Modal split in the EU

Modal split of inland freight transport in 2012-2017: road transport continues to carry three quarters of freight in the EU

Road transport continues to have the largest share of EU freight transport performance among the three inland transport modes. Figure 1 shows that in 2017, road transport accounted for over three-quarters (76.7 %) of the total inland freight transport (based on tonne-kilometres performed). This share increased by 0.5 percentage points (pp) compared with the previous year. The share of road has remained stable at around 75 % in recent years, fluctuating between 74.6 % in 2012 and 75.3 % in 2015.

Figure 1: Modal split of inland freight transport, EU28, 2012-2017 (% share in tonne-kilometres)

Between 2012 and 2016, the share of rail in the inland transport performance remained relatively stable (between 18.5 % and 17.6 %). In 2017, rail transport accounted for 17.3 % of the EU total, slightly lower than the previous year (-0.3 pp). Between 2012 and 2017, the share of inland waterways in EU freight transport fluctuated between 6 % and 7 %, recording a share of 6 % of the total inland transport performance in 2017.

Noticeable changes in the modal split of Estonia, Latvia and Sweden from 2012 to 2017

Even though the modal split between the different modes of transport does not tend to change radically from year to year at EU level, changes are sometimes more noticeable at country level. As can be seen in Figure 2, the modal split at country level varies considerably. In particular, the modal split obviously depends on the availability of a given mode. Only 18 of the Member States report freight data on inland waterways. In
particular, Cyprus and Malta do not have either railways or navigable inland waterways; thus, for these two Member States the share of road freight transport is 100 % by default.

The importance of rail transport in the Baltic States is evident. This is essentially linked to the transport of Russian energy products to the Baltic Ports. For several years, the share of rail in the total transport performance was in the range 70 % - 85 % in the three Baltic countries. The share of rail in Estonia has constantly fallen between 2012 and 2016, when it dropped below 50 %. In 2017, a small rebound was observed with a 1.5 pp increase compared with previous year. Compared with 2012, it is a 23 pp decrease (see Table 1). This was mainly caused by a significant fall in transport of petroleum products. As Estonia has no inland waterways transport, the fall in the share of rail was directly reflected in a corresponding rise in the share of road. From 2012 to 2017, the decreases in the share of rail were substantial also in the other two Baltic countries, with falls of 7.5 pp in Latvia and 5.3 pp in Lithuania.
Table 1: Modal Split of inland freight transport, 2012-2017 (% share in tonne-kilometres) Source: Eurostat, (tran_hv_frmod)

Inland waterways freight transport has a very important role in the Netherlands (44.7 % in 2017), almost matching the share of road (49.4 % in 2017). The comparatively high shares of inland waterways freight transport in Romania (27.4 % in 2017) and Bulgaria (24.9 % in 2017) are in part explained by the extensive traffic on the Danube and in part by the ‘territorialisation’ of the road data. (An explanation of this adjustment is given in the Data sources section below.)

Table 1 shows that between 2012 and 2017, the share of road in total inland transport performance dropped by 2.7 pp in Slovenia, making it the largest decrease among the Member States. Such falls in the share of road were observed in only five other Member States, with the most noticeable in Portugal (-1.3 pp). There was also a fall in the share of road in the two EFTA country Norway and Switzerland (-0.4 pp and -0.1 pp, respectively) over the period 2012-2017. For Portugal and Italy, the fall in the share of road in the modal split was mainly caused by a substantial increase in the tonne-kilometres performed by rail (+13.6 % and +10.3 %, respectively) over the period 2012-2017. In contrast, between 2012 and 2017 noticeable increases in the share of road were observed in Estonia (+22.5 pp), Latvia (+10.1 pp), Sweden (+5.6 pp) and Slovakia (+4.8 pp).

When looking at the two most recent reference years, Hungary showed the strongest decrease in the share of road with 3.5 pp from 2016 to 2017, followed by Croatia (-2.7 pp) and Slovenia (-2.2 pp). In contrast, the share of road increased the most in Latvia (+2.6 pp), followed by Romania (+2.1 pp) and Slovakia (+1.8 pp).

It should be kept in mind that the modal split and the associated shares of each transport mode are calculated with the total transport performance by the inland modes as denominator. This means that an increasing share of one mode does not necessarily express a higher transport performance for that mode. Instead, this may be a result of noticeable drops in other modes. The development in Estonia, for example, where a sharp drop in 2016 in rail transport performance is reflected directly in a steep increase in the share of road transport, is a case in point. This is the reason why the tonne-kilometres data used for calculating the modal split are also presented in this article (Table 2).
Table 2: Inland freight transport performance, adjusted for territoriality, 2012, 2016 and 2017 (million tonne-kilometres)

<table>
<thead>
<tr>
<th>Country</th>
<th>2012</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rail waterways</td>
<td>12,985</td>
<td>14,438</td>
<td>15,452</td>
</tr>
<tr>
<td>Road</td>
<td>1,997</td>
<td>4,122</td>
<td>4,956</td>
</tr>
<tr>
<td>Total</td>
<td>14,982</td>
<td>18,560</td>
<td>20,408</td>
</tr>
<tr>
<td>Rail waterways</td>
<td>13,120</td>
<td>15,719</td>
<td>16,817</td>
</tr>
<tr>
<td>Road</td>
<td>1,859</td>
<td>4,309</td>
<td>4,732</td>
</tr>
<tr>
<td>Total</td>
<td>15,979</td>
<td>20,028</td>
<td>21,549</td>
</tr>
</tbody>
</table>

Source: Eurostat, (rail_go_total) (rail) (iww_go_atygo) (inland waterways) (road_go_ta_tott) (national road transport) (road_go_ca_c) (cabotage road transport) and Eurostat computations (international road transport)

Inland freight transport performance - the need to adjust road transport

The modal split presented in this publication is based on the total inland freight transport performance, expressed in tonne-kilometres. Complying with the relevant EU legal acts, data on rail and inland waterways transport are reported according to the 'territoriality principle' (transport on the national territory, regardless of the nationality of the haulier). However, road transport data is reported according to the nationality of the haulier (regardless of where the transport took place). Therefore, road transport has to be adjusted according to the 'territoriality principle'. More information on how this is done is available in the Data sources section below.

Inland freight transport performance in the EU increased by 11.1 % in 2017 compared with 2012

Table 2 shows the transport performance data used for the calculation of the modal split (modal shares are shown in Table 1). As mentioned above, the data referring to road transport have been adjusted to reflect on which country’s territory the transport took place, regardless of who performed this transport. The tonne-kilometres series used for calculation of the modal split showed an increase (+11.1 %) in the total inland freight transport performance in the EU between 2012 and 2017.

The aggregated EU transport performance figures show that total inland freight transport increased by around 244 billion tonne-kilometres during the period 2012-2017, reaching 2 438 billion tonne-kilometres in 2017. Road transport performance was 14.2 % higher in 2017 than in 2012. In contrast, over the same period the transport performance decreased by 1.8 % for inland waterways but increased by 3.5 % for rail.

Looking only at the two most recent reference years at EU level, the total freight transport performance registered an increase of 4 % between 2016 and 2017, with road rising by 4.7 %, rail by 2.1 % and inland waterways by 0.4 %.

At country level, decreases in total transport performance of inland modes between 2012 and 2017 were observed only in Estonia (-31.6 %), Latvia (-21.9 %) and Cyprus (-8.9 %). As Cyprus has no railways and inland waterways, the fall in transport performance was caused by the decrease in road transport. The fall in total transport performance in Estonia and Latvia was mainly caused by a sharp decrease in rail transport.

Looking specifically at road freight transport over the two most recent reference years, tonne-kilometres increased significantly in several countries among which Cyprus (+17.3 %), Poland (+12.8 %), Slovakia (+9.3 %).
%, Latvia (+8.7 %) and Croatia (+8.2 %). Highest decrease in road transport performance over this period were recorded in Estonia (-6.5 %).

**Who drives where in international road freight transport?**

Whereas both national and cabotage road freight transport are territorial and need no adjustment, the 'territorialisation' of international road freight transport, done to establish the modal split between the different modes of transport for each country, generates some interesting findings.

Table 3 shows the ranking of the countries according to the territories where international transport performance took place, i.e. where hauliers drove most (regardless of who was performing the transport) in 2017. Due to the size of the country and its location in the middle of Europe, but also due to its importance as a country with large manufacturing industries, German roads continue to top the list for European-wide international road freight transport: 27.5 % of all tonne-kilometres performed in international road freight transport (corresponding to around 171 billion tonne-kilometres) took place in Germany, with an increase of 7 % compared with the year before. France followed next, although far behind, with a share of 17.8 %. With 8.7 % of international road transport performance in the EU, Poland comes third, followed by Spain (6.7 %) and Italy (5.3 %).
Table 3: International road freight transport performance, 2017

Source: Eurostat computations

<table>
<thead>
<tr>
<th>Rank</th>
<th>Territory on which the transport was performed</th>
<th>Million tonne-kilometres</th>
<th>Share in total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Germany</td>
<td>171 179</td>
<td>27.5</td>
</tr>
<tr>
<td>2</td>
<td>France</td>
<td>110 865</td>
<td>17.8</td>
</tr>
<tr>
<td>3</td>
<td>Poland</td>
<td>53 832</td>
<td>8.7</td>
</tr>
<tr>
<td>4</td>
<td>Spain</td>
<td>41 501</td>
<td>0.7</td>
</tr>
<tr>
<td>5</td>
<td>Italy</td>
<td>33 082</td>
<td>5.3</td>
</tr>
<tr>
<td>6</td>
<td>Belgium</td>
<td>29 853</td>
<td>4.8</td>
</tr>
<tr>
<td>7</td>
<td>Austria</td>
<td>28 044</td>
<td>4.5</td>
</tr>
<tr>
<td>8</td>
<td>Czechia</td>
<td>20 993</td>
<td>3.4</td>
</tr>
<tr>
<td>9</td>
<td>Netherlands</td>
<td>20 253</td>
<td>3.3</td>
</tr>
<tr>
<td>10</td>
<td>Hungary</td>
<td>13 814</td>
<td>2.2</td>
</tr>
<tr>
<td>11</td>
<td>United Kingdom</td>
<td>12 821</td>
<td>2.1</td>
</tr>
<tr>
<td>12</td>
<td>Switzerland</td>
<td>11 547</td>
<td>1.9</td>
</tr>
<tr>
<td>13</td>
<td>Sweden</td>
<td>10 235</td>
<td>1.6</td>
</tr>
<tr>
<td>14</td>
<td>Slovakia</td>
<td>9 939</td>
<td>1.6</td>
</tr>
<tr>
<td>15</td>
<td>Denmark</td>
<td>7 343</td>
<td>1.2</td>
</tr>
<tr>
<td>16</td>
<td>Slovenia</td>
<td>5 882</td>
<td>1.1</td>
</tr>
<tr>
<td>17</td>
<td>Portugal</td>
<td>5 037</td>
<td>0.9</td>
</tr>
<tr>
<td>18</td>
<td>Romania</td>
<td>5 737</td>
<td>0.9</td>
</tr>
<tr>
<td>19</td>
<td>Croatia</td>
<td>5 261</td>
<td>0.8</td>
</tr>
<tr>
<td>20</td>
<td>Lithuania</td>
<td>4 464</td>
<td>0.7</td>
</tr>
<tr>
<td>21</td>
<td>Greece</td>
<td>4 084</td>
<td>0.7</td>
</tr>
<tr>
<td>22</td>
<td>Bulgaria</td>
<td>3 690</td>
<td>0.6</td>
</tr>
<tr>
<td>23</td>
<td>Norway</td>
<td>3 253</td>
<td>0.5</td>
</tr>
<tr>
<td>24</td>
<td>Latvia</td>
<td>2 029</td>
<td>0.3</td>
</tr>
<tr>
<td>25</td>
<td>Luxembourg</td>
<td>1 738</td>
<td>0.3</td>
</tr>
<tr>
<td>26</td>
<td>Estonia</td>
<td>1 200</td>
<td>0.2</td>
</tr>
<tr>
<td>27</td>
<td>Ireland</td>
<td>1 065</td>
<td>0.2</td>
</tr>
<tr>
<td>28</td>
<td>Finland</td>
<td>1 040</td>
<td>0.2</td>
</tr>
</tbody>
</table>

Note: Malta, Cyprus, Iceland and Liechtenstein are not available.

Source: Eurostat computations

Table 4 lists the five main countries of origin of foreign hauliers performing international transport in each country in 2017. For instance, Belgium’s road network was most used for international transport by hauliers registered in the Netherlands, Poland, Germany, France and Luxembourg. Hauliers from these five countries, taken together, were responsible for 65.9% of the international transport tonne-kilometres performed by foreign hauliers on Belgian territory in 2017.
Table 4: International road freight transport: top 5 countries of registration of foreign lorries active on each territory, 2017 (% share in tonne-kilometres) Source: Eurostat computations

A regional pattern can be detected when looking at the individual countries. Hauliers from the surrounding countries are often the most important foreign hauliers in a given country. Good examples of this are Austria and Finland. The only exception seems to be hauliers registered in Poland, which appear among the top foreign hauliers in every other Member State in 2017. Poland is thus one of the most active haulier countries in international road transport in Europe. Polish hauliers take top place as the most important foreign hauliers in 12 Member States and the 2 EFTA countries Norway and Switzerland, as well as second place in another 10 Member States. The share of Polish hauliers among the foreign hauliers is as high as 61.5 % in Slovakia, 61.3 % in Lithuania, 50.1 % in the Czechia and 48.1 % in Germany. Even in geographically distant countries, Polish hauliers remain active: for example, 29 % of all tonne-kilometres forwarded by foreign hauliers in the United Kingdom were carried by Polish hauliers.

It should be noted that the overall road transport performance in the EU, Norway and Switzerland remains underestimated, as only transport activities of hauliers registered in the EU, Norway, Switzerland and Liechtenstein (until 2013) are considered. Moreover, transport performance of road freight journeys to non-EU countries (apart from the EFTA countries, Turkey, Montenegro and North Macedonia) has not been taken into account.

Modal split based on five transport modes: road competes with maritime at intra-EU level

Figure 3 shows the modal split calculated on the basis of transport performance, measured in tonne-kilometres, of five transport modes: road, rail, inland waterways, air and maritime. When adding air and maritime transport to the inland modes, road still keeps its leading position, followed by maritime transport. In 2017, road accounted for just over half of all tonne-kilometres performed in the EU. Maritime transport came next, with almost a third of the total transport performance, followed by rail (11.6 %) and inland waterways (4.1 %). In terms of tonne-kilometres performed, air transport plays only a marginal role in intra EU freight transport, with a share of 0.4 %.
Figure 3: Modal split of freight transport, EU-28, 2012 and 2017 (% share in tonne-kilometres) Source: Eurostat, (rail_go_total) (rail) (iww_go_atygo) (inland waterways) (road_go_ta_tott) (national road transport) (road_go_ca_c) (cabotage road transport) (avia_tpgo) and Eurostat computations (international road transport and maritime transport)

The relative share of road transport has increased by 1.6 pp from 2012 to 2017, while the share of rail, inland waterways and maritime transport have decreased (-0.8 pp, -0.5 pp and -0.3 pp, respectively) and the share of air transport remained unchanged.

Table 5 presents the transport performance in tonne-kilometres for the five transport modes road, rail, inland waterways, maritime and air between 2012 and 2017. The total transport performance by these five modes of transport increased by 10.6 % during this period. Road and air transport performance increased significantly over this period by 14.2 % and 12.0 %, respectively. However, air transport is of only marginal importance for the total intra EU transport performance. There were also noticeable rises in the tonne-kilometres performed by maritime and rail transport over the same period (+9.4 % and +3.5 %, respectively). In contrast, inland waterways transport performance decreased by 1.8 % from 2012 to 2017.

Table 5: Freight transport performance, adjusted for territoriality, EU-28, 2012-2017 (million tonne-kilometres) Source: Eurostat, (rail_go_typeall) (rail) (iww_go_atygo) (inland waterways) (road_go_ta_tott) (national road transport) (road_go_ca_c) (cabotage road transport) (avia_tpgo) and Eurostat computations (international road transport and maritime transport)
Data sources

The sources for the statistics in this article are from Eurostat. Statistical data have been reported to Eurostat by EU Member States in the framework of various EU legal acts. The essential legal acts are the following:

- **Road:** Regulation (EU) No 70/2012 on statistical returns in respect of the carriage of goods by road (recast);
- **Rail:** Regulation (EU) No 2018/643 recast of Regulation (EU) No 2016/2032;
- **Air:** Regulation (EC) No 437/2003 on statistical returns in respect of the carriage of passengers, freight and mail by air
- **Maritime:** Directive 2009/42/EC on statistical returns in respect of carriage of goods and passengers by sea

This article also includes data for inland transport modes from two EFTA countries, which participate in EU data collections: Norway (NO) and Switzerland (CH). Iceland (IS) and Liechtenstein (LI) (for LI since 2013) both are granted derogations for road freight transport.

According to Regulation (EU) No 70/2012 on statistical returns in respect of the carriage of goods by road, Malta is granted derogation from reporting road freight data to Eurostat. However, since Malta does not have any railway or inland waterways, the share of road in inland freight transport is 100%.

Adjustment of road freight data according to the 'territoriality principle'

Road freight transport, and particularly the part of international (including cross-trade) transport, needed to be 'territorialised' as it is reported by the countries on the basis of the nationality of the haulier, not on the basis of where the transport was carried out. For example, a haulier from the Netherlands might undertake a journey to Portugal. Though only a small part of this journey is in the Netherlands, the entire transport performance is accounted for by the Netherlands, as the vehicle carrying out the transport is registered there.

In order to calculate modal split shares on the basis of coherent data sets, as rail and inland waterways follow the 'territoriality principle', the international road freight transport data have been redistributed according to the national territories where the transport actually took place. This redistribution involved modelling the likely journey itinerary and projecting it on the European road network. The international road freight journeys' tonne-kilometres have been taken from the 'Tables on transport operations at regional level', computed by Eurostat on the basis of the detailed national survey data. There is a time lag before these tables become available and the territorialisation of international road freight data makes sense only when the datasets of all reporting countries have been received.

In order to redistribute the tonne-kilometre data proportionally to the countries concerned by the journey, the TERCET tool (territorial typologies) has been used. This tool allows the calculation of the total distance between the NUTS level 3 region of origin and the NUTS level 3 region of destination and breaks down the total distance into sections according to the countries in which this transport took place. With the help of this tool, the distances driven on the territories of the individual countries were calculated and the declared tonne-kilometres were proportionally attributed to the countries concerned.

Furthermore, transport performance of road freight journeys to non-EU countries (apart from the EFTA countries, Turkey, Montenegro and the Former Yugoslav Republic of Macedonia) has not been taken into account. Therefore the cumulated values of the territorialised transport performance will always be lower than those declared in compliance with relevant EU legal acts. Some journeys have their origin or destination in regions that are not covered by the TERCET tool (which is notably the case for islands such as the Canary Islands, Madeira, Greek Islands, etc.). In such cases, the region of origin/destination have been given the NUTS 3 region code where the main freight ferry terminals are located in order to avoid further underestimation of the data.

Data on total road freight transport for the reference period from 2005 onwards, calculated on the basis of the
territorialised international transport, are included as an annex in the Excel file downloadable under ‘Source data for tables and graphs’ below.

**Calculation of tonne-kilometres for air and maritime freight transport**

Within the framework of the relevant legal act, Eurostat collects maritime data of goods transported in tonnes between port pairs (port of loading and port of unloading). Nevertheless, these data cover only defined ‘main ports’, i.e. ports handling more than 1 million tonnes of goods annually. In order to calculate transport performance in tonne-kilometres for maritime transport, Eurostat has developed a distance matrix on the basis of the most likely sea routes taken by vessels. Multiplying tonnes transported between a pair of ports by the relevant distance has allowed the calculation of the maritime transport tonne-kilometres at EU level.

In order to exclude double counting of the same goods being reported as inwards transport by one port and as outwards transport by another port within the EU, all such records identified in the data have been excluded. However some uncertainty in the recording of the partner ports of loading or unloading may influence the results. Due to some degree of uncertainty in the outwards data, all outgoing goods with an ‘unknown’ partner port have been excluded from the tonne-kilometres calculations on the assumption that this transport has been correctly reported as incoming goods by the partner country. Since inland freight transport (road, rail and inland waterways) is essentially performed on the territory of the European continent, it has been considered appropriate to limit maritime freight transport to national and international intra-EU-28 transport. Thus, distortions in the overall picture of the European transport market, which would appear by including deep sea shipping, are avoided.

Similarly to maritime transport, Eurostat collects air transport data of cargo (expressed in tonnes) forwarded between airport pairs according to the relevant legal act. The legal act defines categories of airports according to the passenger units handled per year. Passenger unit is equivalent to either one passenger or 100 kilograms of freight and mail. Three datasets are defined according to different concepts: 'Flight Stage'; 'On Flight Origin Destination'; 'Airport'). Air transport data used for the calculation of tonne-kilometres are based on the 'Flight Stage' concept. Air transport, as analysed in this article, covers transport to and from any airports in the reporting countries with more than 150 000 passenger units annually. In order to calculate transport performance in tonne-kilometres for air transport, Eurostat is using a distance matrix that contains great circle distances (minimum distance on a spherical line) between airport pairs. The distance matrix contains as well a so-called ‘territorialisation tool’ that allows attributing the calculated tonne-kilometres to the countries overflown on the route. The distance for each country is based on its national airspace, which includes territorial waters of 12 nautical miles off its coast. The calculated ‘territorialised’ air transport performance is a concept intended to be used only for comparing the transport modes’ activity at the EU or at a country level for the purpose of modal split. More information can be found in the relevant metadata on Eurostat website, [here](#).

Definitions of terms used within transport statistics are available in the [transport glossary](#) and in the ’Illustrated Glossary for transport statistics’ (Fourth edition, 2009).

**Context**

The European Commission’s White Paper “Roadmap to a Single European Transport Area — Towards a competitive and resource efficient transport system”, adopted in March 2011, states that the transport sector in the EU should use less and cleaner energy, and that there should be efficient networks. The White Paper adds that shifting transport to more environmentally sustainable transport modes should be encouraged.

There is a need for EU-wide data to monitor progress towards this goal. Recording modal shifts over time is therefore very important, and enables policy guidelines to be tailored more accurately.
Other articles

- Freight transport statistics
- Transport statistics introduced
- Transport statistics at regional level

Publications

- Energy, Transport and Environment Indicators - 2018 edition (Statistical Book)

Main tables

- Transport, see:

  Transport, volume and modal split (t_tran_hv)

Database

- Transport, see:

  Multimodal data (tran)

  Transport, volume and modal split (tran_hv)

Dedicated section

- Transport

Methodology

- Modal split of freight transport (ESMS metadata file — tran_hv_frmod_esms)
- Modal split of passenger transport (ESMS metadata file — tran_hv_psmo_mod_esms)
- Volume of freight transport relative to GDP (ESMS metadata file — tran_hv_ftrra_esms)
- Volume of passenger transport relative to GDP (ESMS metadata file — tran_hv_pstrra_esms)

External links

- European Commission - Transport - Marco Polo Programme
- Trans-European Network Executive Agency