

A downturn in China will reduce growth in Denmark significantly

China's importance to the Danish and global economy has increased considerably in the past 30 years. However, China faces several challenges today that could lead to a sudden economic downturn. This may have substantial consequences for the Danish economy. China is of particular importance to parts of the Danish business sector – either as a market or as a supplier of production inputs.

Written by

Amy Yuan Zhuang
Principal Economist

ayz@nationalbanken.dk
+45 3363 6470

Casper Winther Nguyen Jørgensen
Principal Economist

cwj@nationalbanken.dk
+45 3363 6572

Mikkel Bess
Senior Economist

mbes@nationalbanken.dk
+45 3363 6600

Time used

🕒 27 pages

Key messages



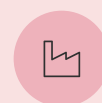
China is one of Denmark's largest trading partners

Over the past 30 years, China has experienced strong growth in activity and prosperity and is today the world's second largest economy. The country has gained great importance to the world and Denmark – especially in trade and production of goods. China is now Denmark's fourth largest export market after the United States, Germany and Sweden.



A downturn in China could have major consequences for the Danish economy

The Chinese economy is currently facing several challenges that could lead to lower growth in both the short term and the longer term. For example, calculations show that a growth decline of 1 percentage point in China will reduce Danish GDP growth by 0.4 percentage points after one year.



Chinese inputs are important to the Danish business sector, and some are particularly critical

China is the largest producer and net exporter of a variety of commodities and products, where global net exports are concentrated in a few countries. This increases the vulnerability of Danish businesses in relation to the supply of critical production inputs.

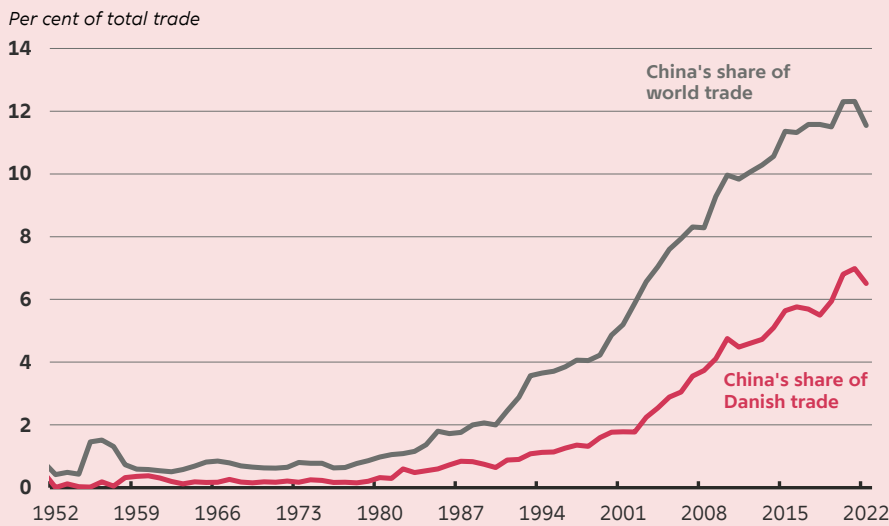
Why is this important?

China has become a major trading partner of great importance to both Danish businesses and consumers. But there are few analyses that quantify the effects of a downturn in China on the Danish economy and assess the critical dependence of the Danish business sector on China. Danmarks Nationalbank has examined this with the present analysis, which shows how a sudden downturn in China will affect the Danish economy, and which industries and product groups are particularly vulnerable.



Let China sleep. For when she wakes, she will shake the world.

Main chart: China has become an important trading partner for both the global and Danish economy



Note: The chart shows China's share of global trade and Danish trade, comprising both exports and imports.

Source: IMF and own calculations.



Topics

Denmark and abroad

International economy

Foreign trade

01 China is an important export market for Denmark



China is today the fourth largest market for Danish exports.

“Let China sleep. For when she wakes, she will shake the world.” This is a quote often attributed to Napoleon. China has long since woken up, and its importance to the global economy has grown significantly over the past decades. Today, the Chinese economy accounts for 18 per cent of the global GDP, relative to just under 2 per cent merely 30 years ago, see table 1. This makes China the second largest economy in the world in terms of GDP in dollar. The strong growth is mainly due to the opening of the Chinese economy to the world and the expansion of global value chains. Over the years, China has established itself as an important production centre in the world, and 31 per cent of the global production of goods came from China in 2021. This is nearly twice as much as the United States, see table 1.

TABLE 1

China’s role in the global economy has increased significantly over the past 30 years

Indicator, 2022 ¹ [1992]	China	USA	Euro area	Denmark
GDP in current prices, percentage of global GDP in USD	18.1 [1.9]	25.4 [25.8]	14.1 [26.6]	0.4 [0.6]
GDP growth, average in 2012-21, per cent year-on-year	6.2	2.1	1.4	2.1
GDP per capita, USD	12,814 [420]	76,348 [25,393]	41,213 [21,643]	66,516 [29,622]
Population, percentage of global population	17.7 [21.3]	4.2 [4.7]	4.3 [5.7]	0.1 [0.1]
Exports, percentage of global exports	14.6[2.3] ²	8.4 [12]	12.4 [14.9] ³	0.5 [1.1]
Global production of goods, per cent	31 [2.7]	16.2[21.8]	14 ⁴ [25.4]	0,3 [0.4]
Oil consumption, percentage of global consumption	16.9 [3.4]	18.9 [24.5]	9.5 [15.8]	0.1 [0.3]

1 Except for share of global production of goods and oil consumption, which are for 2021.

2 To be comparable with the other indicators in the table, the figure is excluding Hong Kong.

3 The data exclude intra-euro area trade.

4 The data are for 2020.

Source: IMF, Eurostat, UN, and the oil company BP.

Chinese demand is more important to the Danish economy than shown by gross exports

China's importance to the Danish economy has also increased significantly, both as an importer of Danish goods and services and as a supplier of finished goods to Danish consumers and production inputs to Danish businesses. While China is an important trading partner for Denmark, it still plays a minor role in other economic areas such as direct investments and financial assets, see box 1. Therefore, this analysis focuses primarily on the trade channel.

Exports from Denmark to China totalled kr. 126 billion in 2022 – corresponding to 6.3 per cent of total Danish gross exports.¹ This is more than a doubling since 2005 and makes China the fourth largest receiver of Danish gross exports, even though it still trails behind Denmark's largest export markets: the United States and Germany.² The increase in exports to China reflects a number of factors, including increased Chinese demand for inputs for production of export goods and a large and growing middle class as an increasingly important driving force behind greater domestic demand in China.³ GDP per capita has increased 30 times in China over the past 30 years, see table 1.

Gross exports measure exports directly from Denmark to China. Since parts of Danish exports consist of inputs produced abroad, and parts of Danish production outputs end up in China via exports from other countries, gross exports do not give the full picture of how Danish businesses are connected with Chinese consumers, see chart 1. International input-output databases can be used to calculate how much of the Danish value added depends on the final demand in individual countries.⁴ Value added is the value of goods produced in Denmark less the costs of foreign intermediate goods. In 2020, China accounted for 7 per cent of the final demand for Danish value added linked to exports, see chart 2. This is significantly more than in 1995, when Chinese demand accounted for only 1.5 per cent of the foreign use of Danish value added.

¹ This is including Hong Kong, which has been an important link for trade in goods between China and the outside world. The figure is based on Statistics Denmark's balance of payments statement.

² In 2022, Denmark's export share to the United States and Germany was 14.7 per cent and 11 per cent, respectively.

³ See Zhang (2016). The number of people characterised as belonging to the middle class has increased from 157 million in 2009 to 400 million in 2021, according to Kharas (2010) and the National Bureau of Statistics of China.

⁴ See Nellemann and Nissen (2016). This analysis uses the results from the OECD's TiVA database, which are calculated based on the OECD's Inter-Country Input-Output tables. The TiVA database comprises trade in goods and services and is measured in current prices. The TiVA database was most recently updated in November 2022 (preliminary figures) with data from 1995 up to and including 2020. Compared to the final data from 2021, the preliminary figures will not significantly change the conclusions drawn based on this analysis.

CHART 1

Global value chains that may lead to deviations between gross exports and value added linked to exports

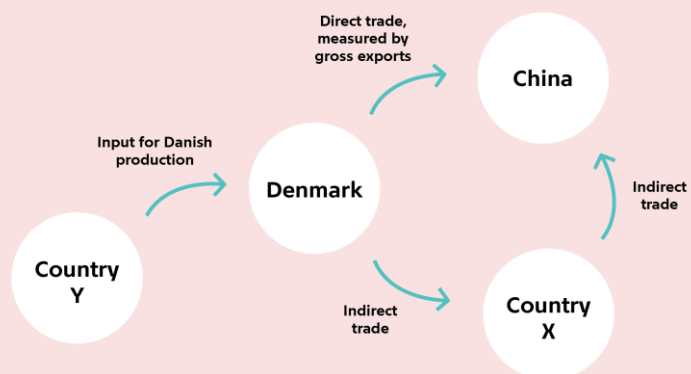
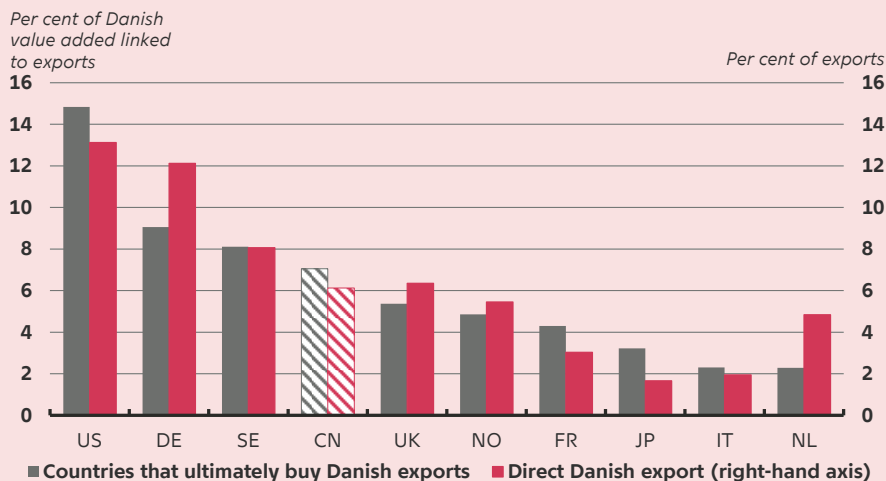


CHART 2

China is Denmark's fourth most important export market



Note: Data are for 2020 and include goods and services. Countries that ultimately receive Danish exports are measured by Danish value added linked to exports and take into account the full value chain for Danish exports. Direct Danish exports are measured by Danish gross exports. Data for China include Hong Kong. Calculations based on the interim 2022 version of the TiVA database from the OECD.

Source: OECD, Statistics Denmark and own calculations.

As a small and open economy, Denmark is more dependent than USA on Chinese demand

Generally, the Danish economy is increasingly dependent on Chinese demand – also more than many other countries, see chart 3. In 2020, 2.2 per cent of the value added in Denmark was absorbed by final demand in China. By comparison, Chinese final demand accounted for 2 per cent and 0.9 per cent of value added in the euro area and the United States, respectively. Thus, Chinese demand plays a greater role for the Danish economy than for particularly the US economy. One reason for the difference may be that Denmark, as a small, open economy, is more dependent on foreign demand. At the same time, the US economy has become less dependent on foreign demand in recent years. This applies particularly to demand from China, reflecting, among other factors, deteriorating trade relations between the two countries.

CHART 3

Denmark is more dependent on Chinese demand than many other countries

Share of total value added absorbed by Chinese demand



Note: The total value added in an economy can come from both domestic and foreign demand. Calculations based on the interim 2022 version of the TIVA database from the OECD. Source: OECD and own calculations.

Exports to China create jobs in Denmark

The increased exposure to China is also reflected in the Danish labour market, where there were approximately 60,000 jobs linked to the final demand in China in 2018. This is twice as many as 10 years ago and is equal to just over 3 per cent of Danish employment in the private sector and 7 per cent of export-related employment.

China is an important supplier of finished goods for Danish consumption and production inputs for Danish production

It is not only as a market that Chinese influence has grown. China has also become an important supplier of intermediate goods for Danish exports and finished goods for Danish consumption, although China still plays a minor role relative to our closest neighbouring countries. In 2022, 7.1 per cent of Denmark’s imports of goods and services came from China, including Hong Kong. Gross imports, like gross exports, do not capture indirect trades between Denmark and China. Denmark imports goods from other countries which are wholly or partly produced in China earlier in the value chain. Calculated by foreign value added, China was the fifth largest supplier of inputs to Danish exports in 2020.

BOX 1

China affects Danish economy through several channels

The Chinese economy can affect the Danish economy through several channels such as trade, commodity prices, direct investments and financial assets. Developments in China also have implications for the rest of the world and Denmark in several other areas such as technology and climate, but the effects from these can be difficult to quantify.

Trade in goods and services has the greatest impact on the Danish economy and is therefore the primary focus of the analysis. In addition, China has an impact on Danish prices through its influence on global commodity prices, because China is one of the world's largest consumers of commodities. For example, China accounts for 16 per cent of the world's demand for oil and more than 50 per cent of the demand for iron ore and copper. The IMF wrote in its latest forecast from April that a strong expansion in the Chinese economy could push global inflation higher via higher commodity prices.¹

Danish businesses' direct investments in China have increased, but they still represent a much smaller share of Denmark's total foreign direct investment relative to other advanced economies. In 2021, more than 40 per cent of Danish direct investments were placed in the other EU countries and 14 per cent in the United States, while only 3.5 per cent went to China, including Hong Kong.² Since 2016, the share of Danish foreign direct investments in China, including Hong Kong, has decreased, which may reflect that Danish businesses began to invest more in the United States during the same period. China's direct investments in Denmark are limited and accounted for 0.1 per cent of total inward direct investments in Denmark.

Financial assets are an area in which China plays a minor role for Denmark, one reason being capital restrictions in China. At the end of the 4th quarter of 2022, China accounted for approximately 1 per cent of Danish foreign financial assets. This includes portfolio investments in Chinese equities and bonds amounting to kr. 25 billion and banks' loans and deposits as well as trade credits amounting to kr. 11 billion.

The financial sector in Denmark has very limited exposure to China. However, financial shocks in China may still have a spillover effect on Danish assets through global risk appetite. An analysis by the European Central Bank concluded that a shock to the Chinese economy has a significant effect on global equity prices, which is, however, only half as large as a shock to the US economy.³

1 See IMF (2023a).

2 Hong Kong has largely functioned as a gateway for investments in China from the outside world. It is possible that some Danish foreign direct investments in China are made through Singapore, which is a financial centre in Asia, but the exact share is unclear. In 2021, China, Hong Kong and Singapore together accounted for 10 per cent of Denmark's foreign direct investment.

3 See Lodge et al. (2022).

Source: The oil company BP, the World Bank and Danmarks Nationalbank.

02 Challenges in China could cause an abrupt downturn that will reduce Danish GDP significantly



A temporary growth decline of 1 percentage point in China will reduce Danish GDP growth by 0.4 percentage points after one year.

The international organisations expect decent growth in the Chinese economy in the coming years. For example, the OECD expects in its latest forecast from June 2023 that the Chinese economy will grow by 5.4 per cent in 2023 and 5.1 per cent in 2024. Nevertheless, the risk of a sharp and abrupt downturn in China is present. For example, several indicators of economic and geopolitical uncertainty regarding China have tripled since 2016.⁵ The increasing uncertainty largely reflects unusual global events such as the coronavirus pandemic and Russia's invasion of Ukraine, but also several challenges facing the Chinese economy. These challenges may trigger a significant downturn in China, which could have a major impact on both the global and the Danish economy.

Two of the most current challenges faced by China are geopolitical tensions with the United States and high indebtedness in the Chinese real property sector. In addition, there are underlying factors that may lead to significantly lower growth in China than expected in the longer term. These factors include a declining population and challenges in shifting domestic demand from investment to consumption and diminishing productivity growth, as a result of many years of excessive investments and dominance of state-owned corporations.⁶

Persistent tensions between the United States and China may weaken Chinese growth outlook

Relations between the United States and China have deteriorated significantly in recent years. Among other things, this has increased protectionism and focus on self-sufficiency for security reasons. Population surveys show that the American and Chinese populations' views of each other have become predominantly negative in recent years. In 2023, 83 per cent of US respondents had a negative view of China, which is a significant increase since 2018, see chart 4. In turn, 75 per cent of Chinese respondents had a critical attitude towards the United States, according to a survey from 2021.⁷

The political decision-makers in the United States are also viewing China with increasing scepticism, and the number of China-related bills introduced in Congress has increased considerably since 2018, also as a share of all bills introduced in Congress. During the current congressional term, running from January 2023 to January 2025, 300 China-related bills have been introduced. This corresponds to nearly 5 per cent of all bills introduced in Congress and a threefold increase relative to the 2017-2018 congressional term, see chart 4. The bills introduced cover e.g., control of export of high-tech goods and screening of investments. The number of

⁵ According to figures from the Economic Policy Uncertainty Index.

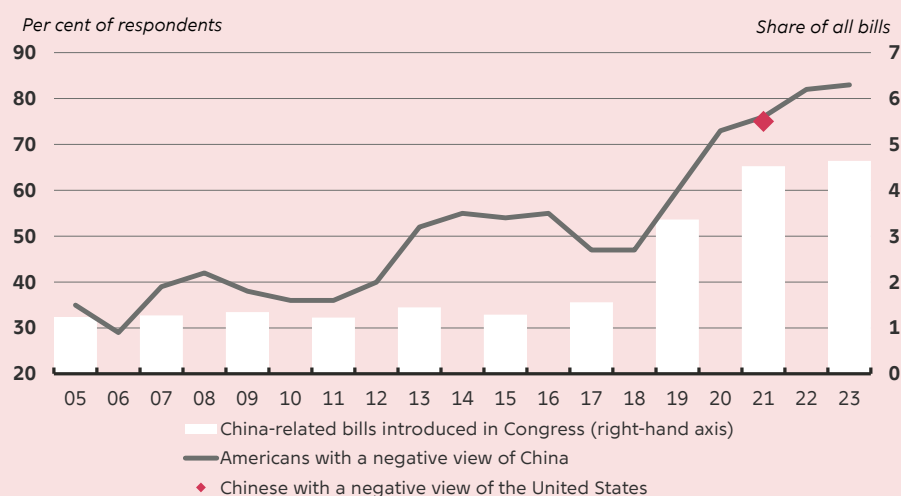
⁶ See IMF (2023b).

⁷ See Liu et al. (2023).

export restrictions from China has also increased significantly.⁸ Ongoing geopolitical tensions between the United States and China could result in more trade and investment restrictions, especially in high-tech sectors. This could weaken China’s growth outlook through lower production and exports. It could also lead to renewed difficulties in international supply chains and increase inflationary pressures.

CHART 4

Both US population and politicians are increasingly critical of China



Note: The columns indicate the share of China-related bills introduced in the U.S. Congress during the two-year term of Congress beginning that year.

Source: Pew Research Center, Liu et al. (2023), US Congress and own calculations.

China’s debt-ridden real property sector poses major economic risks

The Chinese real property sector is characterised by massive indebtedness and therefore poses a significant risk to China’s economic stability. The most serious economic crises often occur in the wake of credit-driven house price bubbles.⁹ Total debt in the Chinese real property sector, which covers both housing loans and debt among property developers, constituted 44 per cent of GDP at the end of 2022, see chart 5. This is a threefold increase since 2005. In particular, the high level of indebtedness among some property developers could pose a risk to the real property sector and the economy as a whole, according to the IMF.¹⁰ In addition, the Chinese housing market is characterised by large shifts between supply and demand, where supply significantly outstrips demand, especially in smaller cities. This increases the risk of an abrupt adjustment of house prices. A sharp fall in house prices will reduce investment and activity in the construction sector, which has otherwise been a driver of Chinese growth. It will also spill over into private consumption, as more than half of

⁸ See OECD (2023).

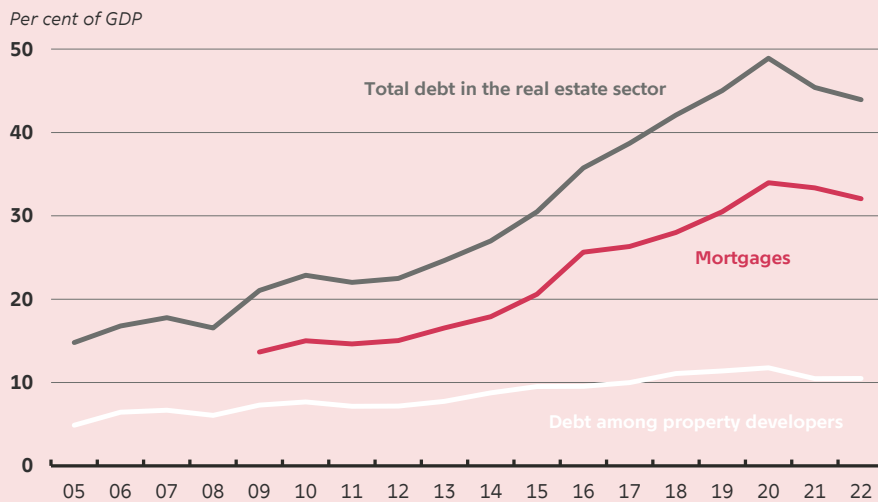
⁹ See Abildgren (2018).

¹⁰ See IMF (2023b).

the households' wealth is tied up in their homes, according to the European Central Bank.¹¹

CHART 5

Indebtedness in Chinese real property sector has grown rapidly



Source: People's Bank of China.

A downturn in China has major implications for the global economy

The impact of a Chinese downturn for the Danish economy is calculated in two steps. Firstly, the Global Projection Model (GPM) is used to quantify the effects on the global economy. See box 2 for a detailed review of GPM. Secondly, the GPM results are used as input in Danmarks Nationalbank's macroeconomic business cycle model, MONA.¹² The shock to the Chinese economy has been scaled to correspond to a decline in GDP growth of 1 percentage point.

A downturn in China will first and foremost affect the global economy through a direct decline in Chinese demand for goods and services. Then, lower Chinese demand has spill-over effects on economic activity in the rest of the global economy through direct and indirect trade effects. In addition, the Chinese downturn will contribute to greater uncertainty in global financial markets and lead to tighter financial conditions globally. This will further contribute to dampening global growth.¹³

¹¹ See Apostolou et al. (2022).

¹² See Danmarks Nationalbank (2003).

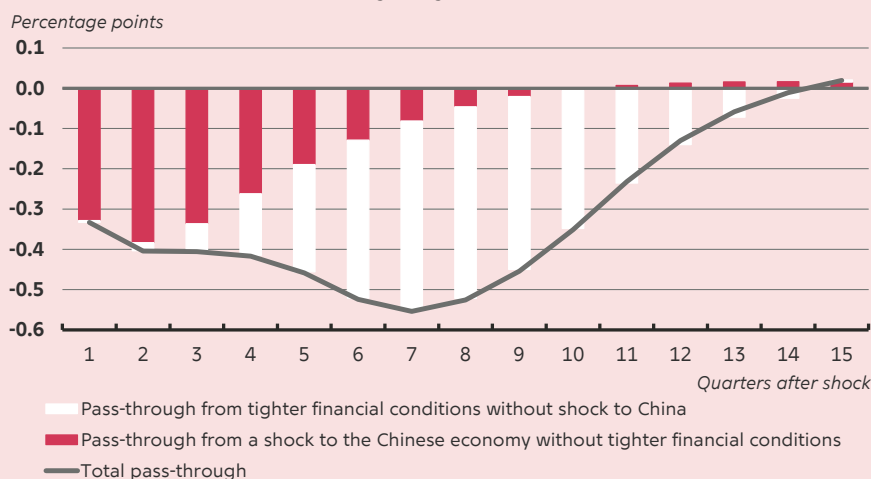
¹³ See Lodge et al. (2022), Barcelona et al. (2022) and Mwase et al. (2016). In the GPM model, a tightening of global financial conditions can be modelled by tightening the credit conditions in the United States, the euro area and Japan. In the United States and the euro area, it is assumed to be 15 per cent of what it was at the beginning of the coronavirus pandemic, while it is assumed to be 25 per cent in Japan, which has a higher degree of economic integration with China than the United States and the euro area.

The results from the GPM calculations show that a decline in Chinese GDP growth of 1 percentage point results in a reduction in global GDP growth, including China, of 0.42 percentage points after four quarters, growing to 0.55 percentage points after seven quarters, see chart 6. A significant part of the effects after four quarters come from the tightening of global financial conditions. The results are in line with estimates from other analyses, where the pass-through of a decline in Chinese GDP growth of 1 percentage point is estimated to be in the range of 0.3-0.6 percentage points after two years.¹⁴

CHART 6

A downturn in the Chinese economy has significant effects on global economy

Cumulative effects of a downturn in China on global growth



Note: The effects have been calculated using the Global Projection Model (GPM) and consist of a shock to Chinese GDP growth of 1 percentage point and a shock to credit conditions in the United States and the euro area corresponding to 15 per cent of the level at the beginning of the coronavirus pandemic and a shock of 25 per cent in Japan.

Source: GPM and own calculations.

Danish growth will decline significantly as a result of a downturn in China

To calculate the effects on the Danish economy of a downturn in China, the results from the GPM model are used as input in MONA. In addition to the negative impact on global demand, it also takes into account that a shock to the Chinese economy is of importance to interest rates in the euro area and the United States, the effective krone rate, global inflation, foreign prices and wages as well as the global oil price.¹⁵

¹⁴ Copestake et al. (2023) find that global GDP growth excluding China declines by 0.6 percentage points after two years. Barcelona et al. (2022) find that the impact on global growth including China is 0.3 percentage points. Furceri et al. (2016) find a pass-through on other countries of 0.33 percentage points, and Slettvåg (2014) finds that there is a pass-through of 0.5 percentage points on global growth.

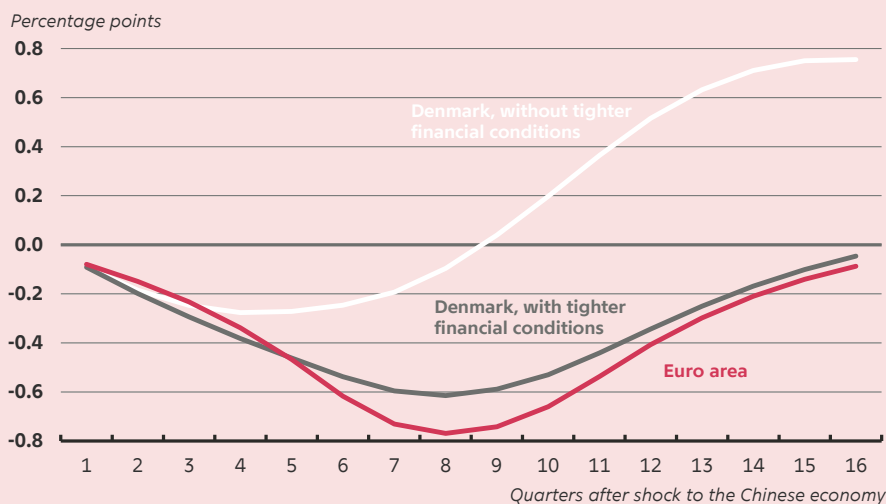
¹⁵ The results of the GPM model are included in MONA as follows: The export market growth is calculated as the krone rate-weighted change in GDP multiplied by an elasticity of 1.5; the change in the effective krone rate is assumed to follow that of the euro area; Danish interest rates are assumed to be affected in the same way as interest rates in the euro area, and the entire yield curve is shifted in parallel; Danish

The impact of a decline in Chinese GDP growth on the Danish economy is strong and relatively long-lasting. Growth in Danish GDP will be reduced by 0.38 percentage points after four quarters, see chart 7 top. The estimated effect is consistent with estimates from other analyses.¹⁶ The calculations take into account that financial conditions in Denmark will tighten as a result of a downturn in China by assuming higher interest rates in Denmark, which will offset the lower interest rates derived from the euro area. If the tighter financial conditions in Denmark are not factored in, the Chinese downturn will have a smaller and more short-lived impact on Danish growth. The effects on the Danish economy, taking into account the tighter financial conditions, are similar to those in the euro area.

CHART 7

A Chinese downturn would have about the same effect on the Danish economy as on the euro area

Cumulative effects of a downturn in China on growth in Denmark and euro area

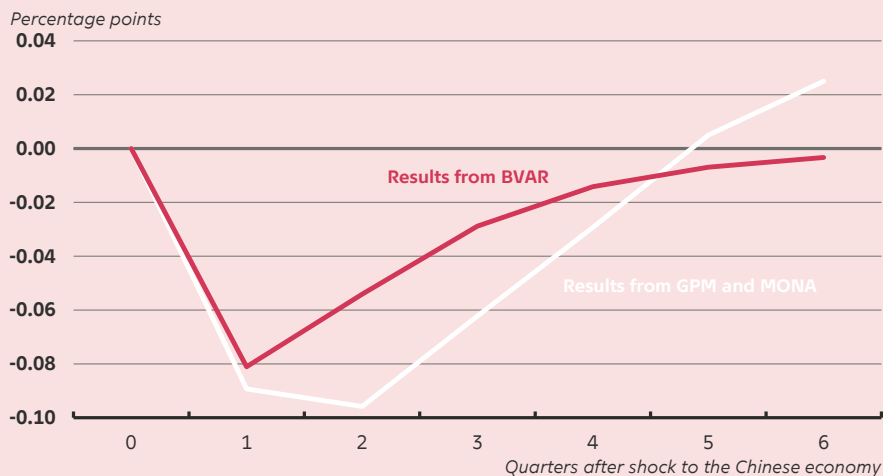


BVAR model shows same effect on Danish economy

Effects of a downturn in China on growth in Denmark without tighter financial conditions in Denmark

import prices are assumed to follow the development in the global consumer price index; and the effect on foreign wages is calculated via a simple Wage Phillips Curve with global output gaps and price inflation as explanatory variables.

¹⁶ See Sørensen (2017).



Note: The effects on Denmark of a separate financial shock have been calculated by removing the positive effects on growth from lower interest rates. The euro area results have been calculated using GPM. BVAR is a Bayesian vector autoregressive (VAR) model estimated for Chinese GDP growth and inflation and Danish GDP growth and inflation in the period 3rd quarter 1992 to 1st quarter 2023. The shocks are identified via sign restrictions.

Source: GPM, MONA and own calculations.

There are several methods for calculating the effects of a slowdown in growth in China on the Danish economy, and the combination with GPM and MONA is one of them. Another method is to estimate a Bayesian VAR (BVAR) model for Chinese GDP growth and inflation and Danish GDP growth and inflation. The results from BVAR show that a downturn in the Chinese economy has a pass-through on the Danish economy in the same order as the results from GPM and MONA, see chart 7 bottom. However, the effects will be short-lived, which may be due to the BVAR model not taking into account other macroeconomic variables such as interest rates in Denmark, the effective krone rate, global inflation, foreign prices and wages as well as global oil prices.

BOX 2

Introduction to Global Projection Model

Global Projection Model (GPM) is a quarterly projection model with 10 individual economies as well as 22 economies aggregated as 'rest of the world'.¹ Together, these economies account for more than 80 per cent of global GDP. The model has been estimated for the period 1st quarter 1999 to 4th quarter 2022.

The model primarily describes the demand side by modelling aggregate demand via an IS curve, inflation via the Phillips Curve, interest rates via a reaction function based on inflation forecasts and the exchange rate via uncovered interest rate parity. All equations measure deviations of the variables from their trend. The four equations are as follows.

The IS curve

$$\hat{y}_t = \beta_1 \hat{y}_{t+1} + \beta_2 \hat{y}_{t-1} - \beta_3 \hat{r}_{t-1} + \beta_4 \widehat{REER}_t^c - \beta_5 FACT_t - \eta_t^{BLT} + \varepsilon_t + \beta_6 (\hat{r}_t^{oil} + \hat{z}_t) + \beta_7 \hat{t} \hat{o} t_t$$

where \hat{y}_t indicates the output gap, \hat{r}_t indicates the long-term real interest rate gap, calculated based on the expected future short real interest rate gap, \widehat{REER}_t^c indicates the actual effective exchange rate, $FACT_t$ indicates the importance of foreign activity via primarily the trade channel, but the variable takes other channels into account to a certain extent, η_t^{BLT} indicates spillover effect via financial channels represented by changes in credit conditions in the United States, the euro area and Japan, ε_t is an error term, which can be seen as shock to the output gap, $\hat{r}_t^{oil} + \hat{z}_t$ indicates the economy's dependence on oil exports and $\hat{t} \hat{o} t_t$ indicates the economy's export dependence on other raw materials such as copper.²

The Phillips Curve

$$\pi_t^c = \alpha_1 E_t \pi_t^c + (1 - \alpha_1) \pi_{t-1}^c + \alpha_2 (\widehat{REER}_t^m - \widehat{REER}_{t-4}^m) / 4 + \alpha_3 \widehat{REER}_t^m + \alpha_4 (\hat{r}_t^{oil} + \hat{z}_t) + \alpha_5 (\hat{r}_t^{food} + \hat{z}_t) + \alpha_6 f(\hat{y}_{t-1}) + \varepsilon_t^{\pi^c}$$

where π_t^c indicates the core inflation measured as inflation excluding energy and food products, π_{t-1}^c indicates year-on-year rate of increase in core inflation, \widehat{REER}_t^m indicates indirect pass-through from import prices, $(\widehat{REER}_t^m - \widehat{REER}_{t-4}^m) / 4$ represents direct pass-through from import prices, $\hat{r}_t^{oil} + \hat{z}_t$ indicates indirect pass-through from global oil prices, $\hat{r}_t^{food} + \hat{z}_t$ indicates indirect pass-through from global food prices, the output gap is represented in the Phillips Curve via $f(\hat{y}_{t-1})$, and $\varepsilon_t^{\pi^c}$ is an error term, which can be seen as a shock to core inflation.

Reaction function based on inflation forecast

$$i_t^{unc} = g_1 i_{t-1} + (1 - g_1)(\bar{i}_t + g_2 \pi_t^{dev} + g_3 \hat{y}_t) + \varepsilon_t$$

where $i_t = \max\{i_t^{unc}, i^{floor}\}$ indicates an effective lower limit of the short nominal interest rate, \bar{i}_t indicates the neutral nominal interest rate in equilibrium, and π_t^{dev} indicates the deviation of the expected inflation from the objective.

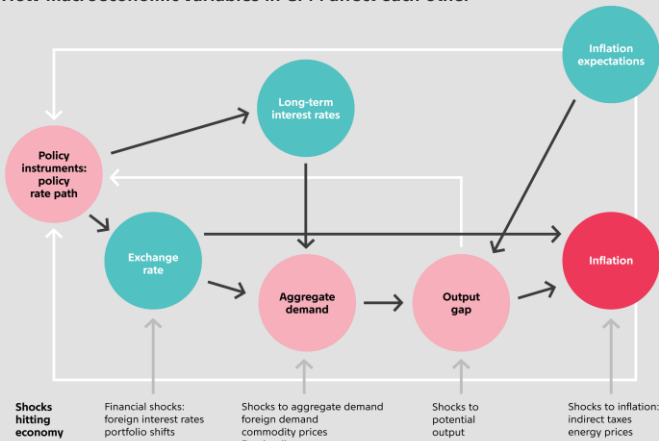
Uncovered interest rate parity

$$s_t = E s_{t+1} - (i_t - i_t^{US} + prem_t) + \varepsilon_t$$

where s_t indicates the nominal exchange rate, $E s_{t+1}$ indicates the expectations for the future nominal exchange rate, i_t^{US} indicates the nominal interest rate in the United States, and $premi_t$ is a risk premium.

Chart A

How macroeconomic variables in GPM affect each other



1 The 10 individual economies are China, the United States, the euro area, India, Japan, Russia, Brazil, the United Kingdom, Mexico and

03

China is particularly important for parts of Danish trade and industry

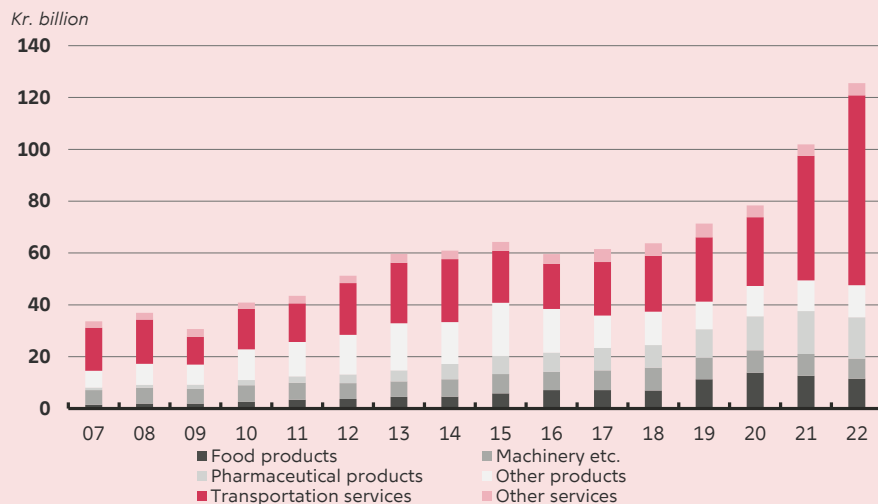
China plays an important role for Danish export markets and the Danish economy as a whole. However, parts of the Danish economy are more dependent on or vulnerable to the Chinese economy than others. This applies not only to individual industries' exposure to Chinese demand, but also in relation to imports of consumer goods and production inputs for Danish production of goods. China is today the largest producer of a wide variety of products and commodities, where global net exports are concentrated on few countries. This may make China particularly critical to parts of Danish trade and industry.

The transport sector and pharmaceutical industry are especially exposed to Chinese demand

The extent to which the individual industries are exposed to the Chinese economy varies greatly. Today, shipping, pharmaceuticals, food products and machinery make up the largest share of Danish exports to China, see chart 8. However, this has not always been the case. Previously, primarily machinery and shipping accounted for the majority of exports to China, but the export share of food products and especially pharmaceuticals has increased substantially in recent years. The changes in the composition of exports over time may, for example, reflect rising income, higher living standards and changing consumption patterns among Chinese consumers. However, the increased exports of food products must also be seen in the context of the outbreak of African swine fever in China, which has led to a rise in Danish exports of pork to China over the past four years. In addition, the strong increases in freight rates in 2021 and 2022 have significantly raised the nominal value of exports of transport services in recent years.

CHART 8

Food products, machinery, pharmaceutical products and shipping make up the majority of Danish exports to China



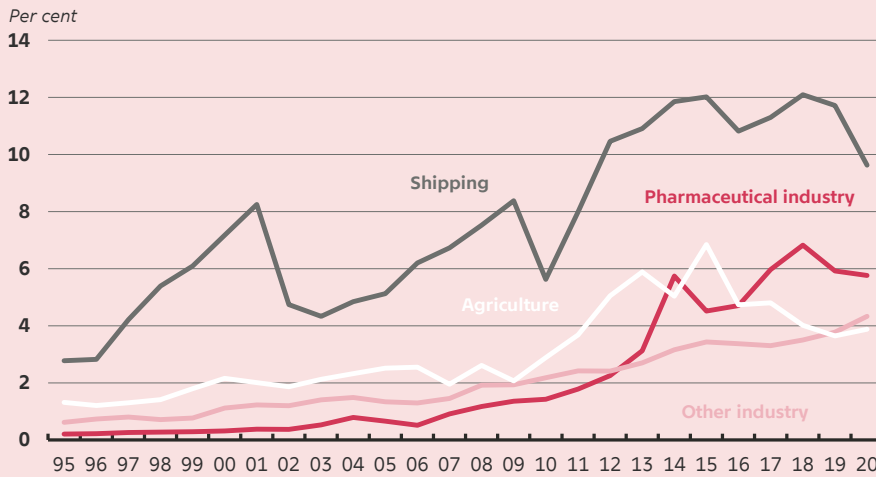
Note: Exports to China and Hong Kong.
Source: Statistics Denmark and own calculations.

Taking into account the parts of Danish exports to China that are produced abroad and the parts of Danish value added that end up in China via exports from other countries, Chinese demand is particularly important for the transport service industries – especially shipping. Here, Chinese demand accounts for around 10 per cent of the total Danish value added in the transport sector, see chart 9. In recent years, the importance of Chinese demand to the pharmaceutical industry has also grown. Whereas Chinese demand accounted for less than 1 per cent of Danish value added in the pharmaceutical industry in the mid-2000s, it now accounts for around 6 per cent. However, the US and European markets are still by far the largest sales markets for the pharmaceutical industry. Sales to the US market have especially seen growth in recent years. In 2020, just under 40 per cent and 20 per cent, respectively, of the total Danish value added in the pharmaceutical industry went to the US market and the European market, respectively.

CHART 9

The Chinese market is particularly important to Danish shipping and increasingly to the pharmaceutical industry

Share of Chinese demand of total Danish value added in the individual industries



Note: Calculations based on the interim 2022 version of the TIVA database from the OECD.
Source: OECD and own calculations.

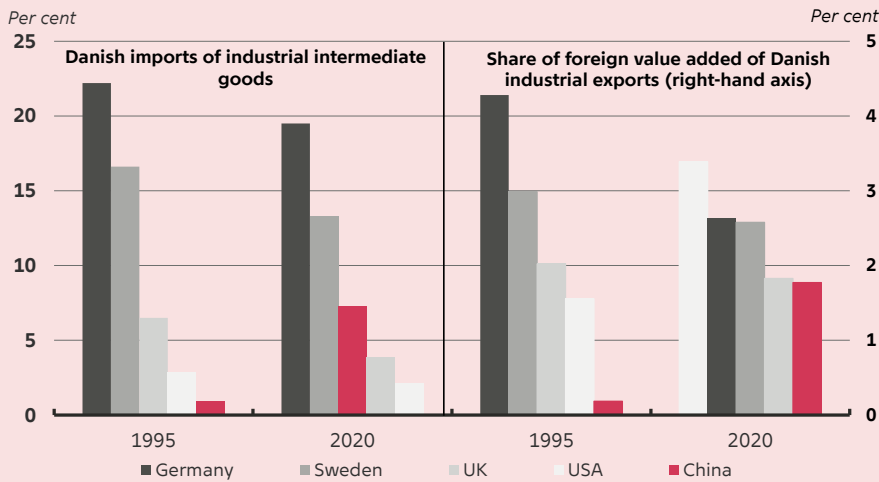
Chinese inputs play a major role in Danish industrial production and exports and may constitute a critical vulnerability for parts of Danish trade and industry

As one of the world's largest manufacturing countries, China today holds a central position in the global value chains. This also applies to Danish businesses, which increasingly use components made in China in the production of their goods. Gross imports of industrial production inputs from China have thus increased significantly over the years. In 2020, China was the third largest foreign exporter of industrial intermediate products to Denmark, with a share of approx. 7 per cent against less than 1 per cent in the mid-1990s, see chart 10. Correspondingly, the share of Chinese value added in Danish industrial exports has also increased.

CHART 10

Chinese inputs play a greater role in Danish trade and industry

The individual country's share of Danish imports of industrial production inputs and value added in Danish industrial exports, respectively



Note: Calculations based on the interim 2022 version of the TIVA database from the OECD.
Source: OECD and own calculations.

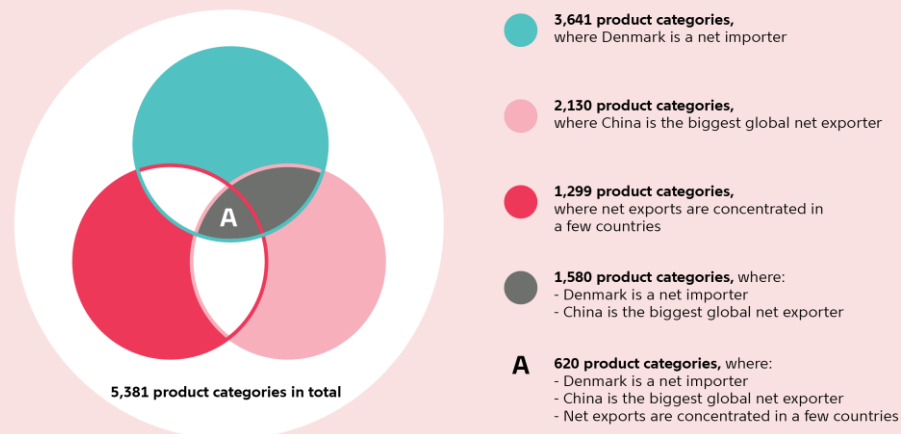
China's growing importance to Danish businesses is also seen at product level. Out of just under 3,650 product categories of which Denmark is a net importer, China is the largest global net exporter of nearly 1,580 of these categories, see chart 11 top.¹⁷ In line with the expansion and optimisation of global value chains, a significant part of net exports of the products has been concentrated in fewer and fewer countries. Over the years, China has become the largest global exporter of many of these products, with global net exports being concentrated in a few countries. While, in the mid-1990s, China was the largest net exporter of a little more than 100 product categories concentrated on few countries, and where Denmark was a net importer, today this applies to about 600 product categories, see chart 11 below.¹⁸ In comparison, this only applies to about 25 and 70 product categories for the United States and the EU, respectively.

¹⁷ China (including Hong Kong and Macao) is the largest direct exporter to Denmark of 473 of the product categories of which Denmark is a net importer. As Denmark also imports products produced in China via imports from other countries, the calculation of direct exports may underestimate China's importance to Danish trade and industry. Therefore, global net exports are used in the analysis.

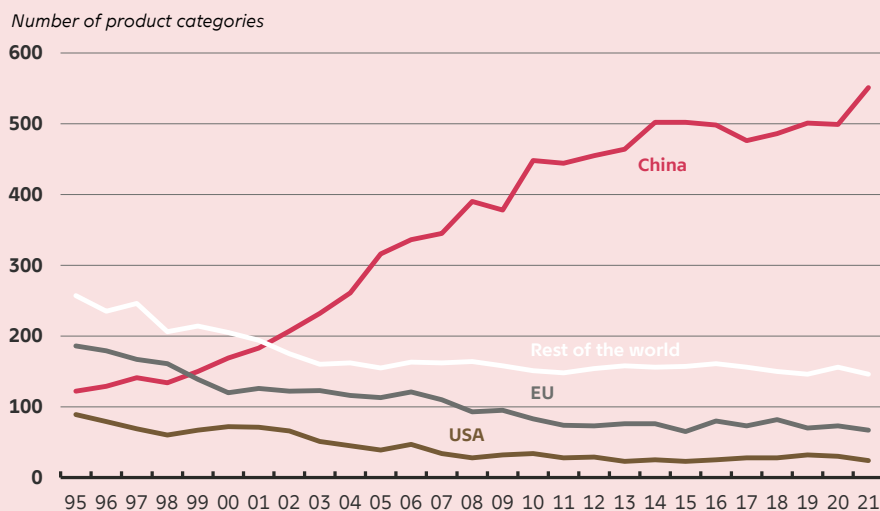
¹⁸ The calculations are based on the BACI International Trade Database, which contains import and export figures for 5,384 product categories from 238 countries. Based on this dataset, a Herfindahl-Hirschman Index (HHI) has been calculated for each product category as a measure of how concentrated net exports are for individual countries. A high HHI means that few countries are net exporters of the individual product category, and conversely for a low HHI. Product categories with an HHI below 0.4 have been left out. Furthermore, only product categories of which Denmark is a net importer are included.

CHART 11

China's great importance is also seen at product level



Note: China is including Hong Kong and Macao. Calculations based on the BACI International Trade Database at the Product-Level, HS17, for 2021, which contains a total of 5,381 product categories.
Source: Own calculations.



Note: The chart shows the number of product categories, where 1) the individual country is the largest net exporter, 2) Denmark is a net importer and 3) net exports are concentrated on few countries. China is including Hong Kong and Macao. Calculations based on the BACI International Trade Database at the Product-Level, HS92, from 1995 to 2021, which contains a total of 5,022 product categories.
Source: Own calculations.

The high concentration of global production and exports in few countries increases the vulnerability of Danish businesses and consumers. During the pandemic, for

example, China adopted a very hard line against the spread of the coronavirus, leading to strict lockdowns of the Chinese economy in periods. This made it difficult for both consumers and businesses to obtain finished goods and necessary inputs for domestic production which they normally imported from China. The disruptions to the supply and value chains were one of the reasons for the very high inflation that we have seen in many countries in the wake of the pandemic.¹⁹

Many of the products that Danish businesses or consumers get from China, they can probably do without for a period of time, or they can find alternatives. This applies, for example, to clothing, textiles and many other consumer goods which constitute a significant part of the product categories, see chart 12.²⁰ These products are thus not directly critical to the Danish economy.

However, there are also products that are necessary in the production of Danish goods and more difficult to replace with alternative products. These may be specific chemicals, metals or electronic components that are critical to parts of Danish trade and industry. For example, Denmark imports a number of chemicals from China, which are used in, for example, the production of pharmaceutical products.²¹

China is also the largest producer and exporter of a number of critical raw materials that constitute a vulnerability to the European and Danish economies.²² This includes production, processing and export of rare earth elements²³ used in, for example, the production of wind turbines and electronic devices.²⁴ In addition, China produces the majority of the world's solar cell panels and lithium-ion batteries.²⁵ This gives China a completely central position in relation to the green and digital transition.

In recent years, both businesses and political decision-makers have become aware of the supply risk of a high concentration of imports of production inputs from few countries and few suppliers. Questionnaire responses from members of the Confederation of Danish Industry (DI) indicate that many Danish industrial companies want to reduce their supply vulnerabilities by increasing the number of subcontractors in the wake of the corona pandemic and the war in Ukraine.²⁶ Most recently, the European Commission has also presented a number of measures, one aim of which is to make EU countries less dependent on China in relation to critical raw materials.²⁷ This will, for example, be achieved through European production of critical raw materials. However, the establishment of European production of critical raw materials is costly and will take several years.

¹⁹ See Danmarks Nationalbank (2022).

²⁰ The analysis at product level only gives an indication of China's importance to the Danish economy. The reasons for this include that the level of detail is not sufficient to determine the dependency on specific products or inputs.

²¹ See Sørensen and Ellegaard (2023)

²² The term 'critical raw materials' covers raw materials of great economic importance and for which there is little security of supply and which are not replaceable by other raw materials. In 2023, the European Commission has identified 34 critical raw materials for the EU, with China being the primary supplier of 11 of these raw materials. See European Commission (2023B).

²³ Rare earth elements are a generic term for 17 metals that are critical in, for example, the production of wind turbines, electric cars and electronic products such as mobile phones and computers. In 2022, China accounted for approximately 70 per cent of the global production of rare earth elements, see U.S. Geological Survey (2023), and 98 per cent of the EU's supply of rare earth elements comes from China, see European Commission (2022).

²⁴ See www.vestas.dk (link).

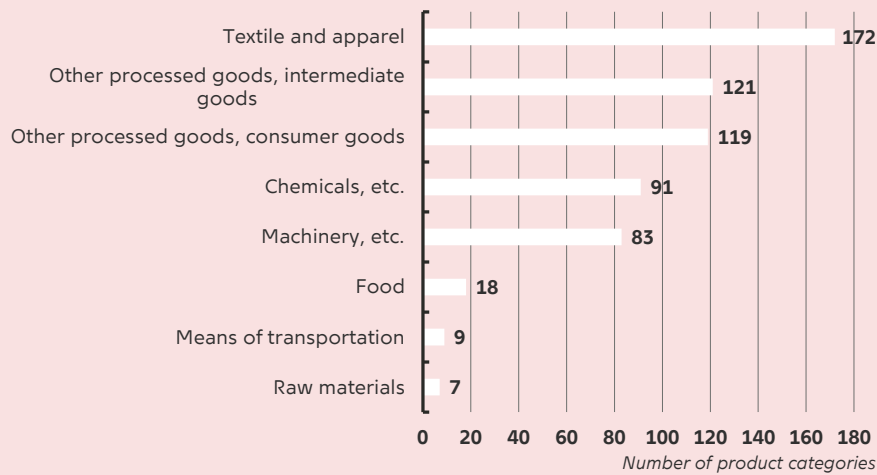
²⁵ See International Energy Agency (2022A) and International Energy Agency (2022B).

²⁶ See Ellegaard (2022).

²⁷ See European Commission (2023A).

CHART 12

Intermediate goods, chemicals, machinery and raw materials account for about half of the product categories



Note: The chart shows the number of product categories, where 1) China is the largest net exporter, 2) Denmark is a net importer and 3) net exports are concentrated on few countries. That is the product categories in field A at the top of chart 12. China is including Hong Kong and Macao. Calculations based on the BACI International Trade Database at the Product-Level, HS17, for 2021, which contains a total of 5,382 product categories.

Source: Own calculations.

Bibliography

Abildgren, Kim (2018), *Danmarks Nationalbank 1818-2018*, Danmarks Nationalbank.

Apostolou, Apostolos, Alexander Al-Haschimi and Martino Ricci (2022), Financial risks in China's corporate sector: real estate and beyond. *ECB Economic Bulletin*, no. 2, March.

Barcelona, William L, Danilo Cascardi-Garcia, Jasper J. Hoek and Eva Van Leemput (2022), What Happens in China Does Not Stay in China, *International Finance Discussion Papers* 1360. Washington: Board of Governors of the Federal Reserve System, November.

Copestake, Alex, Melih Firat, Davide Furceri and Chris Redl (2023), *China spillovers: aggregate- and firm-level evidence*, forthcoming, International Monetary Fund.

Danmarks Nationalbank (2003), *Mona – en kvartalsvismodel af dansk økonomi*.

Danmarks Nationalbank (2022), War in Ukraine dampens growth and increases prices, *Danmarks Nationalbank Analysis (Outlook for the Danish economy)*, no. 5, March.

Ellegaard, Bastian Emil (2022), Danish companies still embrace globalisation, *DI Analysis*, November.

European Commission (2022), EU strategic dependencies and capacities: second stage of in-depth reviews, *Commission Staff Working Document*, February.

European Commission (2023A), *European Critical Raw Materials Act*, March.

European Commission (2023B), *Study on the Critical Raw Materials for the EU 2023 – Final Report*.

Furceri, Davide, João Tovar Jalles and Aleksandra Zdzienicka (2016), China spillovers: new evidence from time-varying estimates, *IMF Spillover notes*, no. 8, November.

Global Projection Model Network (2023), *The structure of the GPM++ model*.

IMF (2023a), A rocky recovery, *World Economic Outlook*, April.

IMF (2023b), People's Republic of China: 2022 article IV consultation, *IMF Country Report*, no. 67, February.

International Energy Agency (2022A), *Global Supply Chains of EV Batteries*, IEA, Paris.

International Energy Agency (2022B), *Special Report on Solar PV Global Supply Chains*, IEA, Paris.

Kharas, Homi (2010), The emerging middle class in developing countries, *OECD Working Paper*, no. 285, January.

Liu, Adam Y., Xiaojun Li og Songying Fang (2023), Unpacking "the west": divergence and asymmetry in Chinese public attitudes towards Europe and the United States, *Journal of Current Chinese Affairs*, vol. 52(1), pp. 119-133.

Lodge, David, Ana-Simona Manu and Ine Van Robays (2022), The impact of Chinese macro risk shocks on global financial markets, *ECB Financial Stability Review*, May.

Mwase, Nkunde, Papa N'Diaye, Hiroko Oura, Frantisek Ricka, Katsiaryna Svirydzenka, and Yuanyan Zhang (2016), Spillovers from China: Financial Channels, *IMF Spillover Notes*, no. 5, September.

Nellemann, Peter Beck and Karoline Garm Nissen (2016), Global Value Chains, *Danmarks Nationalbank (Monetary Review)*, 1st quarter 2016.

OECD (2023), Raw materials critical for the green transition: Production, international trade and export restrictions, *OECD Trade Policy Papers*, no. 269, April.

Slettvåg, Bjørnar K. (2014), Consequences of an abrupt slowdown in China's property market, *Norges Bank Commentaries*, no. 5, June.

Sørensen, Allan (2017), Kinas store omstilling: Nu skal forbrugerne trække væksten, *DI Indsigt*, November.

Sørensen, Allan og Bastian Emil Ellegaard (2023), Kinas økonomiske betydning for Danmark, *DI Analyse*, April.

U.S. Geological Survey (2023), Mineral commodity summaries 2023, *USGS Numbered Series*, January.

Zhang, Longmei (2016), Rebalancing in China – progress and prospects, *IMF Working Paper*, no. 183, September.

See also

Outlook for the Danish economy – Declining but still high inflation, March 2023:

https://www.nationalbanken.dk/da/publikationer/Documents/2023/03/ANALYSE_nr.%204_Udsigter%20for%20dansk%20%C3%B8konomi.pdf

China's significance for Danish exports continues to grow, April 2017

https://www.nationalbanken.dk/da/publikationer/Documents/2017/04/Nyt_Kinas%20betydning.pdf

Global value chains

https://www.nationalbanken.dk/da/publikationer/Documents/2016/03/Globale_vaerdikaeder_kvo1_16.pdf

[Overskrift]

[Indsæt links]

Publication series



NEWS

News is an appetizer offering quick insight into one of Danmarks Nationalbank's more extensive publications. The series is targeted at people who need an easy overview and like a clear angle.



STATISTICAL NEWS

Statistical news focuses on the latest figures and trends in Danmarks Nationalbank's statistics. The series is targeted at people who want quick insight into current financial data.



REPORT

Report comprises recurring reports on Danmarks Nationalbank's areas of work and activities. Here you will find Danmarks Nationalbank's annual report, among other documents. The series is targeted at people who need a status and update on the past period.



ANALYSIS

Analysis focuses on current issues of particular relevance to Danmarks Nationalbank's objectives. The analyses may also contain Danmarks Nationalbank's recommendations. They include our outlook for the Danish economy and our assessment of financial stability. The series is targeted at people with a broad interest in economic and financial matters.



ECONOMIC MEMO

Economic Memo provides insight into the analysis work being performed by Danmarks Nationalbank's employees. For example, Economic Memo contains background analyses and method descriptions. The series is primarily targeted at people who already have knowledge of economic and financial analyses.



WORKING PAPER

Working Paper presents research work by both Danmarks Nationalbank's employees and our partners. The series is primarily targeted at professionals and people with an interest in central banking research as well as economics and finance in a broader sense.

The analysis consists of a Danish and English version. In case of doubt as to the correctness of the translation, the Danish version will prevail.

Danmarks Nationalbank
Langelinie Allé 47
DK-2100 Copenhagen Ø
+45 33 63 63 63

Editing completed on 26 June 2023



**DANMARKS
NATIONALBANK**