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How big are Danish exports and who are our main trading partners?

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In recent decades it has become more common to produce goods across national borders. Increasing globalisation challenges our understanding of what a country's exports encompass and what different statistical measures of exports show.

Previously, different export statistics provided a fairly similar picture of Denmark's exports and trading partners. However, an increasing proportion of Danish exported goods never crosses Danish borders, and that has resulted in increasing differences across the various export statistics. This analysis describes Danish exports and trading partners, based on the different export statistics.

Main conclusions:

- Danish exports in goods are largest when measured in Denmark's balance of payments, where the sale of goods that have never crossed Danish borders are included as exports. Today, around a sixth of the total Danish export of goods takes place outside of Danish borders.
- Only goods which have crossed the Danish border are classified as exports in the international trade in goods statistics which implies that the export of goods appears lower here than in the balance of payments.
- Exports appear lowest when measured by Danish value added, as these calculations discount the value of the imports included in the production of the exported goods and services. Estimates from an Input-Output model in Statistics Denmark suggest that imported contents in exported goods and services constitute nearly half of the total value.
- Regardless of the type of export statistics, Germany is Denmark's most important export market.
- On the basis of goods which cross the Danish border, the US is Denmark's sixth largest export market. When goods sold outside Denmark's border are taken into account, the US is Denmark's third largest export market.
- Looking at the final markets for the part of exports resulting from production in Denmark the US is the second largest export market as measured by Danish value added according to estimates in an OECD international Input-Output model.

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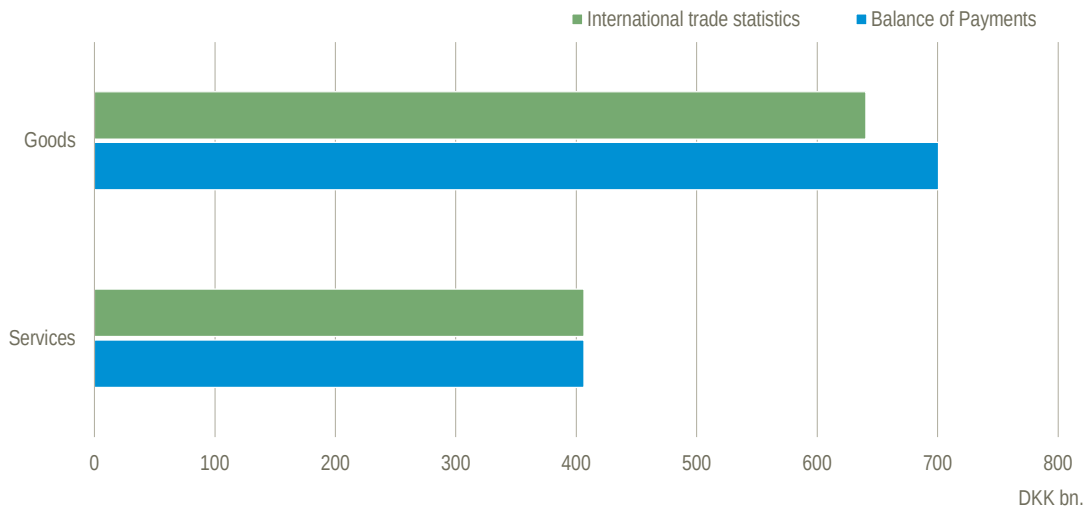
How much does Denmark actually export?

Businesses' international organisation of production complicates the statistical measures for exports. It challenges our understanding of both the composition of a country's exports and what the varying statistical sources of exports show. With businesses utilising global production chains, e.g. to buy and sell goods which never enter the country, it becomes more difficult to pinpoint precisely what Denmark is actually exporting. Determining how much Denmark is exporting is increasingly dependent on the measure we use: divergent pictures are provided by looking, respectively, at goods crossing the Danish border, goods sold from Danish to foreign firms, and the proportion of Danish value added contained in exported Danish goods and services.

This analysis is focused on Danish exports and Denmark's most significant export markets, as shown in both the international trade statistics, in which goods are classified as exports by crossing the Danish border, and in the balance of payments, where the determining factor is whether the ownership of goods changes. Danish value added (i.e., the value of Danish exports exclusive of imported goods and services included in the production of these exports) will also factor in to this analysis. Furthermore, the relationship between Danish exports and employment levels in Denmark will be examined.

Figure 1 Export of goods and services: international trade statistics and balance of payments. 2016



Note: The international trade in services and the balance of payments' services figures use the same measure of value, and are thus identical.
Sources: www.statbank.dk/uhv1, www.statbank.dk/uhtp and www.statbank.dk/bb1

Arguably, the traditional conception of exports is characterised by the international trade in goods statistics, shown in Figure 1. Virtually all goods crossing the Danish border are included in these statistics, which do not take into account the nationality of the owner of the goods. As previously noted, however, Danish businesses are increasingly selling goods abroad which are neither produced in Denmark nor pass Danish borders. In 2016, such exports accounted for 16 per cent of the total exports documented in Denmark's balance of payments, and are thus primarily responsible for the reported difference in exports between the international trade statistics and the balance of payments. In the latter, exports are recorded based on a change of ownership between a Danish and foreign resident (see Box 1). In contrast to the trade in goods, trade in services follows the principle of change of ownership, and thus is identical to services in the balance of payments.

The change of ownership principle means an export, and its value, is recorded as such at the moment when ownership changes, not when it crosses borders. In the majority of cases, the change of ownership and the crossing of borders occur simultaneously. That said, it is entirely possible for a good to cross the Danish border without ownership changing, and vice versa.

Therefore, adjustments are made to the value of exported goods, as recorded in the international trade statistics, to convert this to a figure on a balance of payments basis. In 2016 the value of exports in the balance of payments was around DKK 60 Billion higher than reported in the international trade statistics.

Box 1. The Resident Principle, production and income

In the international trade in services statistics, the balance of payments, and the national accounts (including Input-Output tables), the domestic sector is defined as – and comprises of – entities resident in Denmark. A company is regarded as resident in Denmark if it is economically active in Denmark, and has been so for a minimum of one year. As such, and by way of an example, a branch operated in Denmark by a foreign resident is regarded as resident in Denmark as long as it continues to engage in economic activity within Denmark. Conversely, entities which are not engaged in economic activity, i.e. the production of goods or services, but are instead engaged solely in the import or export of goods, are not regarded as residents in Denmark. Danish subsidiaries abroad which engage in the production of goods and services are also not regarded as Danish residents and their trade subsequently is not included in calculations of Danish exports or GDP. Profits accrued from the operations of these subsidiaries abroad will eventually return to their Danish parent company in the form of income, and will in turn be included in GNI. Statistics Denmark has individual statistics which illustrate the activities of Danish businesses abroad and their foreign affiliates. More on the statistics on Danish foreign affiliates can be read on Statistics Denmark's website.

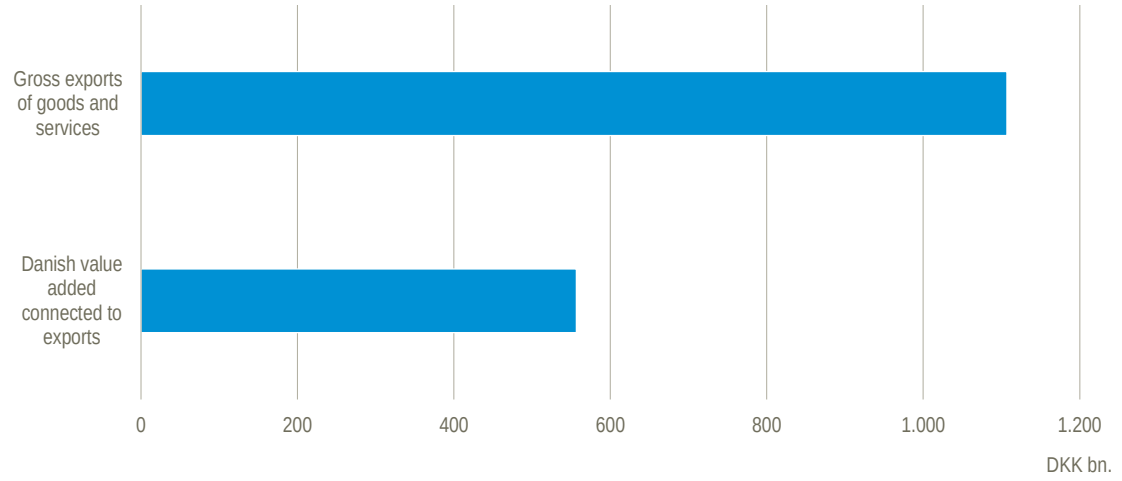
Table 1 Sources of information on Danish exports

	Source	Criteria for export status	Measure of exports
1	International trade in goods	Crossing of borders	Gross exports
2	International trade in services	Change of ownership	Gross exports
3	Balance of payments	Change of ownership	Gross exports (Merchanting calculated Net)
4	National Accounts (Input-Output model)	Change of ownership	Danish value added

Note: The National Accounts' Input-Output model is used here as a source for Danish value added connected to exports.
See: International trade in goods, International trade in services, Balance of payments and Input-output tables for more information.

As well as having different criteria for *when* exports are taking place, the various statistical methods also differ regarding *how* exports are measured, see Table 1. The international trade statistics and the balance of payments measure gross exports. In so doing, what is measured is the absolute value of an export: no information, however, is provided about how much of the exported good's value is actually created in Denmark. In a small and open economy, such as Denmark, it is essential that goods and services be imported in order to produce other goods and services that are subsequently exported. Estimates from an Input-Output model in the Danish National Accounts suggest that only around half of the value of Danish exports is actually created within Denmark. As a result, it is not possible to rely solely on the export figures in the balance of payments when measuring the significance of exports for the Danish economy: as has been shown, exports frequently contain value created *outside* Denmark. Figure 2 compares gross export of goods and services with the export of value added (the proportion of the export value created in Denmark).

Figure 2 Gross exports of goods and services (balance of payments) and Danish value added (I-O model). 2016



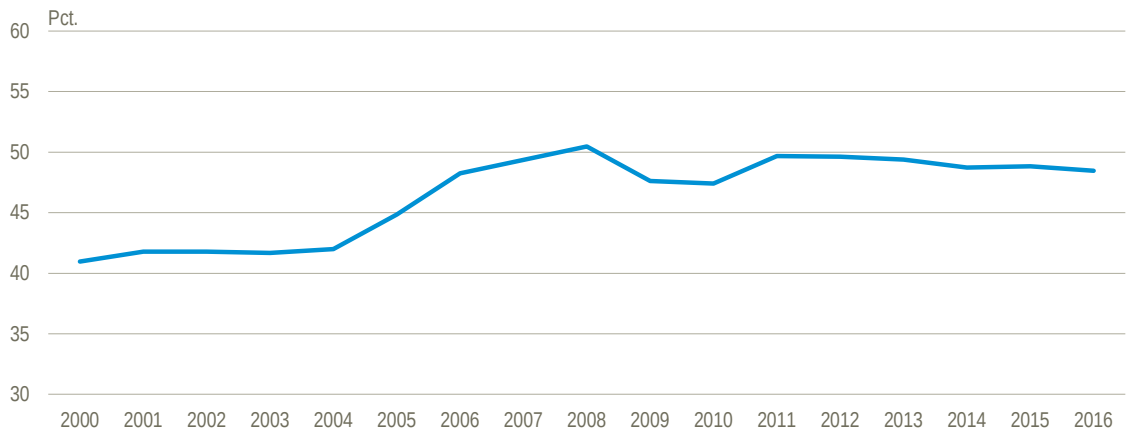
Source: www.statbank.dk/bb1 and model estimates based on Statistics Denmark's Input-Output tables.

Import content of Danish exports: how much; where from?

The spread of global and regional value chains has precipitated an increasing tendency for intermediate products produced in one country to be included in another country's production. In turn, businesses are increasingly specialising, e.g. in producing specific components in wider value chains. This development means that a growing share of imports is directly connected to exports.

As such, in 2016 approximately 48 per cent, equating to DKK 536.6 Billion, of the value of exports in the balance of payments originated in foreign imports. Figure 3 shows how, in the first 5 years of the 2000s, the import content of exports was relatively stable, at around 42 per cent, until this proportion rose to around 50 per cent in 2008. Since 2006, excluding the years of 2009 and 2010 directly following the financial crisis, the import content has continued to remain relatively stable.

Figure 3 Import content of Danish exports



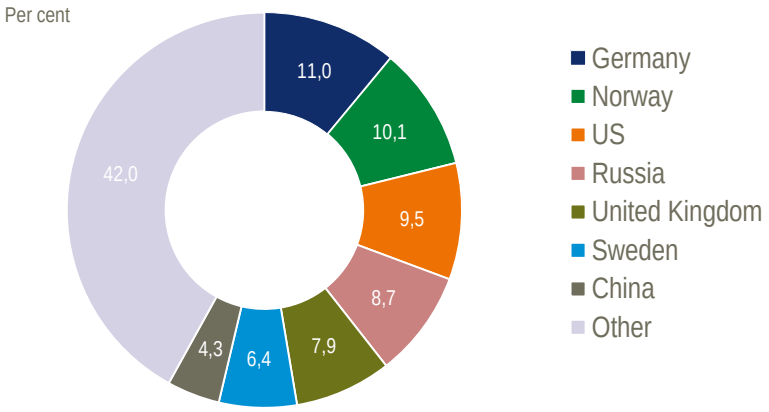
Source: Model estimates based on Statistics Denmark's Input-Output tables.

A complication arises, however, due to the fact that some imported products used in the value chain may themselves have been produced with input from goods and services produced in Denmark. These 're-imports' imply that the foreign import content of exports is actually lower than shown by the Input-Output model used in Figure 3.

Estimates based on an international Input-Output model from the OECD documents the source countries responsible for the foreign value added contained in Danish exports (see Box 3). Foreign value in Danish exports is produced in a number of nations, both regional and global. In

Figure 4, the nations which provided the most value added to Danish exports in 2014 are shown. The neighbour markets of Germany, Norway, and Sweden were responsible for around a quarter of the total value added contained in Danish exports. The US and Russia each provided around 10 per cent of this value, and China almost 5 per cent.

Figure 4 Foreign value in Danish exports by market shares. 2014



Source: Data extraction from OECD's TiVA table made especially for this analysis.

What effect do exports have on employment in Denmark?

As well as containing value created abroad, the production undertaken by export industries also contains value created by Danish subcontractors in other industries. As a result, Danish businesses' value chains both inside and outside Denmark have great significance regarding the effect of exports on Danish employment levels. When attempting to assess the effect of exports on employment, it is not enough to only look at employment connected to direct exports.

Almost a quarter of total Danish employment is related to export of Danish production, signifying here value created in Denmark. In 2016, this amounted to around 730,000 jobs. This figure encompasses both direct employment (employees working in companies exporting goods and services) and indirect employment (employees whose jobs are created, for example, in delivering products to the exporting companies). As a result, other businesses in the value chain also benefit from the jobs created by exports. For example, there are many export-related jobs in the service industry. Even though some service industries, such as the transport industry, have themselves considerable direct exports, service industries contribute especially via subcontracting to export businesses.

Box 2. Calculating direct and indirect employment

The calculation of the estimated employment related to exports is based on an Input-Output model developed from Statistics Denmark's own Input-Output tables. Input-Output tables clarify the relationships between imports, production, and use in the Danish economy, and are closely connected to the National Accounts. These tables can be used, albeit with the caveat that a number of assumptions are involved, to calculate specific relationships in the economy. In the context of this analysis, the model has been used to calculate the levels of employment connected to both the direct and indirect production required to produce Denmark's exports. More information on Input-Output Tables can be found on Statistics Denmark's website. In this analysis, a slightly modified version of the Input-Output tables has been applied. Private consumption by non-residents in Denmark has been moved from the general category of private consumption to the general category of exports. By way of a more specific example, the purchase of hotel rooms by tourists has been moved from private consumption delivered by the hotel industry and is treated instead as an export from the hotel industry.

In 2016, the headline figure for export related employment in Denmark was 730,000; this figure represents almost 25 per cent of total employment in Denmark. It is important to note, however, that this figure cannot be compared to the recent Statistics Denmark's publication (in Danish) in which it was reported that 45 per cent of private Danish employment is related to exports. In that publication, only employees in private, urban occupations were taken into account. Thus, employees in, for example, the agricultural and public sector were not included in the denominator.

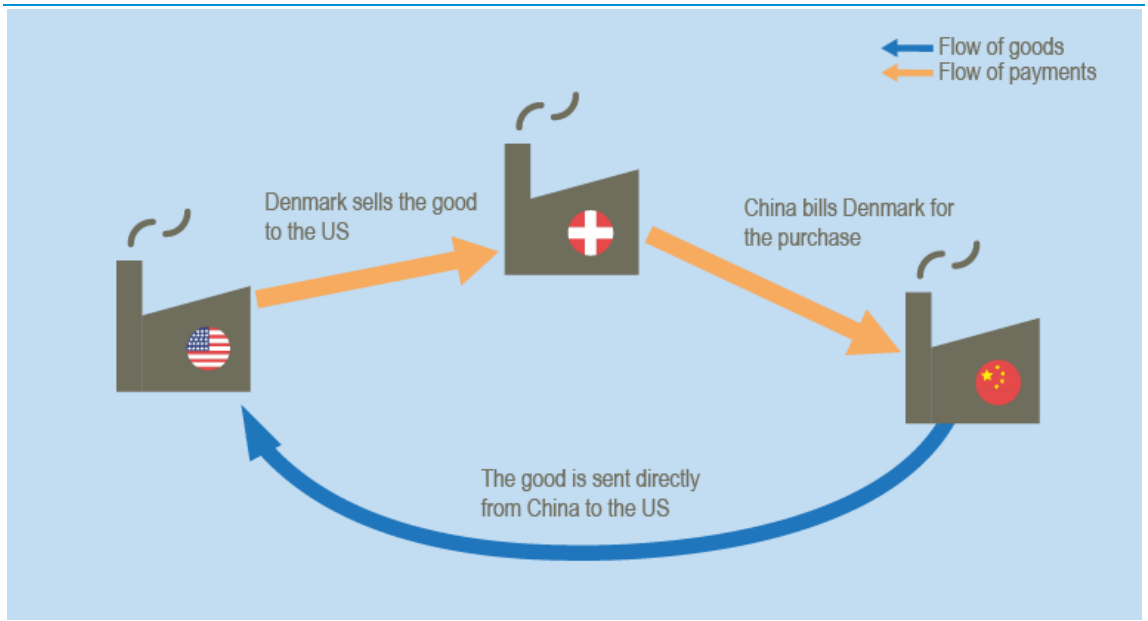
Danish exports outside Danish borders

Danish exports outside Denmark's borders occur when a Danish business sells a product abroad, which they own, and which has not passed Danish borders. These exports are included in Denmark's balance of payments. Precisely how these exports are recorded is dependent on whether the product is sold abroad after processing, or if it is simply purchased as a commodity and subsequently sold *without* further processing (this process is known as merchanting).

In the balance of payments, merchanting is treated as a net export (selling price minus acquisition price) to the country the respective products are sold to. In 2016, merchanting accounted for DKK 46.5 Billion, while products sold abroad after processing came to DKK 62.4 Billion. In total, Danish exports outside Denmark's borders accounted for 16 per cent of the total export of goods in 2016's balance of payments. This means that a significant part of the production process of goods sold abroad by Danish businesses took place either entirely or partly abroad. This kind of international organisation is described in greater detail in a 2016 Statistics Denmark analysis.

Merchanting is a common practice in the international organisation of production carried out by multinational corporations. The example in Figure 5 demonstrates a Danish parent company purchasing products from their Chinese foreign affiliate. The products are sold unaltered to an American customer, and subsequently sent directly from China to the US, never crossing Danish borders. The profit earned by the Danish parent company (the selling price received in America minus the acquisition price paid for the goods in China) is included in Denmark's balance of payments, recorded as merchanting products exported to the US.

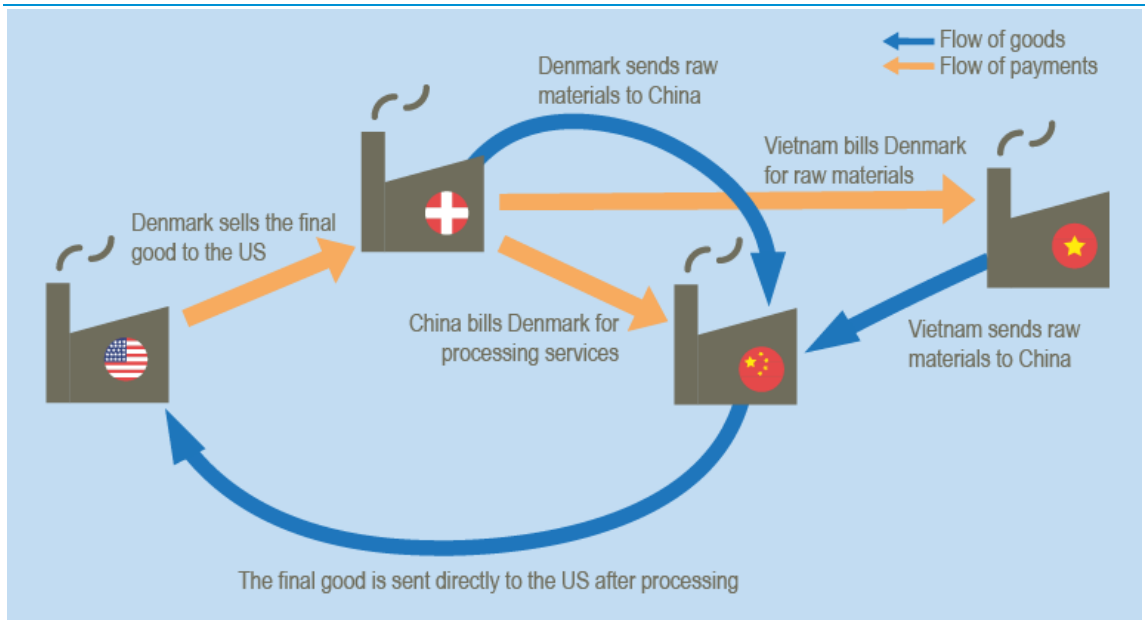
Figure 5 Merchanting – 'goods for resale'



Another way by which production is organised is when Danish businesses let companies abroad manage the manufacturing process of goods that the Danish businesses deliver (and own). Just like merchanting, this way of organising production is very widespread amongst multinational corporations. Relating this to the previous example, if the Danish parent company chooses not to purchase the processed goods from their Chinese subsidiary (as shown in Figure 5), but instead chooses to enter a contractual agreement with their subsidiary concerning the processing of goods owned by the Danish company, this would be recorded as a purchase of processing services. Consequently, the same flow of goods will appear differently in statistical records, depending on who owns the goods at the time they are processed.

The example in Figure 6 shows a processing set-up in which a Danish business owns the products throughout a large part of the global value chain. In this example, the Danish parent company purchases goods in both Denmark and Vietnam to be produced in China. The parent company pays the Chinese subsidiary for the aforementioned processing services. As such, the parent company owns the goods throughout the entire production process and sells them first as finished goods to the American customer.

Figure 6 Processing

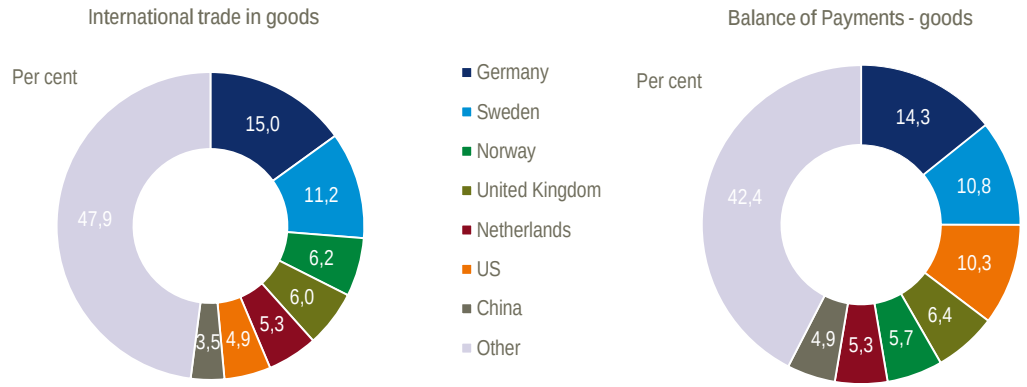


The payment for processing in the given example is recorded in the statistics for international trade in services as an import of a processing service. This service category covers both payroll and any supplementary purchasing of raw materials undertaken by the foreign business in relation to the further processing of the Danish goods. The goods purchased by the Danish parent company in Denmark and sent to China are recorded in the statistics for international trade in goods as exports. However, as Danish ownership remains constant and no change to a non-resident occurs, this movement of goods will not be classified as an export in the balance of payments. On the contrary, the goods purchased in Vietnam are *not* recorded in the statistics for international trade in goods as exports, but are included in the balance of payments as imported goods, due to the change from Vietnamese to Danish ownership. After processing, the products are sold to the US having never crossed Danish borders. The sale of goods abroad after being processed abroad is recorded as an export in the balance of payments: it is statistically irrelevant whether the goods are processed by a subsidiary or a third party.

Who is Denmark *actually* trading with?

For the export in goods, in both the international trade in goods statistics and the balance of payments, Denmark's neighbouring countries rank amongst the most significant recipients of Danish exports. The largest markets for the export of Danish goods are the neighbouring nations of Germany and Sweden. Together, they account for around a quarter of Denmark's total export of goods. Aforementioned methodological differences begin to assert themselves, however, when it comes to Denmark's third largest export market. According to the balance of payments, the US holds this position; primarily on account of the sale of goods which have not crossed the Danish border. Figure 7 shows Denmark's largest goods export markets, as measured in both international trade in goods statistics and the balance of payments.

Figure 7 Largest export markets for goods: international trade in goods and balance of payments. 2016

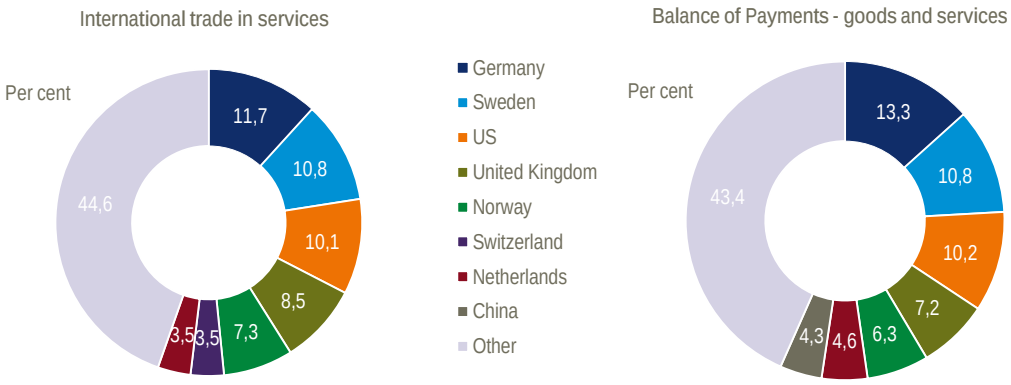


Source: www.statbank.dk/SITC5R4Y and www.statbank.dk/bb3

Germany, Sweden, the US, and the United Kingdom account for more than 40 per cent of Denmark's export of services, and these countries retain this position in relation to the total export of goods and services according to the balance of payments, as shown in Figure 8. The three most significant of these countries, Germany, Sweden, and the US, receive over a third of the total export of Danish goods and services.

As the next section shows, however, the role of these respective markets changes significantly when one focuses instead on the final destination of Danish value added.

Figure 8 Largest export markets: international trade in services and the balance of payments' total exports of goods and services. 2016

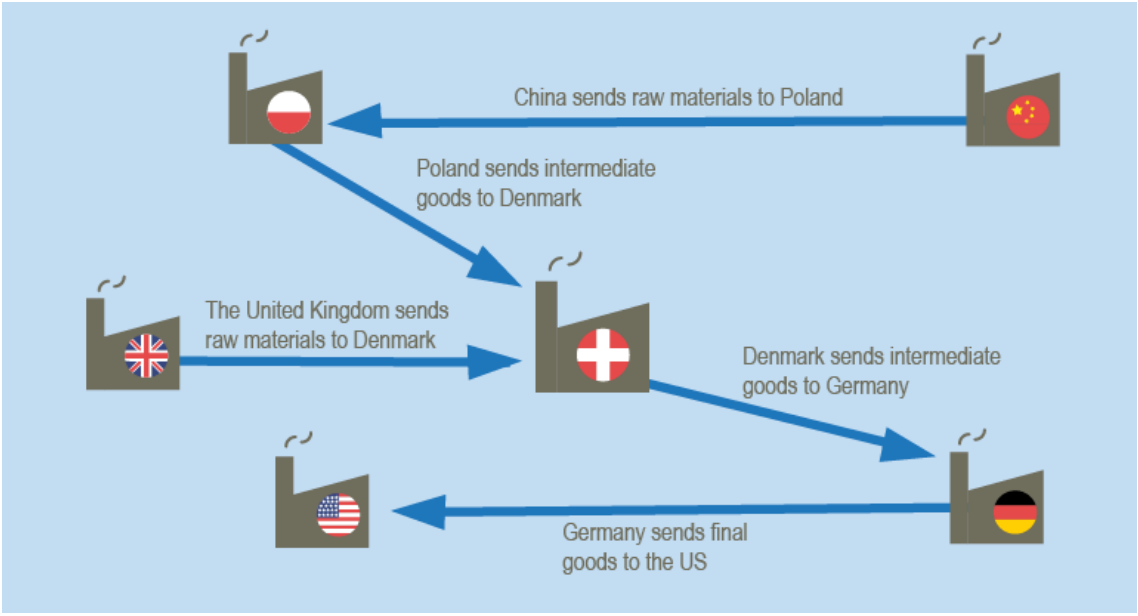


Source: www.statbank.dk/uhtl and www.statbank.dk/bb3

The final markets for Danish exports

Traditional statistics show us countries that directly receive Danish exports of goods and services. In a global economy that consists of multiple value chains, such statistics fail to tell where Denmark's exported goods and services finally end up, particularly the share of exports associated with production in Denmark. The OECD's TiVA model (see Box 3) registers both the country at the end of the global value chain and the part of exports resulting from production in Denmark (i.e. Danish value added): in other words, it shows where the Danish value added content of the export of goods and services actually ends up. This model provides a new picture of Denmark's trading partners.

Figure 9 Global value chains



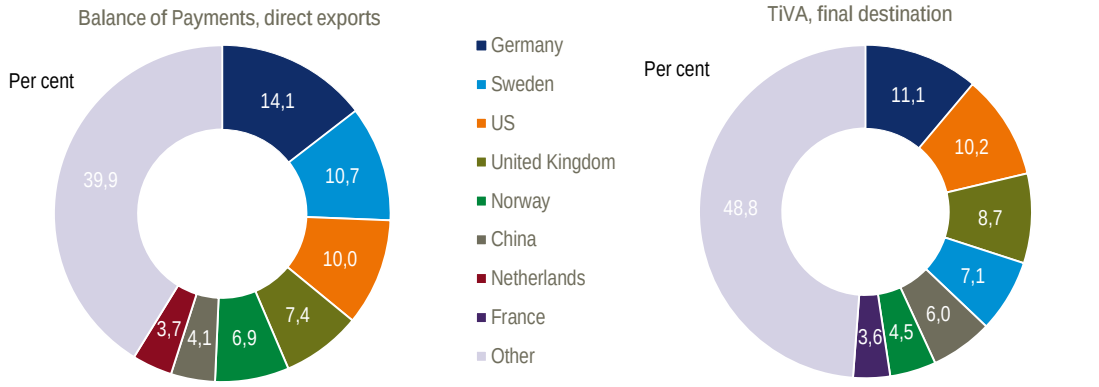
In the example in Figure 9, a Danish business purchases intermediate goods from Poland and raw materials from the United Kingdom for processing in Denmark. The intermediate goods produced in Poland contain raw materials imported from China. The Danish goods are resold to a customer in Germany, where they are utilised in a further production process. Subsequently, the German business sells these finished goods to the US for consumption. In this example, Danish exports are dependent on demand in the US – and so are exports from China, Poland, the United Kingdom and Germany. The OECD's TiVA model takes these relationships into account, and thus represents a useful tool, albeit one with significant caveats, in investigating the two questions that opened this analysis: how much does Denmark export, and who are Denmark's trading partners. By factoring in the import content of Danish exports, TiVA helps provide a picture of the Danish value added in export. In turn, by following Danish goods 'from door to door', so to speak, and showing where Danish value added ends up, a different picture is provided of who Denmark is actually trading with.

Box 3. TiVA and its limitations

TiVA (Trade in Value Added) is a collection of indicators which show value added embodied in international trade. The indicators are compiled on the basis of a model prepared in a joint project by the OECD and WTO. The model is based on a number of countries' Input-Output tables, and therefore referred to as an inter-country Input-Output model. As the model is based on a number of assumptions, it is important to note that TiVA indicators are associated with uncertainty. For example, the model assumes that one country's exports correspond to their partner country's imports. Of course, in practice this is rarely the case. The TiVA model provides estimates, not official statistics, and ought to be treated as a tool. Nevertheless, is it a useful tool, one which provides a general insight into the form and impact of economic globalisation, particularly regarding the characteristics of global value chains and how these change over time and across borders. More can be read about TiVA on the OECD website. The most recent TiVA estimates are from 2014.

Figure 10 shows TiVA estimates of the final destination for the part of exports resulting from production in Denmark (i.e. Danish value added). When compared to direct exports measured in the balance of payments, two divergences can be detected: exports according to TiVA are less concentrated in individual markets and, furthermore, geographical distance appears to hold less significance.

Figure 10 Largest export markets in goods and services: direct exports (balance of payments) and final destination (TiVA). 2014



Source: www.statbank.dk/bb3 and TiVA (OECD)

The geographical distribution of exports which create value for Denmark is thus more diffuse than shown in traditional statistics. The diffuse nature of Denmark's exports by value added means that the Danish economy is less affected by individual export market fluctuations than might be expected.

Figure 10 also shows that Sweden, Norway and Germany are less significant export markets when looking at the final markets for the part of exports resulting from production in Denmark (i.e. Danish value added), although Germany nevertheless remains Denmark's largest export market. According to TiVA, the Netherlands is a far less significant export market than is otherwise suggested in the balance of payments.

It is a different story, however, for China and the US. For both countries, their significance for Danish exports increases slightly in comparison to the balance of payments. In the TiVA model, the US moves up a place to become Denmark's second largest export market. These countries are thus shown to have a greater influence on Danish production and employment than is suggested in the traditional export statistics. Close markets – traditionally Denmark's primary export markets – subsequently have less significance when measuring where Danish value added is actually earned.

Box 4. A brief summary of the various export measurements

Statistics measuring the **international trade in goods** reflect the physical flow of goods which cross the Danish border: change of ownership is not taken into account. These statistics are published monthly, contain a high degree of detail, and have long time series.

The statistics measuring **international trade in services** are calculated in the same way as the calculations for services in the balance of payments. However, these statistics are far more detailed. They are published quarterly.

The **balance of payments** shows the value of the transactions which take place between Denmark and abroad, and are duly based on the change of ownership principle. These statistics do not contain the same high level of detail as the international trade statistics. These statistics account Danish businesses' sale of goods abroad, including *merchanting*, and are useful both in analysing global production setups and in making comparisons with GDP. In the context of the balance of payments, partner countries refer to *direct trading partners*; in other words, the target markets in which Danish businesses operate.

Input-Output models are closely linked to the national accounts, and can be used to illustrate the import content of exports. The full value chain of Danish products is, however, not fully taken into account: production of semi-manufactured goods, for example, can take place abroad before they are subsequently imported into Denmark. To highlight the full value chain requires the use of a multiregional Input-Output table, such as the OECD's ICIO (Inter-Country Input-Output). Input-Output models are used, for example, in the compiling of the OECD's Trade in Value Added (TiVA) model.

TiVA shows trade in value added. The value from each industry and country in the production chain is traced to the point of final sale. These estimates make it easier to visualise value chains and production networks, irrespective of borders. This enables a better understanding of the way in which macroeconomic fluctuations in foreign markets affect the Danish economy. By way of example, it is useful to apply TiVA's estimations as to where Danish value added is ultimately sold when investigating how other countries' economic development affects Danish exports. TiVA is not published regularly and is dependent on significant assumptions, but it is in a constant state of development and improvement. More can be read about TiVA on the OECD website.