

Abbreviations

Data in this note refers to the year 2010 except where stated.

RTS denotes Road Traffic Stats

FS denotes Freight Stats

CSRG T denotes the Continuous Survey of Roads Goods Traffic.

Summary

[Table 0401 of the 2011 TSGB](#) provides the following estimates of Tonne-km: 151bn by road, 19bn by rail, 42bn by water (mainly inshore shipping) and 10bn by pipe line, where the numbers relate to Great Britain. Those yield 68% by road, 8.5% by rail, 19% by water and 4.5% by pipe or if water and pipe are ignored, 88.8% by road and 11.2% by rail.

This note shows that the road freight in that table should be increased by 24%. The effect on modal split is to provide 186.6bn tonne-km or 72.4% by road leaving 7.4% by rail, 16.3% by water and 3.9% by pipe. Or, if water and pipe are ignored, 91% by road and 9% by rail.

Further, we now estimate that 73% of the nation's road freight is on the Motorway and Trunk Road system, compared with previous estimates, based on the Heavy Goods Vehicle veh-km, of 64%.

These estimates include 12bn Tonne-km in light goods vehicles. (This value is the difference between 151bn Tonne-km in TSGB Table 0401, where the effect of light goods vehicles is included, and the value of 139bn Tonne-km for domestic road freight available from other FS tables where freight in light goods vehicles is not included).

A caveat

Possibly the vehicle-km missing from the estimate made from the CRRGS are not randomly distribute but are concentrated on empty running. If so then our estimate for Tonne-km will be too high.

The Problem

1. That data in [TSGB 0401](#) makes an allowance for light goods vehicles (vehicles of less than 3.5 tonnes). Without the latter there would be 139bn Tonne-km by road, freight [Table RFS0107](#). However, both tables omit international freight in foreign and Northern Ireland registered lorries. That at least should be added if the data is to be compared to other modes. It amounted to 9.1bn tonne-km in 2010.
2. Separately from that we had an interest in calculating the proportion of road freight carried by the strategic road network. To that end we requested, from the freight stats team, the vehicle-km and tonne-km by class of vehicle, defined by numbers of axles. That data would enable us to calculate average loads for the various axle configurations. Multiplying by the corresponding vehicle-km, available by special request from the Road stats team, would provide the tonne-km.
3. The immediate problem was that the vehicle-km provide by freight stats differed from those provided by Road stats as set out below: Detail is in the working spread sheet here.

Table 1	Bn Veh –km 2010.	
	RT stats.	Freight stats.
2-axle rigids	10.0	5.9
3-axle rigids	1.8	1.6
4 + Axle rigids	1.5	1.2
3-4 axle artic	1.5	0.9
5-axle artic	5.6	1.7
6 + axle artic	6.0	7.5
Total	26.3	18.8

4. The differences are so large as to undermine confidence in the statistics as a whole. We have 40% more vehicle-km from Road stats than from Freight stats, let alone the vast differences at vehicle class level.
5. We informed the DfT statistics people of the problem in September 2012. On 25th January 2013 we received notification of the Discrepancies Report.

The discrepancies Report.

This report says that The RTS data (a) overestimates 2-axle Goods vehicle traffic by 1,400 million vehicle-km (b) includes heavy vehicles that are not classed as Goods Vehicles by the FS survey, but makes no estimate of the effect (c) Classifies vehicles travelling with one axle raised as though from the lower axle class but again makes no estimate of the effect.

Additionally the report says that the FS data underestimates traffic attributable to rigid bodied goods vehicles by 20% and that attributable to artics by 11%. Further, as above, the CSRGD does not capture foreign and Northern Ireland lorries. These vehicles are however inevitably included in the RTS data. The report says the foreign and Northern Ireland lorries account for 1,035 million vehicle-km, mostly 5-axle artics.

The report is silent as to adjustments needed to the tonne-km estimates.

Our adjustments

Calculations and sources providing our estimates of road freight and the modal split are as follows:

We started with the data at left in the first sheet in the spread sheet attached. It provides tonne-km and vehicle-km by class of vehicle. The source is the DfT's Freight Stats team. We then combined vehicle types so as to correspond to those recorded by the DfT's Road Traffic stats team. That data is at right on the first sheet of the spread sheet. Dividing the Tonne-km by the vehicle-km provided average loads for the RTS classifications.

The vehicle flows, as adjusted in Appendix F of the discrepancies report, are at top of the second tab of the spread sheet. We adjusted the RTS values by:

1. Reducing vkms to take account of non-goods vehicle HGVs included in the RTS values:

The RTS HGV vkms include HGVs not licensed as goods vehicles. The Discrepancies report says that these are mostly 2-axle rigid or 5-axle artics. They include emergency services, farm tractors, mobile cranes and diggers along with road sweepers. Table VEH 0102 provides 470,100 HGVS. Table VEH 0103 provides 389,900 goods vehicles. The difference is 80,200. Our view is that all of them will have trivial annual mileages. We assume 8,000 km per year per vehicle, providing 640m vkms. We split that equally between the 2-axle and 5-axle artics, deducting 320 million vkms from each, on the assumption that they do not carry freight.

2. Adjusting the numbers in each class, but without changing the totals, to take account of the vehicles with one axle raised

The sub-classifications need adjusting to take account of the RTS classifying lorries with one axle raised as vehicles with one axle less than born. If the percent running with an axle raised is p then the recorded veh-km for the highest axle class in the RTS should be increased by dividing the recorded value by $(1-p)$. That should be subtracted from the class immediately below. The difference in that flow class should then be divided by $(1-p)$. We set " p " to 35% for 6-axle artics, 10% for 5-axle artics, and to 5% for 4-axle and 3-axle rigid. Readers may carry out sensitivity tests by varying any of those within the spread sheet.

Multiplying the adjusted RTS vehicle-km by the average loads from the FS data and summing yields our estimates of 174.6 Tonne-km for 2010. Adding for freight in light goods vehicles provides 186.6bn Tonne-km

Applying similar principles to the HGV flows on the motorway and trunk road system provided an estimate of tonne-km on that network

Values for other years are estimated by apportioning the difference between our estimate of 186.6 bn tonne-km and the value of 151 bn tonne-km in TSGB 0401 according to the flow differences from Appendix A of the Discrepancies report. That produces the data below also available in the spread sheet at third tab.

Results

1. Our estimate of the road freight on roads in Great Britain for the year 2010 is 186.5bn tonne-km, an increase of 24% on the value of 151 bn tonne-km in TSGB table 0401
2. The effect on modal split is to provide 72.4% by road, 7.4% by rail, 16.3% by water and 3.9% by pipe. Or, if water and pipe are ignored, 91% by road and 9% by rail.
3. We estimate that the motorway and trunk road network carries 137bn tonne-km, including an allowance of 3,650m tonne-km for freight in light goods vehicles, (the latter calculated by apportioning the 12bn for all roads in proportion to light goods vehicle flows). On that basis the motorway and trunk road system, carries 72% of the nation's road freight. In corroboration, the network carries 80% of the vehicle-km attributable to artics and nearly 70% of that attributable to 4-Axle rigid.

The following table summarises the results.

Table 2. Comparisons Vehicle-km and Tonne-km	Veh-km Million			Tonnes per vehicle	Tonne-km Million		
	RT Adjusted	CSRGT original	CSRGT adjusted		RT Adjusted	CSRGT original	CSRGT adjusted
2-axle rigid (R2)	8,192	5,917	7,100	1.71	13,993	10,107	12,128
3-axle rigid (R3)	1,814	1,632	1,958	4.50	8,154	7,336	8,805
4-axle rigid (R4)	1,562	1,209	1,451	7.96	12,435	9,624	11,549
Total Rigid	11,567	8,757	10,509		34,582	27,066	32,482
3 or 4 axle artic (A3/4)	1,285	852	946	5.92	7,602	5,044	5,597
5 axle artic (A5)	2,281	1,654	2,871	8.15	18,579	13,470	23,385
6 or more axle artic (A6)	9,165	7,506	8,332	12.43	113,881	93,270	103,530
Total artics	12,730	10,012	12,148		140,062	111,784	132,512
Total HGV	24,298	18,769	22,657		174,644	138,850	164,993
Ratios RT/CSRGT		1.29	1.07			1.26	1.06
Add for Light Gds (a)					12,000	12,000	12,000
Totals					186,644	150,850	176,993
Ratios RT/CSRGT						1.24	1.05

The comparison of the RTS adjusted the CSRGT adjusted flows is fair.

The proportional calculation for other years provides the table below.

Table 3 Tonne-km Billions						Ratio. Adjusted to original road, %
Year	CSRGT Original by road	Adjusted by road	Rail	Water	Pipeline	
2000	159	184	18	67	11	115.5%
2001	159	188	19	59	12	117.9%
2002	159	188	19	67	11	118.2%
2003	162	191	19	61	11	118.2%
2004	163	196	20	59	11	120.4%
2005	163	196	22	61	11	120.1%
2006	163	197	22	52	11	121.0%
2007	169	204	21	51	10	120.8%
2008	157	196	21	50	10	124.8%
2009	137	176	19	49	10	128.4%
2010	151	187	19	42	10	123.6%

The modal split from Table 3 in percentage terms follows:

Table 4	All modes %					Road Plus rail %	
Year	Road	Rail	Water	Pipe	All	Road	Rail
2000	65.9%	6.4%	23.8%	3.9%	100.0%	91.1%	8.9%
2001	67.8%	6.8%	21.1%	4.3%	100.0%	90.8%	9.2%
2002	66.2%	6.6%	23.4%	3.8%	100.0%	90.8%	9.2%
2003	68.0%	6.7%	21.5%	3.9%	100.0%	91.0%	9.0%
2004	68.8%	6.9%	20.5%	3.8%	100.0%	90.8%	9.2%
2005	67.8%	7.5%	20.9%	3.8%	100.0%	89.9%	10.1%
2006	70.1%	7.7%	18.3%	3.9%	100.0%	90.0%	10.0%
2007	71.6%	7.3%	17.7%	3.5%	100.0%	90.7%	9.3%
2008	71.0%	7.5%	17.9%	3.6%	100.0%	90.3%	9.7%
2009	69.6%	7.4%	19.1%	3.9%	100.0%	90.3%	9.7%
2010	72.7%	7.3%	16.2%	3.8%	100.0%	90.8%	9.2%

Sensitivity tests

Readers may carry out their own sensitivity test by varying the proportions of RTS vehicles with one axle raised within the spread sheet, or altering other adjustments.

As an alternative we have made estimates where the RTS values for total vehicle-km are taken as control totals but where the proportions in each vehicle class are adjusted to match those found in the FS data, see spread sheet , sheet 4. That provided data immaterially different from the above. E.g. an increase in Tonne-km with respect to the original CSRGT data of 25% instead of 24% and 71% of freight on the strategic road network instead of 72%

Conclusion

Subject to the caveat, cited above, namely, that possibly the vehicle-km missing from the estimate made from the CRRGS are not randomly distributed but are concentrated on empty running, significant, if not substantial, amendments are due to all, or nearly all, the road freight stats published by the DfT.

We also encourage the DfT to amend the road traffic stats vehicle classifications so as to report the axle classes as seen instead of classifying those with one axle raised as from the lower axle class.

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Minor text changes at 4th April 2013

Discrepancies report Comment

Top of page 3 provides “79% of licensed HGVs are commercial”.

Comment: Table VEH0102 provides 470,100 HGVs and Table VEH 0103 provides 389,900 goods veh. Hence Goods vehicles as a percent of the whole are $(389.9/470.1) = 83\%$, not 79%. Perhaps they worked it out incorrectly thus $[(470/389.9)-1] = 79\%$, or have a different data source.

Page 2, Geographical coverage. It says, “Foreign HGVs account for 945m vkms of total traffic (3.6% of traffic of GB roads)”. There are also 90m vkms for NI lorries.

Comment: It should say 3.6% of **HGV** traffic on GB roads.

Page 3, 5-axle artics: It says, “The RT estimate of 5-axle articulated HGV traffic is 4 billion vkms higher than the CSRGT estimate. Reasons for this difference include the treatment of HGVs with trailers as articulated by the RT estimates”

Comment: That cannot be correct. The CSRGT subdivides by trailer and type. Our subsequent combinations match the RTS classification. RTS provided 5.6b veh Km. The CSRGT combination provided 1.7b – see table below.

	Bn Veh –km 2010	
	RTS	FS
2- rigids	10.0	5.9
3- rigids	1.8	1.6
4 + rigids	1.5	1.2
3-4 artic	1.5	0.9
5- artic	5.6	1.7
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Total	26.3	18.8

Page 4, ATC Misclassification, raised axles: It says, “This is partly due to the fact that those vehicles with 6 or more axles that travel with one raised may be classed as 5-axle vehicles in the RT estimates but may be recorded as 6 or more axle vehicles by the CSRGT GB”

Comment: There is heavy use of the word “may”. Subsequently the DfT have said that the axle misclassification is duplicated by enumerators, so as to maintain consistency with the ATC record.

Further, we see raised axles on all HGVs except 3-axle artics and 2-axle rigids (for which raised axles are an impossibility), not just on 6-axle artics.

Page 4 – underreporting: The text says there is underreporting of 20% for rigids and 11% for artics. In Appendix F the observed values are increased by those percentages. There is therefore a mistake since, if the words are correct, the increase on rigids should be the observed value divided by 0.8 or multiplied by 1.25, not 1.2. Similarly for artics: the observed value should be increased not by 11% but by 12.23% or multiplied by the inverse of 0.89. On the other hand it could be that Appendix F is correct, in which case the words on page 4 need to be changed.

Further there is no indication as to whether the underreporting falls proportionally on loaded or empty running. Possibly it is empty running that is the more likely to be underreported.

Page 9, use of HGV estimates: Text contains no advice as to how to adjust the published data. Some of the links overleaf - page 10 appear inert.(Numbers, 2, 4,5 and 6).

Annex B provides differences between the RT and CSRGT. The percentages are with respect to the RT but the table does not make that clear. The same should be published with respect to the CSRGT for which the values are very much, if not catastrophically, larger.

Appendix F

No attempt is made to correct the estimates of tonne-km or tonnes lifted.