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Statistics on International Rail Passenger Transport

Note by the secretariat

I. Introduction

1. This document aims to give an overview of data availability for international rail passenger transport in United Nations Economic Commission for Europe (UNECE) countries, using available data sources at the international level. This analysis aims to support the work of the Working Party on Rail Transport in its considerations of how to increase and improve international rail passenger transport. It has been compiled by the secretariat of the Working Party on Transport Statistics (WP.6).

II. Data Sources

2. Through a common questionnaire with the International Transport Forum and Eurostat, UNECE publishes rail passenger figures (both in terms of passenger numbers and passenger-km) for ECE member States, data for which are broken down between national and international journeys. As an example of data availability, at the time of writing the public database shows total passenger numbers for 37 ECE member States for 2018, while the international passenger breakdown is shown for 34 of these.

3. In addition to this general source, Eurostat (through its legal acts) also collects a variety of relevant datasets with more specific data. For example, two datasets[1] "rail_pa_intgong" and "rail_pa_intcmng" give respectively, international passenger numbers from the country, split by destination country, and passenger numbers into the country, split by origin country. Data availability shows around 21 countries with relevant data for 2018. However, the absence of figures for some key European international rail partners like Austria, France, Italy and Netherlands make any analyses of these data less than complete.

[1] Both available from https://ec.europa.eu/eurostat/web/transport/data/database.

4. The final international data source at the European level considered relevant for this document was another Eurostat table, which has regional data based on the European Nomenclature of Territorial Units for Statistics at level 2 (NUTS 2 regions).[2] The "Tran_r_rapa" table covers both national and international rail passenger loadings and unloadings by NUTS 2 region. This allows a richer analysis of international passengers, travelling between different regions (and thus city pairings can typically be seen, though not in all cases). The dataset is only collected every five years, and so the latest year is 2015, although data availability in this dataset is typically better than the two mentioned above. This is helped by each origin/destination pair being requested from both the origin and destination country, so that data gaps from a single country do not always lead to coverage problems (although this situation leads to its own challenges.

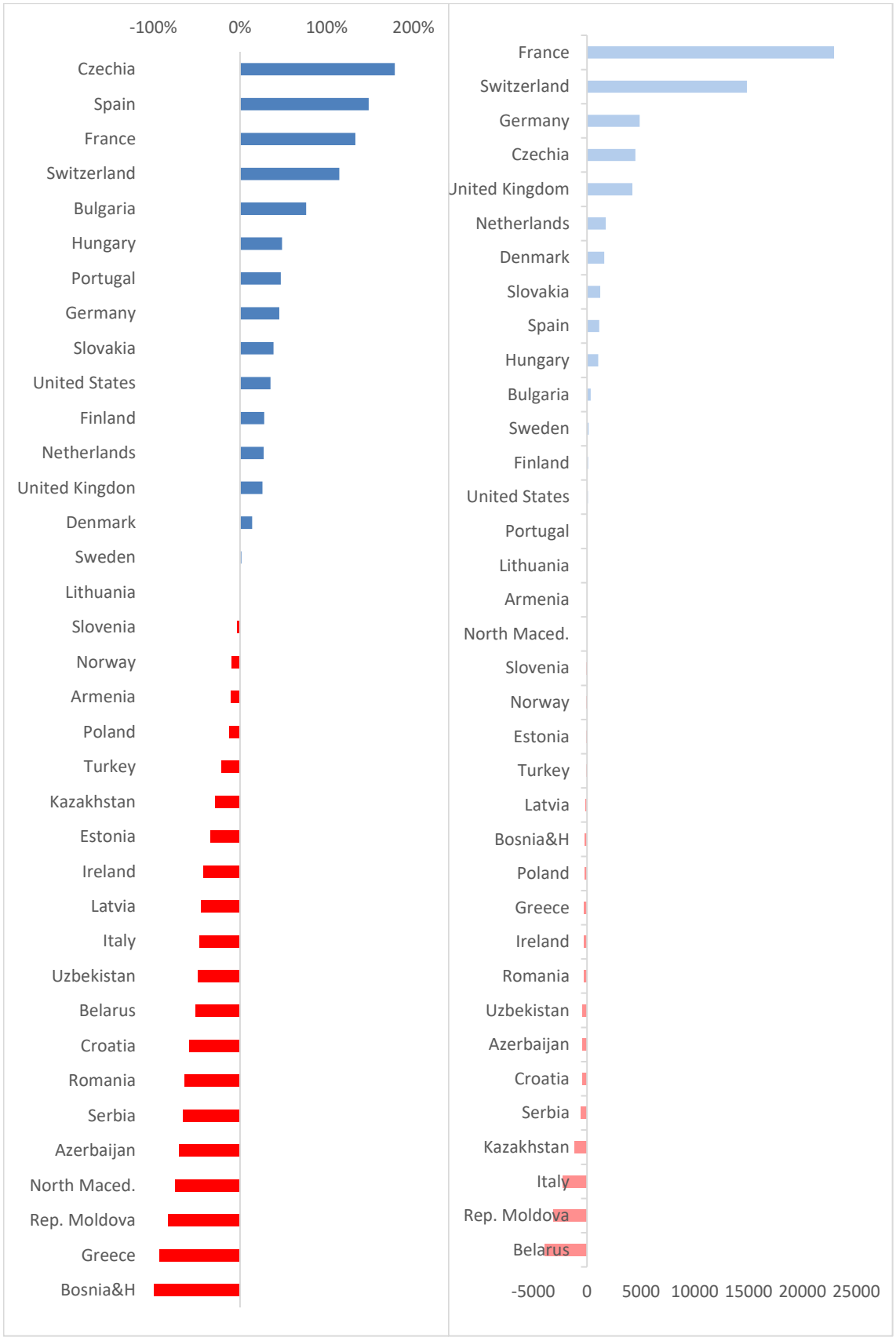
III. Overall Trends from ECE Data

5. Figure I (left side) shows relative trends in total international passenger numbers for available ECE countries in the last decade (either 2008-2018, or earliest year to latest year available within this period). This shows a very mixed picture, with around half of countries seeing decreases and the others seeing increases in the time period. Czechia, Spain, France and Switzerland all saw increases of above 100 per cent, while Bosnia and Herzegovina, Greece, Republic of Moldova and North Macedonia saw decreases greater than 75 per cent.

6. However, these numbers mask the fact that in some countries international passenger numbers are very small, and so the discontinuation of a single service can sometimes imply large decreases. And thus figure II provides the same changes in absolute figures. Both sources combined show that while Belarus, Italy and Republic of Moldova did see some significant decreases, the overall trend (based on available countries) is much more positive, with four countries (France, Switzerland, Germany and Czechia) increasing international passenger numbers by over 5 million per year over the time period.

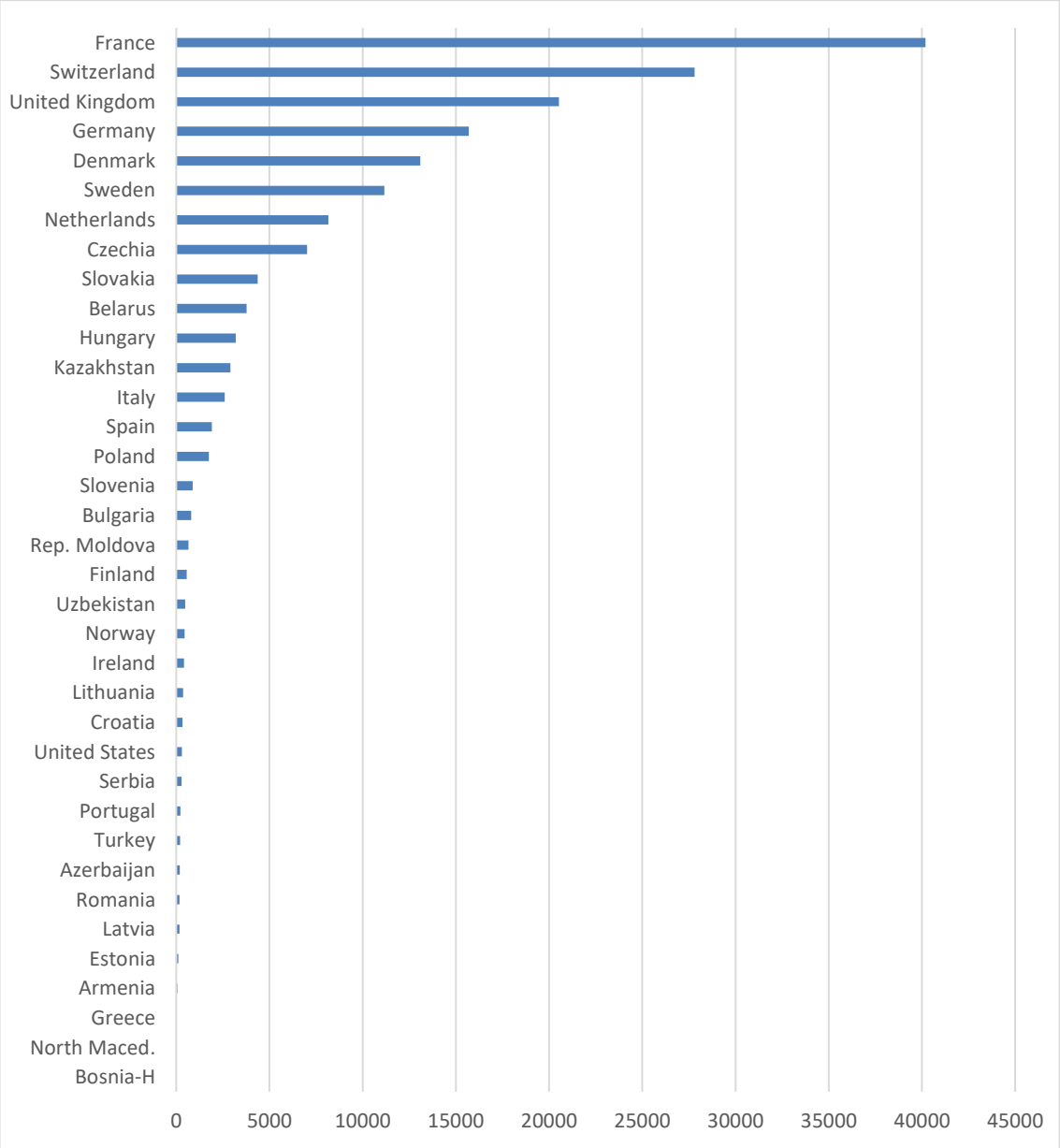
[2] The Nomenclature of Territorial Units for Statistics. See https://ec.europa.eu/eurostat/web/nuts/background.

Figure I: **Change (2018-2018 or latest) in international rail passenger numbers, in percentages (left) and absolute values (right)**



7. Looking again at absolute numbers of international passengers in the latest year, UNECE data show that France, Switzerland and the United Kingdom of Great Britain and Northern Ireland have the biggest international passenger numbers, followed by Germany, Denmark and Sweden (figure II).

Figure II: **Total number of international rail passengers, 2018 or latest year**



8. A notable country that does not have any recent data but that may otherwise appear towards the top of this list is Belgium, with strong train connections to each of its neighbours. The latest year of Belgium data in the ECE database from 2009 shows 19 million international rail passengers, which would place it fourth on the above graph of total international passenger numbers.

9. A natural question looking at the above graph is how much of each country's international passenger numbers is due to a handful of key routes. For example, due to geography the vast majority of United Kingdom of Great Britain and Northern Ireland passenger numbers will be London to Paris and London to Brussels traffic (Northern Ireland to Ireland connections making up the rest). The UNECE dataset cannot answer these questions, and so further sources were explored.

IV. Regional Data from Eurostat

10. As mentioned above, the Eurostat "Tran_r_rapa" dataset covers origin and destination of rail passenger journeys between NUTS 2 regions, and the data are only collected every five years. NUTS 2 regions are at the level below countries in the Eurostat nomenclature, and represent "basic regions for the application of regional policies". In the NUTS 2016 classification,[3] there are 281 separate NUTS 2 regions to consider.

A. Process

11. Using statistical software, 2015 data with non-negative values, and also where the origin country did not equal the destination country, were isolated, yielding 11,444 different data points (out of the more than 60,000 in the original dataset). The data were further filtered by only considering observation pairs with more than 100,000 passengers per year (approximately 273 passengers per day), to make the analysis simpler and the results clearer.

B. Data Challenges

12. As each country reports e.g. Paris>London and London>Paris traffic, so each origin/destination combination appears four times. For the purposes of this analysis, it was assumed that the destination country in each case would likely be more accurate, as a country may collect origin information for border security purposes. This still leaves each relevant origin-destination pair with either one or two values, depending if one or both countries have reported data for it. In order to account for these different cases, the mean of the value(s) multiplied by two was used.

13. A further challenge was what to do when a country has reported passenger numbers only to a country, and not to a specific region. The simplest solution was to adjust each of these manually to run to the country's capital in lieu of any extra information, but this may of course create some anomalies. For both countries and NUTS 2 regions, their geographical mid-point or "centroid" was taken for their coordinates, and again this has created obvious discrepancies where these mid-points are not close to major cities (for example, one Swiss NUTS 2 region covers both Geneva and Lausanne, but its centroid is relatively far from these two cities).

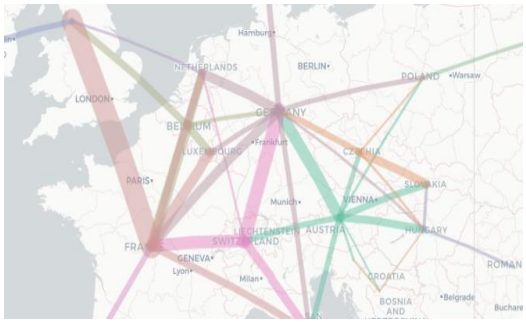
C. National Results

14. As a simple first step, data were summed up to the national level to see flows between different countries. Figure III shows these data, with a filter of only pairs with more than 100,000 passengers a year (in either direction). This first visualization clearly shows the large proportion of traffic that flows between a few key countries, such as France and the United Kingdom of Great Britain and Northern Ireland, and France and Switzerland (as well as Denmark and Sweden, which is not visible on the map). There are also obvious problems with how this visualization appears, however, with the centroid of a country being far from the reality of where international rail journeys start and end.

15. In the case of simpler cases such as Ireland, Portugal and the United Kingdom of Great Britain and Northern Ireland, it would be easy to manually adjust these coordinates to better reflect termini in e.g. Belfast, Dublin, Lisbon and London. However, cases such as Germany and Switzerland would be much harder to accurately ascribe to a particular city, given the multiple potential origin/destination pairings. Nevertheless, the country-level figures do provide a useful insight into the biggest partnerships between countries in terms of international passengers.

[3] As the latest data year was 2015, NUTS 2013 classifications are used in the dataset. See correspondence data here https://ec.europa.eu/eurostat/web/nuts/history.

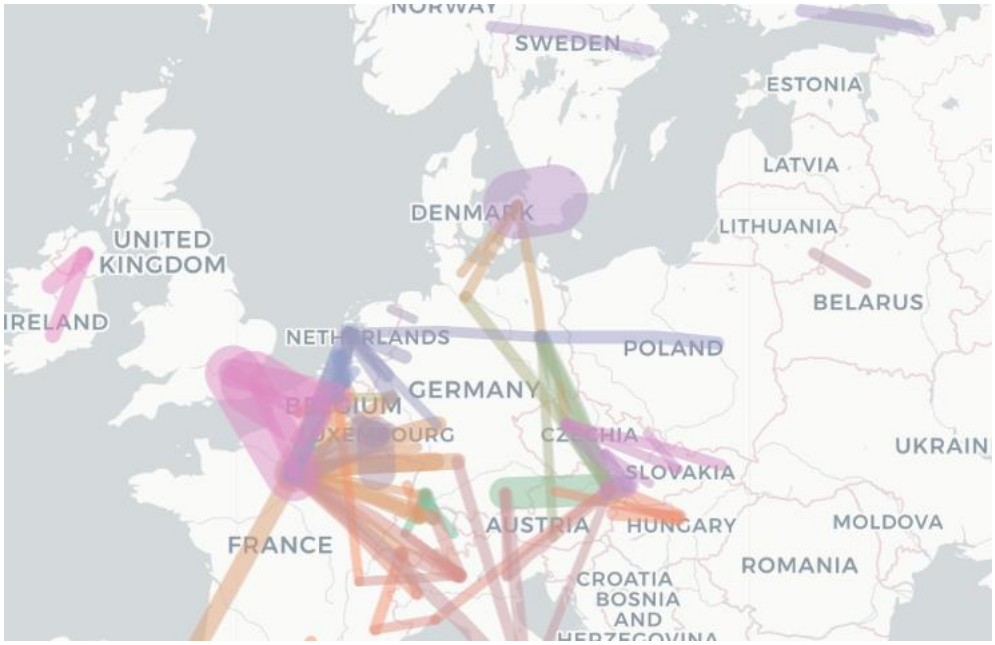
Figure III: **Visualisation of International rail passenger numbers between countries, 2015 data from Eurostat**



D. Regional Results

16. After conducting the analysis on an international level as an overview, data were processed and mapped at the regional level as well. Even after considering the data gaps already described, there were still issues to resolve. These were mainly caused when a country had not provided a corresponding NUTS 2 region for an international journey, but only a country pairing. Each of these cases had to be adjusted manually. Unless there was a good reason not to, these pairings were assumed to run to the missing country's capital city region. Thus figure IV shows the map with these manual changes made.

Figure IV: **Rail passenger flows between NUTS 2 regions, 2015**



17. This map still has some issues, but is largely a useful account of international train travel for countries covered by Eurostat. It shows the importance of pairings like Paris and London, Calais and Folkestone (Eurotunnel), Copenhagen and Malmo, as well as the many smaller connections done between non-capital city regions for e.g. Germany and Switzerland.

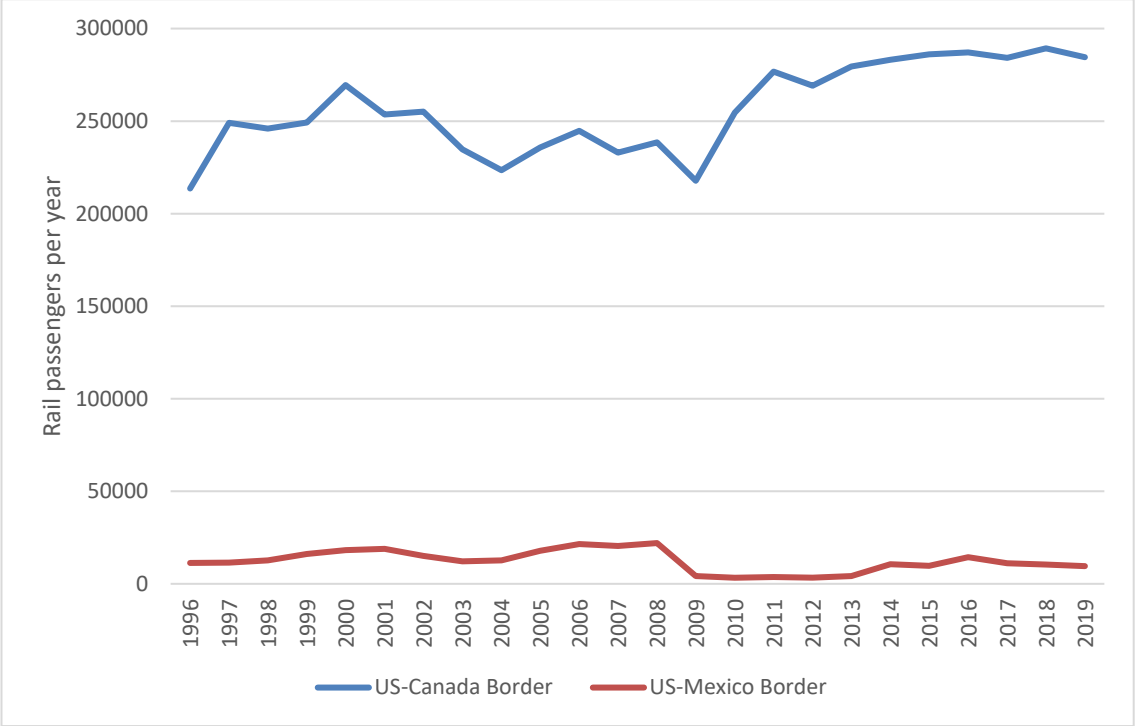
18. The map can be used to show the strong links between many big population centres, but also the relatively low number between certain regions. As the data quality for the 2010 and 2005 collections was not of the same quality, it was not possible to make any meaningful comparisons across time, but hopefully with the 2020 collection a map showing increases and decreases in specific routes will be possible.

V. North American Data

19. For Canada and the United States of America (as well as Mexico), international rail passenger numbers are available for download from the United States Bureau of Transportation Statistics.[4] These data go back to 1996, and can thus be used to see how international passenger numbers change over time. Data are split by border crossing point, and can also be summarized by partner country (either Canada or Mexico).

20. Annual data for Canada/United States of America crossings have been slowly increasing since 1995, with around a 30 per cent growth over the period, which happened mainly after 2010. The Mexico United States of America border, by contrast, saw strong growth until 2008 (with passenger numbers doubling), followed by an 80 per cent fall in 2009 and then growth again back to 1996 levels from 2014 onwards (figure V).

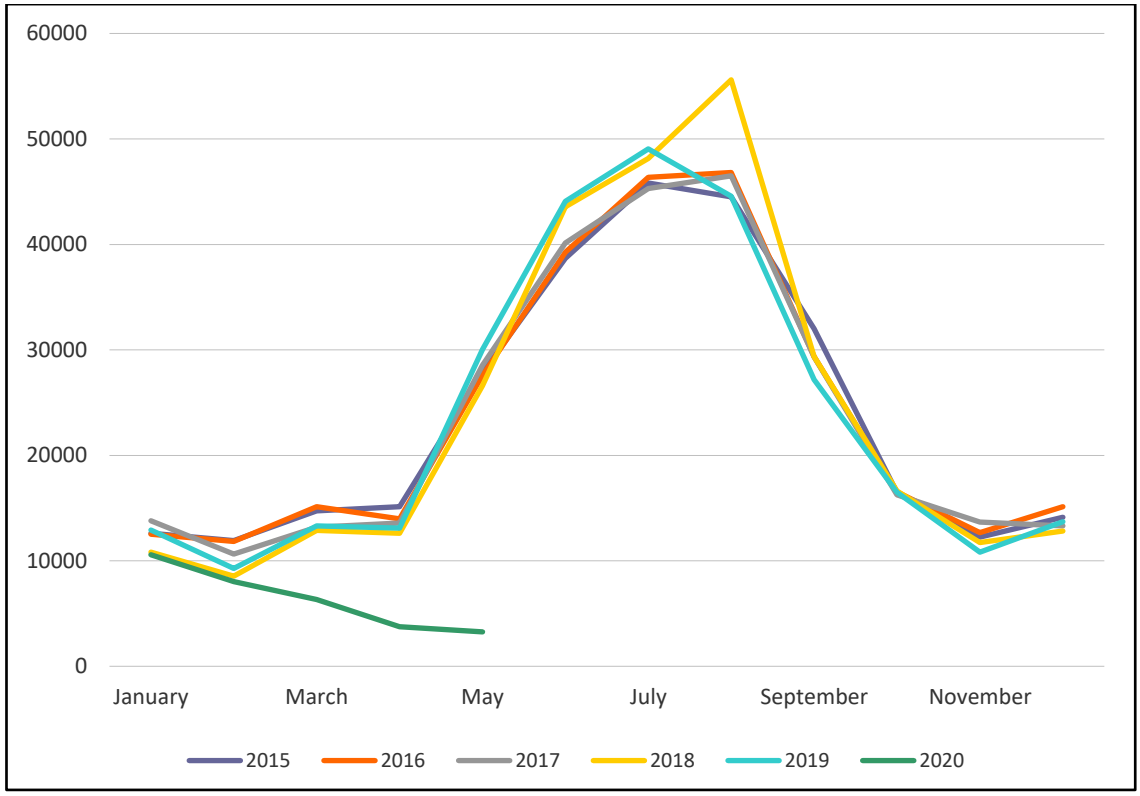
Figure V: **US-Canada and US-Mexico rail passengers per year**



21. The North American data also show strong seasonality, with peak Summer months having up to four times the number of passengers as winter months. These monthly data also show the impact of COVID-19 on international numbers. Figure VI shows the last six years of monthly data, showing that in May 2020, passenger numbers between Canada and the United States of America were around a sixth of their typical value.

[4] https://explore.dot.gov/views/BorderCrossingData/Monthly?:isGuestRedirectFromVizportal=y&:embed=y.

Figure VI: **Monthly rail passengers between Canada and United States of America**



VI. COVID-19 Impact in Available European countries

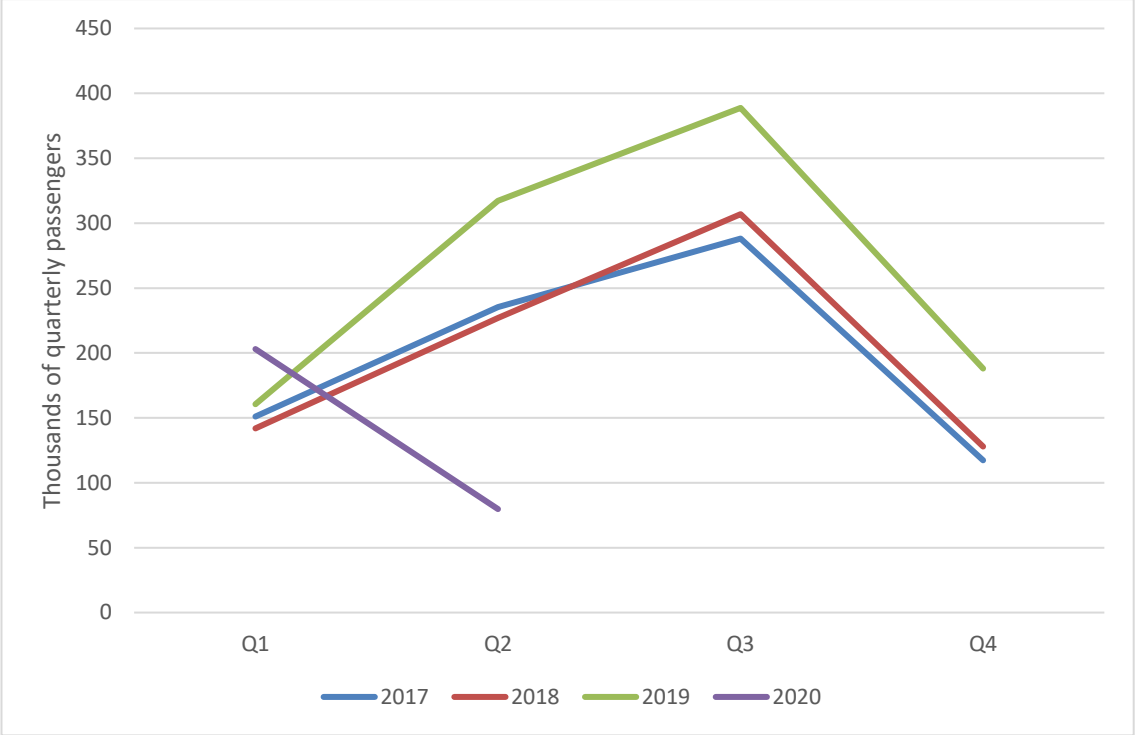
22. Much interest lies in how the COVID-19 crisis has affected all transport activity, including international rail passenger performance. With no harmonized short-term data collated at the international level, a range of national sources have been referenced below, to give the best possible overview of what is happening. These sources are all included in the UNECE wiki on short-term data sources, which has been released and regularly updated since the COVID-19 pandemic started to affect ECE countries.

23. While international rail passenger numbers were not available for Russian Federation, total year-to-date passenger data are available.[5] These are split between commuter rail and long-distance rail (it is assumed that international passenger numbers are included in the long-distance part, but this may not be the case). These data show that for January-July 2020 total passenger numbers were 32.4 per cent down on the same period of 2019, whereas long-distance trains were down 45 per cent. These data seem to show that long-distance passenger travel, including international passenger journeys, has declined more than other rail journeys.

24. Data for other countries typically did not have international rail passengers separated out either, or perhaps did not include them in short-term statistics at all. An exception to this was Bulgaria, which publishes these data on a quarterly basis. At the time of writing, data for the second quarter of 2020 were released. These data show that while the international passenger trend has been very positive over the last few years, the second quarter data for 2020 were 75 per cent lower than the same period in 2019.

[5] At https://eng.rzd.ru/en/9498/page/103290?id=12510#header.

Figure VII: **Quarterly Bulgarian international rail passenger numbers**



VII. Conclusions on data availability

25. This document only serves as an overview of data availability on international rail passenger numbers and the COVID19 impact. WP.6 is always available for further discussions and projects on rail statistics.