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in a Country Comparison**

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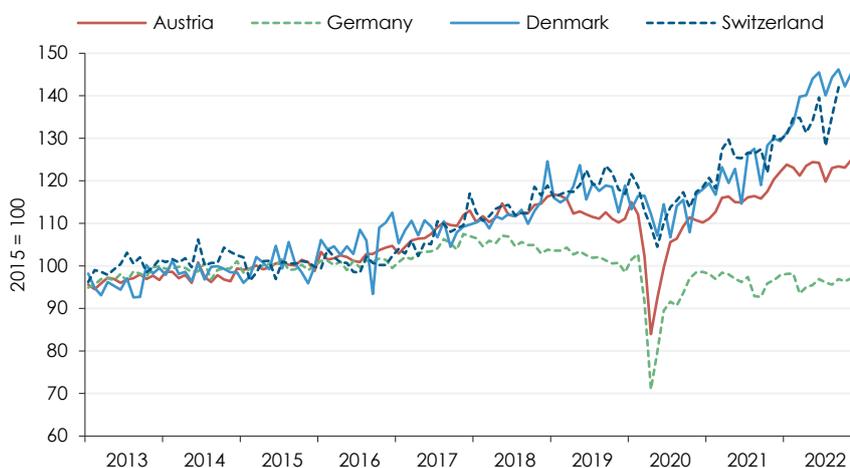
# Austrian Industrial Production in a Country Comparison

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- The better performance of the Austrian industry compared to Germany since 2017 is less a reflection of the strength of the domestic economy than of Germany's industrial weakness.
- In Denmark and Switzerland, output grew even more dynamically than in Austria in recent years. However, the lead of these countries is exclusively due to the boom in the pharmaceutical industry. If this industry is excluded, Austria's lag dissolves.
- The weakness of the German industry is also evident when the Austrian industrial structure is transferred to the sectoral development in the countries compared. Denmark even performs worse than Austria in this calculation variant.
- Industrial labour productivity has been declining in Germany since 2017. Austria, Denmark and Switzerland show similar increases if the pharmaceutical industry is excluded.

## Development of production in manufacturing

Industrial production index NACE C, seasonally and working day adjusted



**"The better performance of Denmark and Switzerland is due to the pharmaceutical industry. Without this industry, there is no growth advantage over Austria in respect of output, value added or labour productivity."**

While industrial production in Austria, Denmark and Switzerland soon reached pre-crisis levels after the crisis-induced slump in 2020 and has grown rapidly since then, the slight downward trend continued in Germany (source: Eurostat, Macrobond).

# Austrian Industrial Production in a Country Comparison

Marcus Scheiblecker

March 2023

## Austrian Industrial Production in a Country Comparison

In recent years, the Austrian industrial production index has grown significantly faster than that of Germany. In Switzerland and Denmark, on the other hand, industry has expanded even more strongly than in Austria since the end of the COVID-19 crisis. However, the higher momentum in these countries is due to the boom in the pharmaceutical sector. Without this industry, the growth advantage dissipates. For all observed countries, the share of value added in output of the industry as a whole, remained rather constant recently. Therefore, meaningful comparisons can be made based on output data. Calculations of productivity based on hours worked reveal a similar development to the one of output. While a decline has been observed in Germany since 2017, labour productivity has increased in the other countries. The increase in Denmark and Switzerland was even more pronounced than in Austria. Here, too, the difference can be attributed solely to the pharmaceutical industry. Without it, there is no difference in labour productivity as compared to Austria.

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## 1. Introduction

International comparisons of competitiveness in the industrial sector focus mostly on industrial production. In view of a high export share, industrial goods have to compete in international markets. Therefore, industrial production is considered an important measure of competitiveness. A comparison of the development of the Austrian industrial production index with that of Germany shows significantly stronger growth in domestic production from 2017 onwards.

This analysis examines the suitability of the industrial production index for a structural assessment of a country's industrial competitiveness, sheds light on its consistency with other economic statistics and extends the comparison to countries with similar economic structures.

The term industry mainly refers to the use of standardised, machine-based production

techniques with large batch sizes and is therefore closely related to company size. Although the term is not used consistently in common parlance, it is clearly defined within economic statistics. Uniformly across Europe, the industrial production index covers economic units above a certain size, which, in the broadest definition, belong to NACE Rev. 2 sections B to E.

In German statistics, these sectors are grouped together under the heading of "Produzierendes Gewerbe" (producing industry). The associated economic section C is referred to as "verarbeitendes Gewerbe" (manufacturing) in Germany, but as "Herstellung von Waren" (production of goods) in Austria<sup>1</sup>. This classification system is also used by the EU member country Denmark and by Switzerland<sup>2</sup>.

<sup>1</sup> In Austria, large companies are classified as industrial and smaller companies as commercial, but this is irrelevant for the business statistics and only serves the purpose of the trade association classification by the Austrian Economic Chamber.

<sup>2</sup> The General Classification of Economic Activities (NOGA) is the Swiss version of the European classification of economic activities NACE. For Denmark as an EU member country, the NACE classification also applies.

The industrial production index is a part of the European set of short-term business statistics, as monthly values are published, which are able to indicate changes in the business cycle in a timely manner. Economic section C in particular, is exposed to cyclical fluctuations through international trade in goods. In contrast, construction is more dependent on national and local conditions due to the often strong involvement of the

public sector (especially in civil engineering). Section E (water supply) only reflects cyclical fluctuations to a limited extent. The electricity, gas, steam and air conditioning supply (NACE Rev. 2, section D) is likewise suitable for cyclical monitoring to a limited extent, only. Therefore, only section C, manufacturing, is considered in the following analysis.

Table 1: **NACE classification of economic sections in industry**

Code	Designation
B	Mining and quarrying
C	Manufacturing, production of goods
D	Electricity, gas, steam and air conditioning supply
E	Water supply; sewerage, waste management and remediation activities

Source: Eurostat.

## 2. The production index

The compilation of the production index follows the Council Regulation concerning short-term statistics (EC 1165/98, Council of the European Union, 1998) and is therefore largely harmonised with regard to the methods applied and the compilation dates. Within the scope of the business survey in the manufacturing sector, the data are collected in accordance with the EU regulation using a primary data collection with variable cut-offs and a standardised criterion of representativeness.

The current Austrian production index is based on a sample of the year 2015 of around 9,800 companies of economic sections B to F (NACE Rev. 2, sections B to E: 5,800, section F: 4,000). In 2015, the population comprised about 63,600 enterprises. Participation in the survey is mandatory for companies with 20 or more employees. If the standardised criterion of representation (concentration sample) is not met in the relevant economic sector, companies with a turnover threshold of 1.5 million € or more (or 2.5 million € in NACE Rev. 2, division 43) are additionally included (Statistics Austria, 2023). The weights and NACE classifications used to calculate the index are kept as stable as possible over the index period and only actual changes between economic activities are taken into account.

The production index is calculated on the basis of deflated production values, using total technical production, i.e. own production destined for sales and for internal supplies and services, plus contract work performed. Appropriate deflators are used for price adjustment (construction price indices for the construction sector, producer or wholesale price indices for the other sectors). This should be broadly consistent with the practice in the compilation of the national accounts, where output is measured

in a similar way to the production index. The only difference is likely to be the own-account capital formation, which is included in the national accounts output values but not in the production index.

The values collected for the production index are then converted into growth rates and weighted according to the size of the company in the base year 2015. If a company grows significantly more (or less) than the other companies in the sample in subsequent years, its growth contribution will be underestimated (or overestimated) compared to the national accounts, which use the previous year as the basis for weighting. To minimise such errors, the EU regulation requires the index to be rebased every 5 years.

Since the industrial production index only takes into account companies above a certain size, it reflects only part of the production of an economy in the respective economic sector recorded in the national accounts. The more comprehensive annual structural business statistics used for national accounts purposes cover considerably more production units (enterprises). Estimates must be made for companies and their production that are not even covered by this survey.

Another difference to the production (output) of the individual sectors reported in the national accounts is that the sample is fixed to a base year. While a company that is included in the business survey and is later dissolved appears in both the national accounts and the production index with an output of zero, the output of newly founded companies is only included in the national accounts data, but not in the production index. This is because a newly established industrial company – if it meets the size criteria

**The industrial production index represents the volume of real output of companies with at least 20 employees on a monthly basis.**

When comparing the industrial production index with the volume of output according to the national accounts, several conceptual differences must be taken into account.

– cannot be included in the sample until the next rebasing of the index at the earliest.

Differences in the growth rates between the volume of output according to the industrial production index and the production value according to the national accounts may therefore be due to the following reasons<sup>3</sup>:

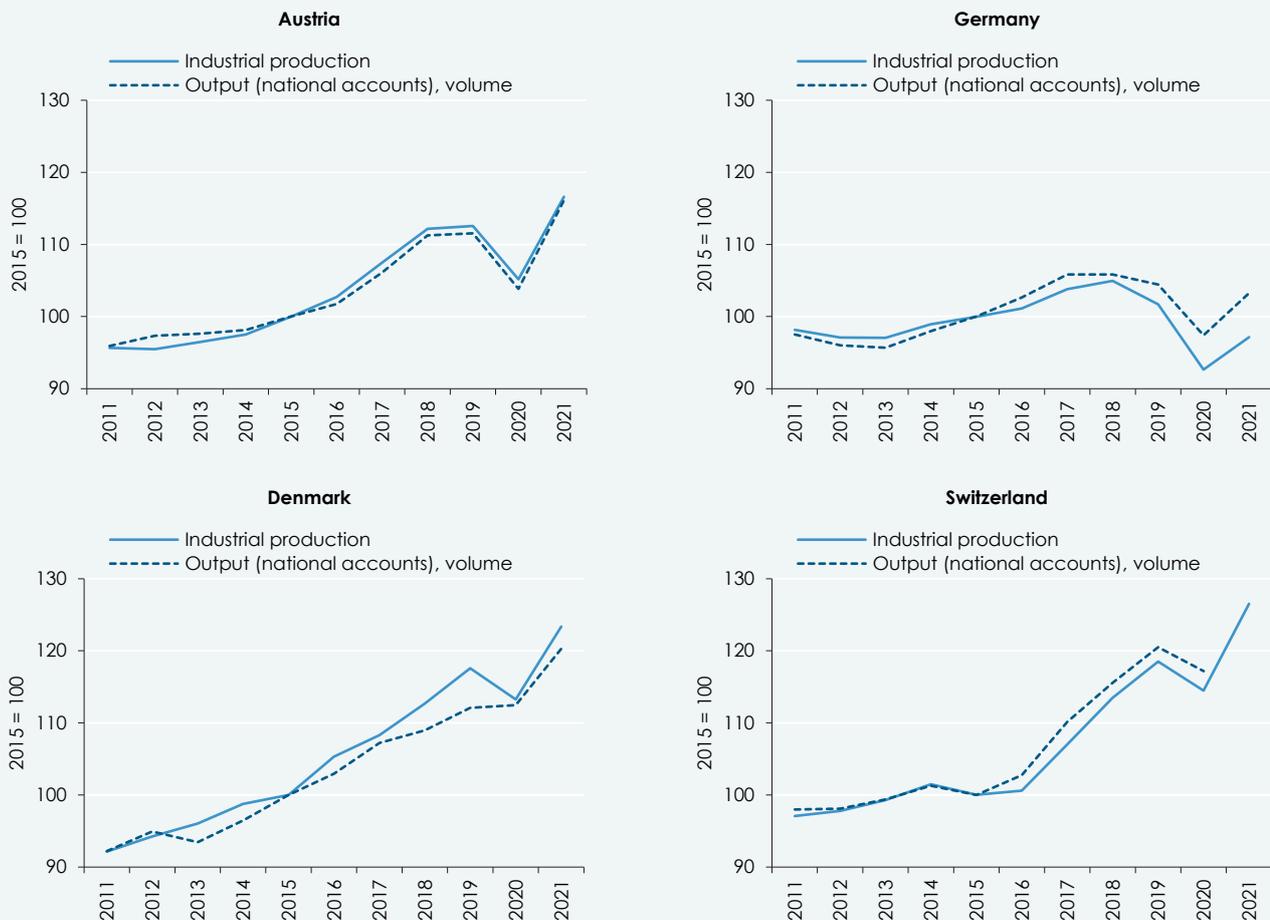
- Smaller enterprises, which are not included in the industrial production index, in a given economic activity have grown more or less strongly than the larger companies covered.
- New companies have been created which are not yet included in the

industrial production index but are included in the national accounts.

- The weighting in the industrial production index, which is fixed to the base year, no longer reflects the current industrial structure.

As Figure 1 shows, a clear divergence of the time series due to different growth rates is only visible for Germany. In this case, the production index, as an indicator of the volume of industrial output, underestimates the growth of industrial production. However, both time series highlight a weakness in German industry that had already begun before the outbreak of the COVID-19 pandemic.

Figure 1: Development of output according to national accounts and industrial production in manufacturing



Source: Eurostat, Statistics Austria, WIFO calculations, Macrobond.

Although Figure 1 suggests a high degree of conformity of growth rates for all countries except Germany, the production index data available earlier in the year have only

a limited suitability for a preliminary estimate of annual national accounts output (Table 2)<sup>4</sup>. The growth differences between the industrial production index and the output

<sup>3</sup> Another difference, which is less important in practice, is the definition of production. According to the national accounts, unlike the production index, it also includes the value of own-account capital formation.

<sup>4</sup> An even better comparison for the purpose of pre-estimating the national accounts values published later would have to be based on real-time data, as the values given in Table 2 have already been revised several times.

(according to national accounts) in manufacturing can be quite considerable. In the case of Austria, they are the smallest with a deviation of  $-1\frac{1}{2}$  to  $+1$  percentage points. In Switzerland and Germany, they have been

over 2 percentage points in some years. In the case of Denmark, the differences can be relatively large with up to 4 percentage points.

Table 2: Industrial production and output

	Austria			Germany			Denmark			Switzerland		
	Industrial production	Output <sup>1</sup>	Δ									
	Percentage changes from previous year	Percentage changes from previous year	Percentage points	Percentage changes from previous year	Percentage changes from previous year	Percentage points	Percentage changes from previous year	Percentage changes from previous year	Percentage points	Percentage changes from previous year	Percentage changes from previous year	Percentage points
2012	+ 0.2	+ 1.5	- 1.6	- 1.1	- 1.6	+ 0.5	+ 2.3	+ 2.9	- 0.7	+ 0.7	+ 0.1	+ 0.6
2013	+ 1.0	+ 0.3	+ 0.7	+ 0.0	- 0.3	+ 0.3	+ 1.9	- 1.6	+ 3.4	+ 1.5	+ 1.3	+ 0.2
2014	+ 1.1	+ 0.5	+ 0.6	+ 1.9	+ 2.4	- 0.4	+ 2.8	+ 3.2	- 0.4	+ 2.2	+ 1.9	+ 0.3
2015	+ 2.6	+ 1.9	+ 0.6	+ 1.1	+ 2.1	- 1.0	+ 1.3	+ 3.7	- 2.4	- 1.4	- 1.3	- 0.2
2016	+ 2.7	+ 1.7	+ 1.0	+ 1.1	+ 2.6	- 1.5	+ 5.3	+ 2.9	+ 2.4	+ 0.6	+ 2.7	- 2.1
2017	+ 4.6	+ 4.3	+ 0.4	+ 2.6	+ 3.1	- 0.5	+ 2.8	+ 4.1	- 1.3	+ 6.4	+ 7.2	- 0.8
2018	+ 4.4	+ 4.9	- 0.5	+ 1.1	+ 0.0	+ 1.1	+ 4.0	+ 1.6	+ 2.4	+ 6.0	+ 4.9	+ 1.1
2019	+ 0.4	+ 0.3	+ 0.1	- 3.1	- 1.3	- 1.8	+ 4.3	+ 2.9	+ 1.5	+ 4.4	+ 4.3	+ 0.1
2020	- 6.6	- 6.9	+ 0.3	- 8.9	- 6.7	- 2.2	- 3.7	+ 0.3	- 4.0	- 3.4	- 2.8	- 0.6
2021	+ 10.9	+ 11.8	- 0.9	+ 4.8	+ 6.0	- 1.2	+ 8.9	+ 7.0	+ 2.0	+ 10.5	-	-

Source: Eurostat, Statistics Austria, WIFO calculations, Macrobond. Δ . . . Difference of the respective rates of change. - <sup>1</sup> According to national accounts, volume.

### 3. Country comparison of industrial production

In the following, Austria's industrial development in recent years is compared with that of Germany, Denmark and Switzerland. In Germany and Switzerland, industrial accounts for a slightly larger share of total value added (according to national accounts) in section C than in Austria, the share in Denmark is significantly smaller (Felbermayr, 2023). As open economies, all three countries of comparison are exposed to international competition, just like Austria. Denmark and Switzerland, however, do not belong to the euro area and could reap competitive advantages over Germany and Austria – at least in the short term – by following an independent exchange rate policy.

Up to 2017, industrial production showed similar dynamics in all four countries, although the fluctuations were somewhat more pronounced in Denmark. In Austria, Switzerland and Denmark, industrial production continued to increase in 2018, while in Germany a trend decline set in. In 2019, the momentum in Austria seemed to briefly join the declining trend in Germany. In Denmark and Switzerland, the expansionary phase continued for another 6 months before the indices fell to the level of Austria at the end of 2019 (cf. figure "Development of production in manufacturing").

Due to the outbreak of the COVID-19 pandemic, there was a drop in industrial production activity in March 2020, especially in

Germany and Austria. In Denmark and Switzerland, on the other hand, the decline was more like a continuation of an already observable economic downturn.

The picture has changed considerably since the recovery in the summer of 2020. While industrial production in Germany resumed its downward trend, dynamics have picked up significantly in the other three countries.

In Denmark and Switzerland, growth dynamics in manufacturing exceeded those in Austria in 2021 and 2022<sup>5</sup>. Currency devaluations to improve price competitiveness on international markets can be ruled out as a cause for both countries. The value of the Danish krone against the euro remained almost unchanged between January 2013 and November 2022 (0.3 percent appreciation). Switzerland managed to massively expand its industrial production in real terms, even though the Swiss franc appreciated by 20 percent over the same period. This indicates that the Swiss industry is highly competitive.

In order to identify the sectors that drive industrial production, the growth of the respective main goods producing sectors is examined. Table 3 shows the percentage shares of the divisions in the gross value added at factor cost included in the parent section C for the four countries. The shares are based on the year 2015, which is also

**The COVID-19 pandemic affected industrial production in Germany and Austria more than in Denmark and Switzerland.**

<sup>5</sup> However, this cannot be observed when looking at a broader industrial production index that includes mining and electricity, gas, steam and air condi-

tioning supply (NACE 2008, sections B to D). In such an observation, Austria kept pace with Denmark and Switzerland.

the base year for calculating the production index 2015. They thus correspond to the weights with which the production of the

industrial companies in the respective division is weighted in the short-term statistics (Statistics Austria, 2023).

Table 3: **Weights of NACE divisions in the manufacturing section**

	Austria	Germany	Denmark	Switzerland
	Gross value added at factor cost 2015 in percent			
C10	<b>7.9</b>	6.2	<b>12.8</b>	<b>8.4</b>
C11	2.8	1.0	1.1	0.8
C12	–	0.3	0.2	–
C13	1.0	0.7	0.8	0.6
C14	0.5	0.4	–	0.3
C15	0.5	0.1	0.0	0.1
C16	4.2	1.2	1.6	3.2
C17	3.4	1.9	1.2	0.9
C18	1.7	1.3	1.2	1.5
C19	0.8	0.8	–	0.1
C20	5.2	<b>7.4</b>	6.3	5.3
C21	3.5	3.0	<b>20.1</b>	<b>21.9</b>
C22	4.1	4.8	3.5	2.6
C23	4.5	2.9	3.5	2.3
C24	<b>7.5</b>	3.6	1.1	1.4
C25	<b>10.7</b>	<b>9.3</b>	<b>7.5</b>	<b>8.2</b>
C26	4.2	5.5	6.0	<b>18.4</b>
C27	<b>8.0</b>	<b>6.9</b>	3.4	4.0
C28	<b>13.9</b>	<b>15.9</b>	<b>14.0</b>	<b>10.2</b>
C29	6.3	<b>17.7</b>	0.9	0.6
C30	1.4	2.3	0.6	1.6
C31	2.5	1.3	2.2	1.0
C32	2.2	2.7	<b>8.2</b>	2.7
C33	3.3	2.7	2.6	1.6
HHL <sub>n</sub>	2.85	5.15	6.30	7.61

Source: Eurostat, WIFO calculations, Macrobond. Weighting according to Statistics Austria (2023), Table 3. The 5 largest divisions in each case are highlighted in bold. For Switzerland, missing values in C15, C18, C23 were imputed with the mean of the next available annual values. – <sup>1</sup> Measure of sector concentration, normalised and multiplied by 100.

The Herfindahl-Hirschman Index shown in the last row of Table 3 serves as a measure of concentration. It shows that industrial production in manufacturing in Austria is less concentrated in individual sectors than in the other three countries.

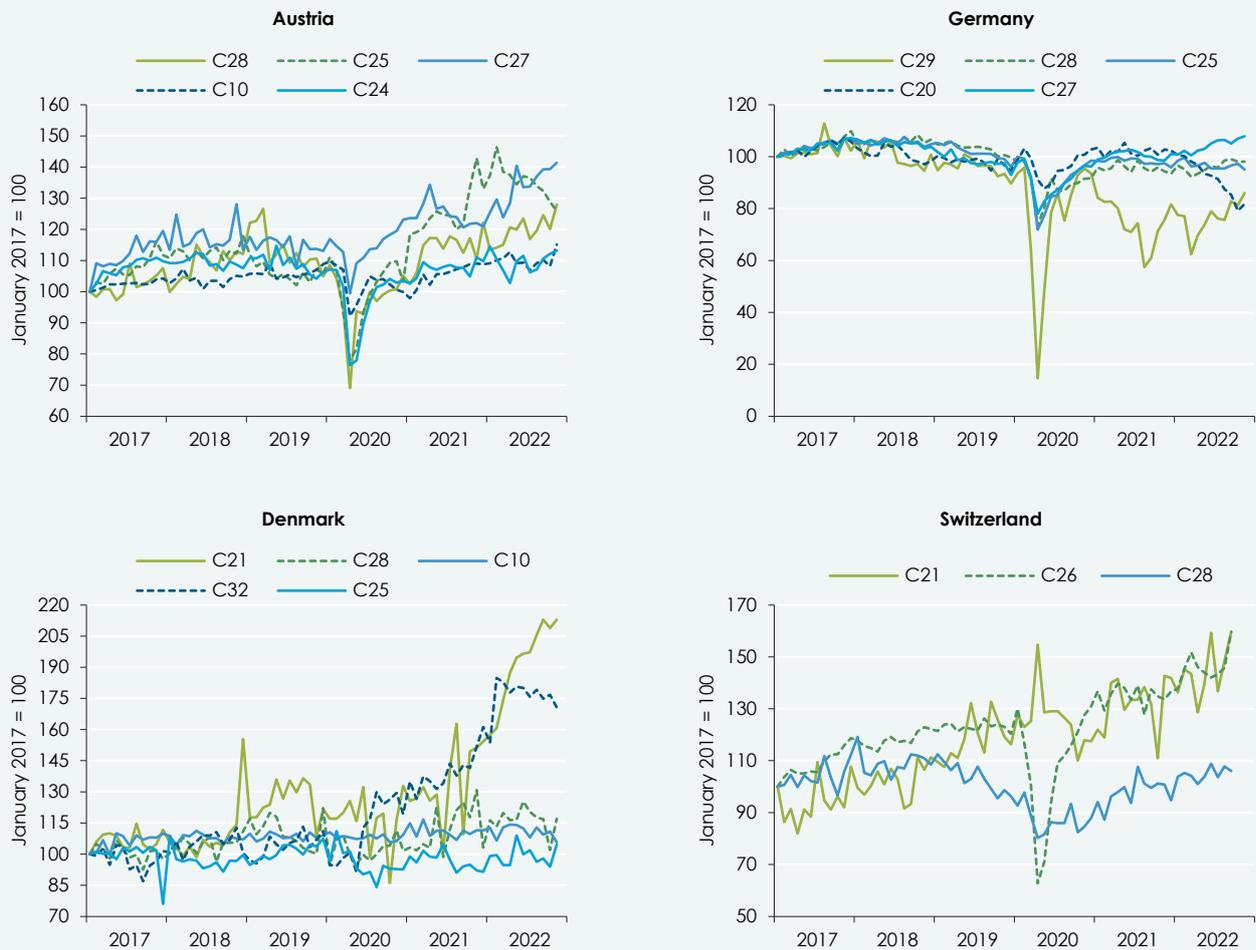
In terms of the share of value added, the manufacture of motor vehicles, trailers and semi-trailers dominates in Germany (17.7 percent), as expected, just ahead of manufacture of machinery and equipment n.e.c. (15.9 percent). In Switzerland and Denmark, the manufacture of pharmaceutical products (C21) stands out with shares of more than 20 percent. The second most important division in Switzerland is C26, which includes the manufacture of watches, with 18.4 percent. In Denmark it is the manufacture of machinery and equipment n.e.c. (C28) with a share of 14 percent.

As for Switzerland the EU-wide harmonised short-term statistics do not show values for all sections of the industrial production index, the following analysis mainly covers Austria, Germany and Denmark.

The weakness in German industry that has been observable for several years, is broadly based and is reflected in its two most important sectors as well. The manufacture of motor vehicles, trailers and semi-trailers (C29), has tended to contract since mid-2017 (Figure 2). In Austria, on the other hand, where it ranked only sixth in terms of production volume in 2015, the sector has fared slightly better, merely stagnating over the same period. In Denmark, the performance of motor vehicle manufacturing was similarly disappointing to that of Germany, but with a production share of 0.9 percent, it is of little economic importance.

Figure 2: **Development of each of the 5 most important manufacturing divisions since 2017**

Production index, seasonally and working day adjusted



Source: Eurostat, Statistics Austria, WIFO calculations, Macrobond. No production indices are available for Switzerland in the divisions C10 and C25. C10 . . . manufacture of food products, C20 . . . manufacture of chemicals and chemical products, C21 . . . manufacture of basic pharmaceutical products and pharmaceutical preparations, C24 . . . manufacture of basic metals, C25 . . . manufacture of fabricated metal products, except machinery and equipment, C26 . . . manufacture of computer, electronic and optical products, C27 . . . manufacture of electrical equipment, C28 . . . manufacture of machinery and equipment n.e.c., C29 . . . manufacture of motor vehicles, trailers and semi-trailers, C32 . . . Other manufacturing.

Germany's second most important industrial sector, the manufacture of machinery and equipment n.e.c. (C28), has also developed weakly in recent years. At the end of 2022, the production level was roughly the same as in 2017. In Austria and Denmark, where the manufacture of machinery and equipment n.e.c. is the most important and second most important industrial sector, respectively, it has performed much better, especially in Austria, where it has increased by around 30 percent since January 2017 (Figure 2).

The weakness of the German industry of the last years is broadly based and is reflected in its two most important sectors, the manufacture of motor vehicles and manufacture of machinery and equipment n.e.c. The chemical industry is ailing, as well. The successful upward trend in industrial production in Denmark and Switzerland is clearly due to the

pharmaceutical industry. This sector, which accounts for more than a fifth of industrial production in both countries, has grown extremely strongly in recent years. In Denmark, the output of this sector has even doubled between 2020 and 2022 – starting from an already high level. The dynamic development of the Danish industrial production index is thus largely based on this component.

If the manufacture of pharmaceutical products (C21) is excluded for all four countries, the resulting production index for Austria, Denmark and Switzerland shows the same dynamics (Figure 3). Nevertheless, the development in Switzerland is remarkable in view of the strong appreciation of the Swiss franc as mentioned above.

In the case of Germany, in addition to motor vehicle and machinery manufacturing, the chemical industry (C20) also weighs on the

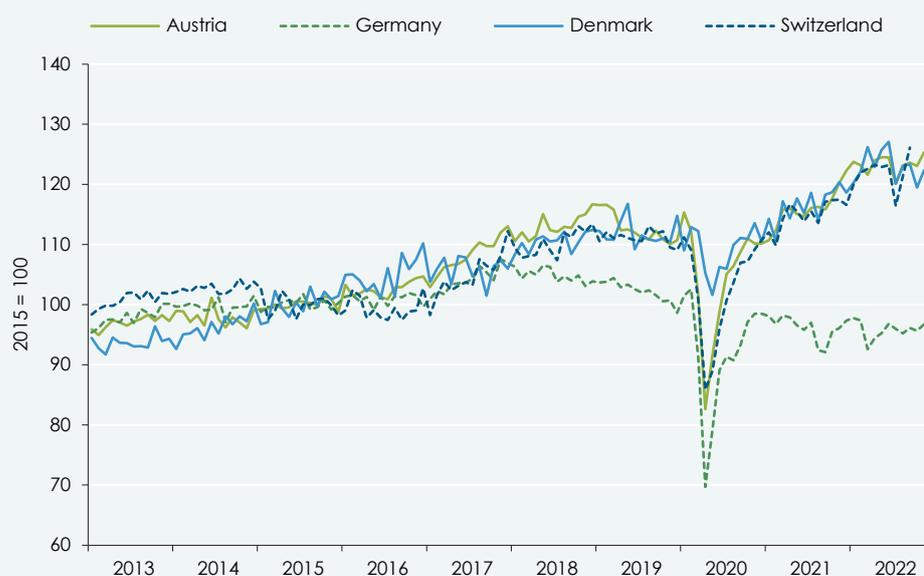
**In Denmark and Switzerland, industrial strength in recent years has been largely based on the pharmaceutical industry. Here, Switzerland has been able to keep up with Denmark's momentum despite a 20 percent currency appreciation.**

overall result. This sector, which accounts for a similarly high share of 5 percent to 7½ percent of industrial production in all four countries, developed weakly only in Germany (stagnation from 2017, decline from the end

of 2021). Austria was able to record a slight expansion in production during this period. In Denmark, this sector grew very dynamically.

Figure 3: **Industrial production excluding manufacture of basic pharmaceutical products and pharmaceutical preparations**

Seasonally and working day adjusted



Source: Eurostat, WIFO calculations, Macrobond. The weighted production index of the manufacture of basic pharmaceutical products and pharmaceutical preparations (NACE 2008, division C21) was subtracted from the production index for manufacturing (NACE 2008, section C). The calculated index was rebased to 2015 = 100. Weights according to Table 3.

**The dynamic development of Austria's industry in recent years is mainly due to three sectors: the manufacture of fabricated metal products, the manufacture of machinery and equipment and the manufacture of electronic devices.**

Austria, on the other hand, saw strong growth in two manufacturing activities that were comparatively weak in Germany and Denmark. These are manufacture of fabricated metal products (C25) and manufacture of computer, electronic and optical products (C26). The manufacture of fabricated metal products is one of the five largest industrial sectors in all four countries. In Austria, its share of value added is particularly high at over 10 percent. In Germany, this industry has shrunk slightly since 2017, while in Denmark it has stagnated. In Austria, by contrast, the pandemic-induced slump was followed by a sharp increase, taking it well above pre-crisis levels.

In the manufacture of computer, electronic and optical products (C26), for which values are also available for Switzerland, the gap is even more pronounced. Austria managed to double its output compared to 2015, far outstripping the growth in the other three countries. However, this sector accounted for only 4.2 percent of total domestic industrial production in 2015.

A simplified shift-share analysis was used to investigate whether the evolution of industrial production in the four countries was due more to the sector mix than to the growth of individual sectors. Figure 4 weights the growth of the individual divisions of section C with the Austrian weights in 2015<sup>6</sup>.

In the case of Germany, the application of the Austrian weighting scheme changes the course of the industrial production index very little (Figure 4, left graph). The dynamics of the index is not even increased by the much lower weight of the ailing motor vehicle production (C29). Apparently, the structure of German industry is less decisive than the weakness across all sectors.

In the case of Denmark, the now lower weight of the pharmaceutical industry, which has boomed in recent years, has a

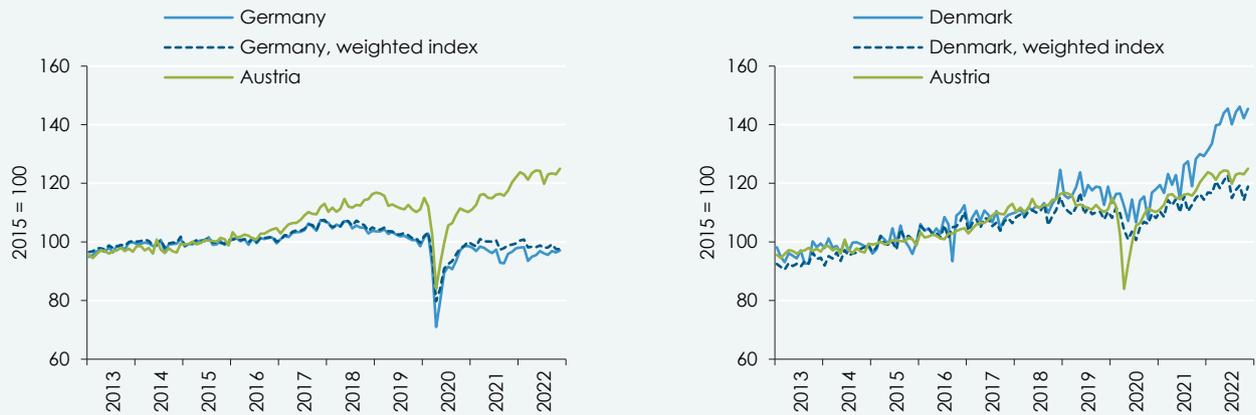
<sup>6</sup> Again, no values are available for Switzerland due to the lack of detail.

significant dampening effect on the simulated industrial production. It even performs worse than the Austrian index. If the Austrian economy had achieved the growth rates observed in Denmark in all manufacturing sectors (including pharmaceuticals), the

overall production index would have grown more slowly. Thus, Denmark has rather focused on the right sectors than benefited from a good performance in all industrial sectors.

Figure 4: **Weighted production indices for Germany and Denmark**

NACE 2008, section C



Source: Eurostat, WIFO calculations, Macrobond. The weighted indices were calculated with the Austrian value added shares according to Table 3. Denmark: excluding manufacture of leather and related products of other materials (C15) and coke and refined petroleum products (C19).

#### 4. Value added counts

Like real output in the national accounts, the production index measures the output of goods<sup>7</sup>, regardless of how much of the industry's or enterprise's own value added is added to the input purchased via intermediate consumption. Increased outsourcing, which leads to increased external procurement of services from domestic or foreign enterprises, e.g. through the supply of car parts or the use of temporary workers, cannot therefore be identified by observing output alone. Furthermore, innovations in production process may reduce the input required for production, which is also not reflected in the output, but increases the value added for a given output.

Analyses based on the volume of value added are therefore more useful for assessing the economic importance of an economic sector and its labour productivity. This represents the factor income of the factors of production. It includes compensation of employees, which represents the remuneration for the factor labour, gross operating surplus, which includes depreciation and entrepreneurial wages as compensation for the provision of capital, and any production levies (less subsidies) to the public sector.

Thus, it is value added that represents the real motive force of economic action.

Gross value added<sup>8</sup> is not reported separately for industrial companies in the national accounts (as defined for the industrial production index), but only for all companies included in an economic activity. Therefore, the validity of statements made on the basis of the value added of an industry for the subset of industrial companies depends on the share of industry in the respective economic activity.

Eurostat's structural business statistics break down gross value added at factor cost for manufacturing and its sections by size of enterprise. In the base year 2015, the companies with 20 or more employees included in the industrial production index covered more than 90 percent of gross value added for the production of goods in all countries surveyed. In some divisions, the coverage is as low as 50 percent, but this tends to affect industries with a low weight in the production index. Reliable statements about the industry based on national accounts value added data should thus be possible for manufacturing. The following analyses are

**The share of value added in industrial production has remained essentially unchanged in all the countries surveyed in recent years.**

<sup>7</sup> More precisely, it measures the growth in the value of goods output at 2015 prices.

<sup>8</sup> Gross value added differs from (net) value added in that it includes fixed capital consumption. As this

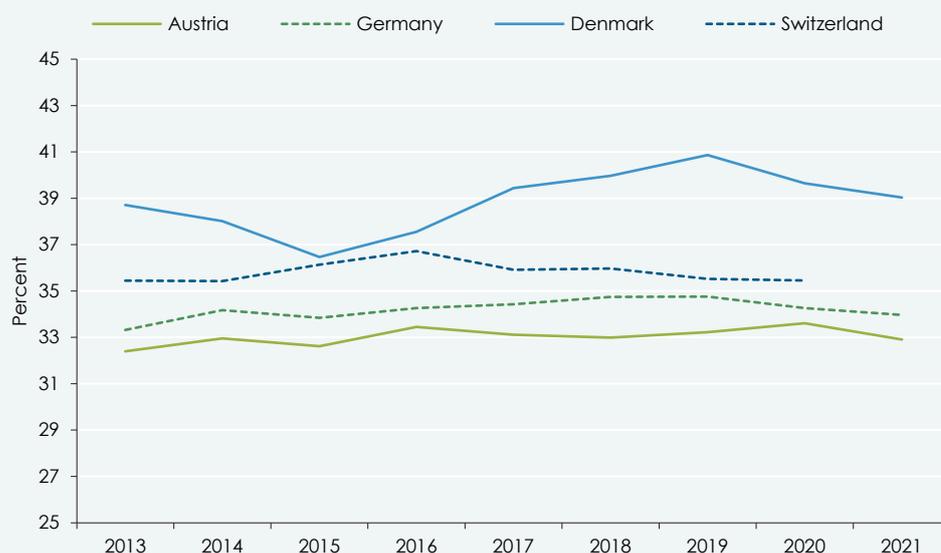
difference is not relevant for the analysis, value added is used as a synonym for gross value added in the following.

therefore based on national accounts data rather than on industrial production index data. The former, however, are only available on an annual basis and not consistently available for all NACE divisions; for Switzerland, data on the volume of work is completely missing.

Although the share of value added in manufacturing output varies between the ob-

served countries, it remained broadly stable between 2013 and 2021 (Figure 5). This would allow statements on productivity changes over time to be based on output rather than value added data, at least for this sector of the economy. However, at a higher level of disaggregation, a change in the share becomes apparent for some sectors. Therefore, the following calculation of productivity is based on value added.

Figure 5: Share of real value added in manufacturing output



Source: Eurostat, Statistics Austria, WIFO calculations, Macrobond.

**In terms of productivity per hour worked, Germany has also fallen significantly behind the other countries in the comparison.**

#### 4.1 Labour productivity

The EU's short-term statistics regulation also provides for the calculation and publication of a productivity index, but this is based on dividing the output of a sector by reported hours worked. As it has been already described above, this output-based index has the disadvantage that it does not take into account outsourcing and productivity gains from saving on intermediate inputs.

Since the value added of industrial companies in section C largely coincides with the data recorded in the national accounts for this sector, the calculation of productivity is based on national accounts values for value added and hours worked<sup>9</sup>.

For Switzerland, the national accounts show the number of jobs by industry, but not the number of hours worked. The latter is only reported in the short-term statistics. In order to

include Switzerland in the comparison, the (annual) index of the volume of work from the short-term statistics was used. For reasons of consistency, the results of this calculation variant are also presented for the other countries compared (Figure 6, right graph). There is hardly any difference to the purely national accounts-based results (Figure 6, left graph).

The picture for labour productivity is similar to that for output. While Germany shows a weaker dynamic, it is livelier in Denmark and Switzerland than in Austria. However, as already shown in the analysis of output, the development there is primarily driven by the most important industry, the pharmaceutical industry. If this sector is excluded, Germany still lags behind, but Austria is on a par with Switzerland and Denmark. For the last year available, 2021, Austria even shows a better development (Figure 7).

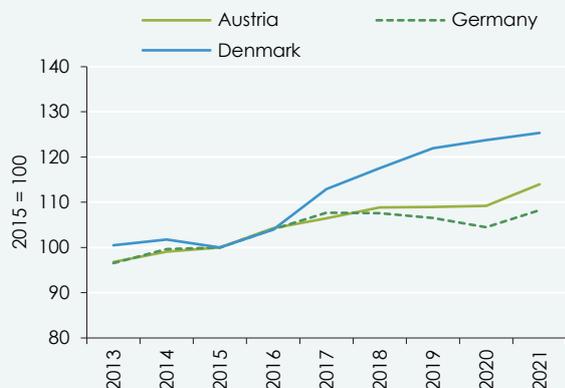
<sup>9</sup> Statistics Austria does not use the jobs reported by industrial companies in the business survey directly for the national accounts, but only calculates the ratio of employment to hours worked. This ratio is then

transferred to the jobs according to the national accounts, which are primarily based on data from the Federation of Social Insurances.

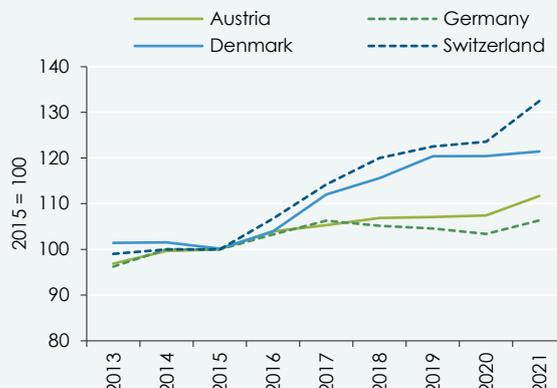
Figure 6: Hourly productivity in manufacturing

Gross value added per hour worked

Based on hours worked (total employment) according to national accounts



Based on hours worked according to short-term statistics

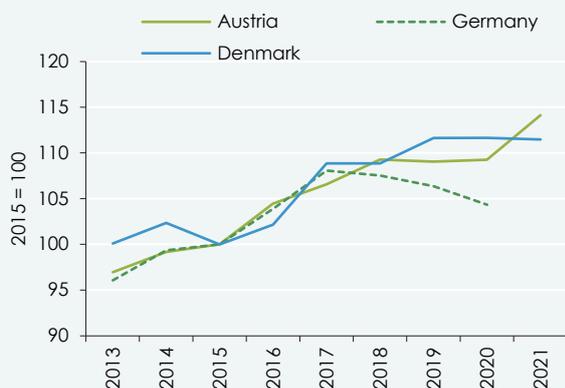


Source: Eurostat, Statistics Austria, WIFO calculations, Macrobond.

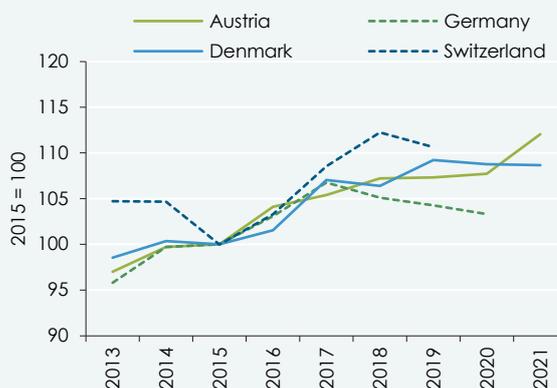
Figure 7: Hourly productivity in manufacturing excluding manufacture of basic pharmaceutical products and pharmaceutical preparations

Gross value added per hour worked

Based on hours worked (total employment) according to national accounts



Based on hours worked according to short-term statistics



Source: Eurostat, WIFO calculations, Macrobond. Manufacturing (NACE 2008, section C) excluding manufacture of basic pharmaceutical products and pharmaceutical preparations (NACE 2008, division C21); Gross value added was calculated using chain-linking, and the volume of hours worked according to national accounts by difference. The index of hours worked according to short-term statistics was subtracted on a weighted basis and the result rebased to 2015 = 100 (weights according to Table 3).

## 5. Summary

Until the end of 2017, industrial production followed a slight upward trend in Austria, Germany, Denmark and Switzerland. Since then, a trend reversal has been observed in Germany, while production in Denmark and Switzerland grew stably until the end of 2019. Austria's industry, on the other hand, entered a temporary phase of weakness at the beginning of 2019, which culminated in a slump in production in 2020. After the COVID-19 crisis in industry had been overcome by mid-2020, a strong production

surge set in in most countries. Only in Germany did the downward trend continue.

The livelier industrial growth in Denmark and Switzerland compared to Austria is due to the boom in the pharmaceutical industry, which is more important there. If this sector is excluded, Austria's growth lag dissipates. In Germany, on the other hand, the weak momentum is rather broadly spread across a wide range of industries.

The share of value added in industrial output remained relatively stable in all four countries between 2013 and 2021. With regard to hourly productivity, the picture is similar to that of output. In Germany, it has fallen

significantly since 2017. Denmark and Switzerland outperform Austria's industry in terms of labour productivity, but the lead is again attributable to the pharmaceutical industry.

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