	Large enterprises with 250+ employment
Ownership	Domestically controlled enterprises without affiliates abroad
	Domestically controlled enterprises with affiliates abroad (Domestic MNEs)
	Foreign controlled enterprises (Foreign MNEs)
Trading Status	Exporters
	Importers
	Two-way traders
	Non-traders

Dependent SMEs are defined as domestic controlled SMEs that are part of an enterprise group. Foreign controlled enterprises with fewer than 250 employees are also classified as dependent SMEs. All other SMEs (e.g. SMEs that are not part of an enterprise group) are classified as independent.

Statistics Denmark was responsible for developing the SAS program that was run in each country to create the tables needed, to ensure the exact same file format and definitions.

1.2 Steps to integrate the Nordic linked microdata into the TiVA ICIO

To integrate the tables derived from the linked Nordic microdata with the TiVA ICIO, a variety of consecutive steps was taken, involving further data preparation (industry conversions, aggregations) and the alignment of business data to national accounts concepts, including accounting for negatives. Finally, a series of challenges specific to breaking down the international trade flows by firm type were addressed. Each of these points is elaborated in more detail below.

The SAS program for these calculations has been developed by the OECD, and was subsequently sent, accompanied by the relevant conversion tables and the TIVA ICIO, to the Nordic country statistical offices to run in combination with their pre-prepared tables based on linked microdata. Only the final results were then sent back to the OECD to include in this report. This highly coordinated research method not only ensured consistency of the results across countries, but also avoided the need for, on the one hand, the Nordic NSOs to invest time to suppress confidential cells in the data, and on the other hand, the need for OECD to subsequently develop estimations for these missing cells (noting that the system for creating an ICIO – including one broken down by firm characteristics – cannot involve missing data).

1.3 Step 1. Data preparation: industry conversions

The Nordic countries report their data using the most recent industry classifications (the NACE equivalent of ISIC rev.4), whereas the TiVA ICIOs are currently built with industries classified according to ISIC rev. 3. Table A3 shows the 2-digit level correspondence table that was used to convert the Nordic data to the TiVA industry classification. Note also that while the TiVA ICIO contains 34 industries, of which 14 are services, these have been aggregated to two 'services' sectors – one that reflects market activities and another that reflects non-market activities. This relatively high level of aggregation was adopted to reflect the fact that the trade data in the Nordic linked microdata only reflect trade in goods and not trade in services.

Table A.3 Conversion of NACE industries to TiVA industries

NACE	Short description	Availability in Nordic data	TiVA industry
A01	Crop and animal production, hunting and related service activities		C01T05
A02	Forestry and logging		C01T05
A03	Fishing and aquaculture		C01T05
B	Mining and quarrying	X	C10T14
C10T12	Manufacture of food products, beverages and tobacco products	X	C15T16
C13T15	Manufacture of textiles, wearing apparel and leather products	X	C17T19
C16	Manufacture of wood and of products of wood and cork	X	C20
C17	Manufacture of paper and paper products	X	C21T22
C18	Printing and reproduction of recorded media	X	C21T22
C19	Manufacture of coke and refined petroleum products	X	C23
C20	Manufacture of chemicals and chemical products	X	C24
C21	Manufacture of basic pharmaceutical products and preparations	X	C24
C22	Manufacture of rubber and plastic products	X	C25
C23	Manufacture of other non-metallic mineral products	X	C26
C24	Manufacture of basic metals	X	C27
C25	Manufacture of fabricated metal products	X	C28
C26	Manufacture of computer, electronic and optical products	X	C30T33X
C27	Manufacture of electrical equipment	X	C31
C28	Manufacture of machinery and equipment n.e.c.	X	C29
C29	Manufacture of motor vehicles, trailers and semi-trailers	X	C34
C30	Manufacture of other transport equipment	X	C35
C31_32	Manufacture of furniture; other manufacturing	X	C36T37
C33	Repair and installation of machinery and equipment	X	C36T37
D35	Electricity, gas, steam and air conditioning supply	X	C40T41
E36	Water collection, treatment and supply	X	C40T41
E37T39	Sewerage; waste collection, and other waste management services	X	C75T95
F	Construction	X	C45
G45	Wholesale and retail trade and repair of motor vehicles and motorcycles	X	C50T52
G46	Wholesale trade, except of motor vehicles and motorcycles	X	C50T52
G47	Retail trade, except of motor vehicles and motorcycles	X	C50T52
H49	Land transport and transport via pipelines	X	C55T74
H50	Water transport	X	C55T74
H51	Air transport	X	C55T74
H52	Warehousing and support activities for transportation	X	C55T74
H53	Postal and courier activities	X	C55T74
I	Accommodation and food service activities	X	C55T74
J58	Publishing activities	X	C21T22
J59_60	Motion pictures, video, television and sound	X	C55T74
J61	Telecommunications	X	C55T74
J62_63	Computer programming, consultancy and related activities	X	C55T74
K64	Financial service activities, except insurance and pension funding		C55T74
K65	Insurance, reinsurance and pension funding		C55T74
K66	Activities auxiliary to financial services and insurance activities		C55T74
L68	Real estate activities and imputed rents	X	C75T95
M69_70	Legal and accounting activities; head offices; management consultancy	X	C55T74
M71	Architectural and engineering activities; technical testing and analysis	X	C55T74
M72	Scientific research and development	X	C55T74
M73	Advertising and market research	X	C55T74
M74_75	Other professional, scientific and technical activities;	X	C55T74
N77	Rental and leasing activities	X	C55T74
N78	Employment activities	X	C55T74
N79	Travel agency, tour operator	X	C55T74
N80T82	Security and investigation activities; office support activities	X	C55T74
O84	Public administration and defence; compulsory social security		C75T95
P85	Education		C75T95
Q86	Human health activities		C75T95
Q87_88	Social work activities		C75T95
R90T92	Creative arts, entertainment; gambling and betting activities		C75T95
R93	Sports activities and amusement and recreation activities		C75T95
S94	Activities of membership organisations		C75T95
S95	Repair of computers and personal and household goods	X	C50T52
S96	Other personal service activities		C75T95
T	Activities of households as employers		C75T95
U	Activities of extra-territorial organisations and bodies		C75T95

Since data for the agricultural industry is commonly missing from business statistics collected in the Nordics (instead, statistical information is collected using specialised surveys), no value added, gross outputs, import, export or employment data broken down by types of firms can be provided for this industry. To arrive at an estimate for the firm type breakdowns for this industry, missing data were for simplicity imputed with a weighted average of the relative importance of different types of firms in all industries, for each of the individual variables. Data for the financial sector was missing as well. For convenience and simplicity imputations were based on those derived from available data for business services in sections 55-74 ISIC Rev. 3.

1.4 Step 2. Adjusting enterprise statistics to NA concepts

The TiVA ICIO follows the practices of the System of National Accounts (SNA), where imports by firms are included as direct imports even if they pass through resident wholesale and retail industries first. In other words imports of goods by wholesalers and retailers for subsequent sale without any further processing are not recorded as their imports in the SNA. The same holds for exports of goods that have not been the subject of any further processing by wholesalers and retailers

In the linked microdata used in this study, trade is matched to those enterprises that are immediately responsible for imports and exports, including to wholesale and retail firms. To align with national accounts concepts, the export and import values for the wholesale and retail industry as reported in the linked microdata were constrained to the levels reported in in Nordic SUTs (i.e., the ratio of exports (or imports) in total output). The additional trade (on average about half of what was reported) was subsequently distributed to other sectors in a two-stage procedure by first identifying the products involved (using official national Trade by Enterprise Characteristics data) and then proportionately allocating these products to using (importing) or exporting industries and firm types on the basis of information included in the microdata and national SUTs. One of the implications of this adjustment is that in the breakdown of firms by trading status, certain 'export only' firms may in fact still import, from a National Accounts perspective, via wholesalers.

1.5 Step 3a. Breaking down the ICIO tables

The basic structure of an ICIO table, depicted in Figure A1 with three countries and three sectors, is not significantly different from a national IO table. The core of the matrix describes the intermediate use relationships between industries and countries, and is supplemented with columns for final demand (consumption, capital formation etc.), and rows that record value added, cif-fob adjustments, tax and subsidies, and output. The vector at the bottom on employment (preferably hours worked, or otherwise FTE) reflects the labour input used in that particular country and industry. The dark green cells specify the domestically produced products for domestic use (either as intermediate use, or for final consumption). The lighter green cells indicate those parts of intermediate use or final consumption that are traded with other countries.

Figure A.1

Structure of the ICIO

		Country A			Country B			Country C			Country A	Country B	Country C
		Sector 1	Sector 2	Sector 3	Sector 1	Sector 2	Sector 3	Sector 1	Sector 2	Sector 3	FD	FD	FD
Country A	Sector 1												
	Sector 2												
	Sector 3												
Country B	Sector 1												
	Sector 2												
	Sector 3												
Country C	Sector 1												
	Sector 2												
	Sector 3												
Taxes less subsidies on products													
Cif-fob adjustments													
Value added	Labour compensation												
	Operating surplus												
	Taxes less subsidies on production												
Output													
Employment													

Disaggregating the ICIO by firm characteristics requires breaking down the columns, and subsequently the rows, using information derived from the linked Nordic microdata. For the Nordic project, three different breakdowns were made: firm ownership, containing a three-way split; firm trading status, reflecting a four-way split; and firm size, a seven-way split.

As a first step, the intermediate use *columns* were broken down. Value added and output were split using information from the linked microdata on the distribution of these variables across firm types (within industries). The data on total imports in the microdata were (further) adjusted for the share of intermediates, after which the IO imports were similarly split by firm types (within industries). Domestic purchases were calculated, by firm type, as the remainder of *gross output –/– value added –/– imports*.

The second step, breaking down the rows, started with splitting gross output and exports by firm type (within industries), again using the linked microdata on these variables. The remainder (output –/– exports, by firm type) reflects output produced for either intermediate use or for final consumption (excluding exports), by firm type. This difference was subsequently allocated to using industries and domestic final demand on the basis of ratios of intermediate to final goods exports by different categories of firms.

1.6 Step 3b. Correcting linked microdata data to avoid negative values

Primary business statistics as available in the linked microdata are not fully consistent with comparable National Accounts aggregates (for example they do not include exhaustiveness adjustments). As a consequence step 3a above retains these inconsistencies, and in some cases introduces negative values (which (with the exception of changes in inventories) should not occur either conceptually, nor practically (indeed the negatives make it impossible to derive a Leontief inverse)). Three different types of negatives occurred, which were treated in the following ways:

- If a type of firms' share in value added is relatively high but in gross output relatively low, this may result, in combination with the ICIO data, in gross output being lower than value added, which in turn implies that the sum of domestic and imported use would be negative. This happened mostly for

relatively small firm categories. In these cases, the distribution of value added is adjusted by lowering the share of the group where negatives occur up to the point where these disappear. The share of the firm category with the largest capacity to take on the correction is similarly adjusted (very often this amounts to only a minor amount).

- If a type of firms' share in value added and in imports is relatively high as compared to its share in output, negative values may occur for domestic use of intermediates. In these cases, the distribution of imports is adjusted in a similar way as above for the firm type concerned, again making the largest category absorb any differences.

- Finally, if a type of firms' share in gross output is relatively low compared to its share in exports, similar adjustments are made for the export shares.

Among the various other options that were explored, this method ensured that the linked microdata data are only minimally adjusted to ensure that the ICIO broken down by firm heterogeneity continues to contain only positive figures.

1.7 Step 4. Breaking down trade geographically

Steps 3a and 3b discussed the breakdown of the ICIO, whereby exports and imports are still treated as an aggregate total. But the additional information provided in the Nordic data on the geographical origins and destinations of trade by the different types of firms also allows move beyond proportionality assumptions when splitting the export and import data by firm type. Two main empirical challenges have been encountered and addressed as follows:

- As mentioned in step 2, zero imports or exports in business statistics (for example, exporting-only enterprises by definition do not import) need to be reconciled with non-zero imports and exports in the context of the ICIO (where exporting enterprises may still import a bit). The geographical breakdown of these flows follows the breakdowns as observed in the original ICIO.

- Again, there are data conflicts between what is observed as total trade values in the ICIO, and what is reported in business statistics. More specifically, when for each individual firm category within an industry, total imports are to be distributed to the partners as suggested by the Nordic business statistics, the sum of total imports for each partner across firm types does not necessarily match the corresponding data in ICIO. In this case, we have opted for an iterative process, whereby trade flows were gradually (in increments of 1 per cent) distributed geographically according to the figures in the linked microdata. If the limit for a certain partner country as given by the ICIO data was reached, this country was excluded from further distribution of trade.

It should be noted that the above breakdowns still imply that the final ICIO with breakdowns by firm characteristics still holds several assumptions (even if these are far fewer than otherwise possible):

- Domestic and import use by firm type is proportionally distributed across sources. I.E., while the import intensity of two types of firms in an industry may differ, their relative share of products purchased does not, nor are substitution effects (between imports and domestic supplies) considered. Additional information on the imports by product, firm type and industry, would be able to further refine this.

- For the breakdown by rows, no information on differences in the preferences of firm types to domestically sell intermediate or final products has been incorporated (beyond what could be derived from export information). More detailed information on the products produced by different types of firms within an industry, e.g. by combining Prodcom data with information on industries and firm types, would allow for further refinements.

- Finally, no information on relationships between different types of enterprises is available, e.g. on whether certain types of firms have a preference to source their products from a specific other type of firm. This would require transaction-level information, which is available in certain EU countries where buyer and supplier have to register the VAT number of their counterpart for their sales/purchases, but may not be in the Nordics.

STATISTICS DENMARK

Statistics Denmark
Sejrøgade 11
DK -2100 København Ø

Telephone +45 39 17 39 17
www.dst.dk
dst@dst.dk