Optimal Regulation and Infrastructure for Ground, Air and Maritime Interfaces

DELIVERABLE D3.1

CURRENT TRAVEL BEHAVIOUR, FUTURE TRENDS AND THEIR LIKELY IMPACT

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EXECUTIVE SUMMARY

The aim of Deliverable 3.1 "Current Travel Behaviour, Future Trends and Their Likely Impact" of the project ORIGAMI is to report the results of the work carried out in Task 3.1 "Current Travel Behaviour" and Task 3.2 "Future Trends" of Workpackage 3 "Identification of Travel Behaviour".

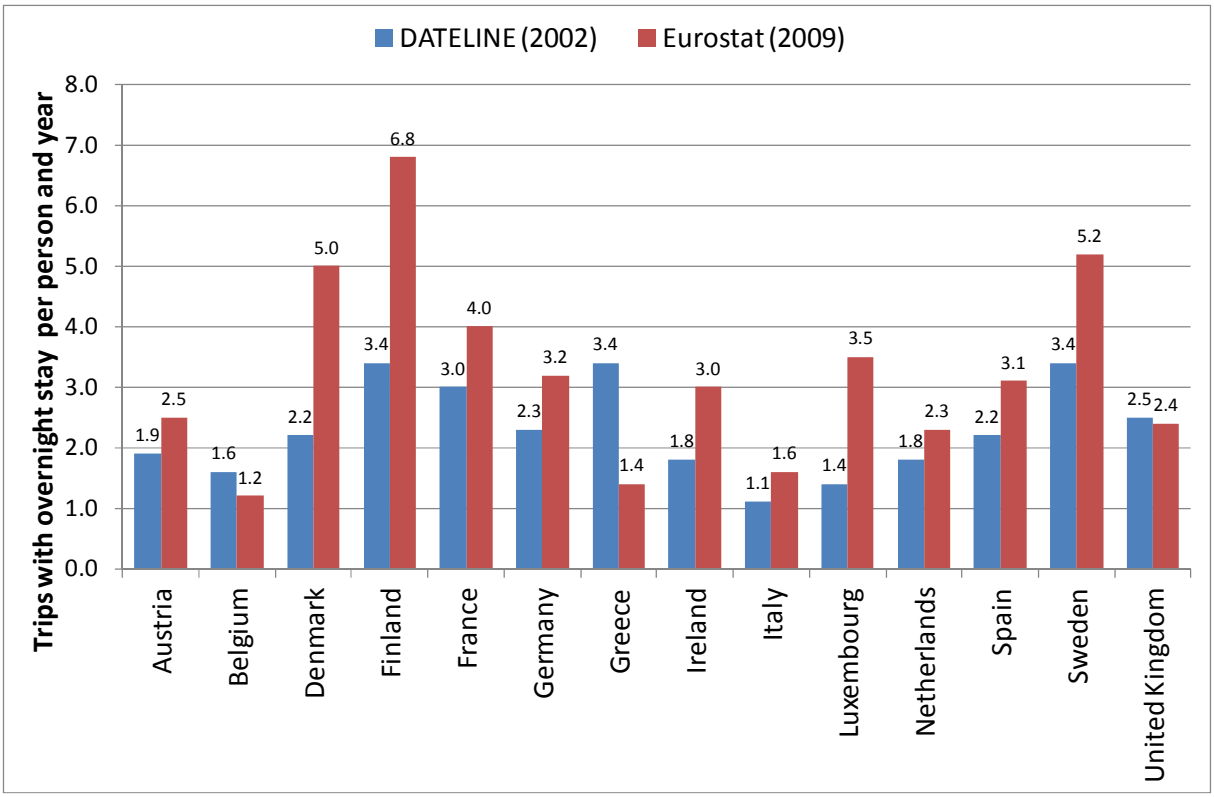
The objective of the first part was to summarise data about current travel behaviour of European residents for long-distance trips. Three main data sources have been identified:

- Eurostat tourism demand data provide a consistent set of data of long-distance travel. This database is updated annually. Data are available at country level. Long-distance trips are defined on the duration of stay (at least one overnight stay or at least four overnight stays) but not by trip length. Data are collected in all EU member states via household surveys for residents aged 15 years and over.
- National Travel Surveys (NTS) are carried out in many Western European countries. Most of them cover at least partly aspects of long-distance travel. It seems that data collection in National Travel Surveys is not common practice in the Eastern European countries. National Travel Surveys provide more detailed data concerning travel distance than the Eurostat database. However, data settings and data structure used in the different National Travel Surveys are not consistent with each other and this limits their comparability.
- DATELINE was the first detailed supranational household and personal survey to focus on long-distance travel. The survey was carried out in 16 European countries. The data provide comprehensive and comparable information concerning travel purpose, travel date, destination, travel mode and focus at least partly on intermodal trips.

Additional information regarding long-distance travel will be gathered in Task 3.3 "Collection of Behavioural Response Data". Data collected in Task 3.1 "Current Travel Behaviour" and Task 3.3 "Collection of Behavioural Response Data" will form the basis for the work in Task 7.2 "Forecasting".

A set of indicators has been defined from the collected data and cross-comparisons have been carried out in order to identify differences/similarities between countries, income and age groups, households with and without access to a car, etc. The results of this analysis form the basis for the identification of future drivers of long-distance mobility and the forecast of future long-distance travel demand. Figure 0-1 shows a comparison of the trip rates per person and year for journeys with an overnight stay from the DATELINE and the Eurostat database. For the majority of the countries, Eurostat reports higher trip rates. Nevertheless the relative ranking among countries is fairly consistent (with the exception of Greece). Due to its completeness concerning the coverage of the European countries, the Eurostat database was selected as the most relevant data source for the subsequent development of a model of long-distance travel and the forecast of future long-distance mobility. Data from the National Travel Surveys was used for testing and validating the model.

The second part of the work presented here deals in general with trends influencing future long-distance mobility behaviour. These trends include among others economic growth, population growth, aging of population, changes in household structures, increasing access to cars. As a first step a brief review of existing literature concerning future long-distance travel demand was carried out. Three studies dealing explicitly with future long-distance travel could be identified. A study from Germany assumes that travel intensity of the German population will remain stable from 2010 to 2050 (Petermann et al., 2006) – implying that the most important driver is the change in population. A study from the UK dealing with the topic of high speed railways forecasts the number of long-distance trips by mode of transport made by UK residents in 2043 (HS2, 2011). Trip rates are predicted to increase between 26 % (car) and 87 % (air). In the framework of another study from the UK, a model of long-distance travel was built to estimate future demand for a range of different scenarios (ITC, 2010, Dargay, 2010). In the base case scenario passenger kilometres travelled are expected to increase between 2005 and 2030 in the range of 25 % (coach) to 126 % (air).



Source: (KITE, 2007) based on DATELINE survey, (Eurostat, 2011d), own calculation

Figure 0-1 Comparison of DATELINE and Eurostat trip rates for trips with an with overnight stay

The next step was the development of a set of national population cohort models and corresponding household composition models (based on system dynamics). These take the major drivers into account in order to quantify the impacts of likely trends regarding future long-distance transport demand. The model output does not include origin and destination information, but does include information regarding the demand for long-distance trips separated by age groups, household groups, and mode share trends for different distance classes. A description of the resulting model (LUNA - simulating the demand for Long-distance travel Using a Non-OD-matrix based Approach) is provided.

A first baseline scenario regarding economy, population and transport costs was defined[1]. Forecasts for important drivers of future long-distance travel demand were made for this baseline scenario and, where possible, compared with other forecasts. Finally the LUNA model was used to forecast long-distance travel demand for the baseline scenario in the EU27 countries plus Norway and Switzerland. The results of LUNA are reasonably close to the predictions made in other studies (Table 0-1 and Table 0-2). Under the current assumptions for the baseline scenario (economic growth, moderate increase in costs for car, coach and rail, declining costs for air, slightly increasing congestion, ageing society) long-distance travel is in general predicted to increase, with air transport predicted to grow at the highest rate. A significant decline in demand is forecast for the modes rail and coach for the longer distance bands (1,000 kilometres and more). A comparison of the demand forecasts by country shows significant differences between the different modes as well as between the different countries. Demand for air travel is increasing in all countries except Germany and Portugal. In these two countries the declining population outweighs the demand increasing effects of economic development and decreasing air fares. It can be concluded that the main drivers of long-distance holiday travel are population and economic trends. Nevertheless their effects are superimposed by the effects of travel times and travel costs. E.g. the relative widespread decline of rail and coach can be attributed to user costs, which are predicted to increase relative to the modes air and car. The mode coach is furthermore affected by the assumption of increasing congestion.

[1] It has to be mentioned that the baseline scenario might be subject to revisions and changes within the framework of the subsequent use of the model LUNA in WP7 Scenarios.

Table 0-1 Comparison of HS2 and LUNA forecasts for growth in UK passenger numbers

Mode	HS2 Ltd forecast (2008 – 2043)	LUNA forecast (2010-2050)
Car	+26%	+33%
Coach	n.a.	+12%
Rail	+61%	+14%
Air	+87%	+38%
Maritime	n.a.	+21%
Others	+68%	n.a.
Total	+36%	+32%

Source: (HS2, 2011), own calculations
n.a. = not available

Table 0-2 Comparison of ITC and LUNA forecasts for growth in UK passenger kilometres

Mode	ITC base case (2005 – 2030)	ITC low GDP growth (2005-2030)	LUNA forecast (2010-2030)
Population	+14%[1)]	+14%[1)]	+11%
GDP	+58%[1)]	+30%[1)]	+34%
Passenger kilometres travelled			
Car	+30%	+18%	+17%
Coach	+25%	+26%	-2%
Rail	+35%	-1%	+2%
Air	+126%	+45%	+18%
Maritime	n.a.	n.a.	+17%
Total	+34%	+18%	+17%

Source: (ITC, 2010), own calculations
n.a. = not available
1) 2009-2030

1 INTRODUCTION

The objective of the work presented in this deliverable is twofold:

- First, to get an overview of current country specific traveller behaviour and
- Second, to identify and quantify future mobility trends taking into account social and demographic trends as well as technological development.

In order to achieve the first objective an extensive data collection and data analysis exercise was carried out. The results of this exercise are presented in chapter 2 of this report. Chapter 2 starts with a description of the methodology, describes the findings from the three most relevant data sources and closes with a brief comparison. The findings form the basis for the subsequent step of forecasting future trends for long-distance travel.

The work carried out to reach the second objective is described in chapter 3. It starts with a brief review of existing literature on forecasting future long-distance travel demand. In the next step the development of the new System Dynamics based long-distance travel demand model LUNA (Simulating the demand for Long-distance travel Using a Non-OD-matrix based Approach) is described. A first baseline scenario regarding economy, population and transport costs was defined and forecasts for important drivers of future long-distance travel demand were made and, where possible, compared with forecasts from other sources. Finally LUNA was used to forecast long-distance travel demand for the baseline scenario in the EU27 countries[2] plus Norway and Switzerland. These forecasts were compared with the findings from the literature review.

The final chapter 4 summarises the findings and draws conclusions.

[2] A list of the EU27 countries and their respective country codes can be found in Appendix 1.

2 CURRENT PATTERN OF LONG-DISTANCE TRIP MAKING

The most relevant and complete data sources concerning long-distance travel are Eurostat tourism demand data, National Travel Surveys (NTS) and DATELINE survey data. These were studied in more detail and their relevant content is summarised in this section. Nevertheless, these data sources have different data contents and release dates (Table 2-1).

Table 2-1 Data source, release date and data basis

Data source	Release date	Data basis
Eurostat tourism demand data	continuous	Tourism
DATELINE	2001-2002	Long-distance travel
NTS	Differ by country	Travel behaviour

2.1 METHODOLOGY

Firstly data from the Eurostat database were collected. The Eurostat database provides tourism demand data on NUTS[3] 0 level. Simon Shepherd (ITS) and Jeremy Shires (ITS) supported the work in this Task. ITS also provided data of the DATELINE[4] project. In a next step data of national travel surveys (NTS), which were studied in the INTERCONNECT[5] project were collected. In this project 12 National Travel Surveys (NTS) were made available to the consortium. Christiane Bielefeld (TRI) was able to provide us with deliverable 2.1 of INNTERCONNECT. Moreover, ISIS provided information about the CLOSER, PASHMINA and TRANSVISIONS projects.

- CLOSER[6] reviewed past tends in short- and long-distance mobility.
- PASHMINA[7] treats the topic of evaluation of policies and modelling of post carbon societies.
- TRANSvisions[8], which was carried out in 2009, looked at a sustainable future for transport.

In addition, TUW asked ORIGAMI consortium partners for national data regarding long-distance travel that could not be found on desktop research. In order to obtain consistency of data TUW devised a template and disseminated it amongst the partners. Giovanna Giuffre (ISIS) completed the template for Italy and Michael Carreno (TRI) completed the template for UK. Furthermore, Monika Bak (UG) compiled a working paper with an overview of data sources on travel behaviour available in New Member States.

Apart from the Eurostat database, DATELINE survey data and National Travel Surveys (NTS) we used several sources from the national statistical offices. Table 2-2 lists all the national data sources which were deemed relevant for this deliverable. It is important to mention that not all data are available for the same year in each country. Most of the data sources are statistics about tourism data and hence cover only one aspect of long-distance travel.

[3] NUTS (Nomenclature des Unités Territoriales Statistiques) is a spatial delimitation of territorial units in the EU. NUTS 0 countries, NUTS 1 groups of states, NUTS 2 states and NUTS 3 groups of districts.
[4] DATELINE (Design and Application of a Travel Survey for European Long-distance Trips based on an International Network of Expertise); cgiserver.uni-mb.si/elmis/
[5] INTERCONNECT (INTERCONNECTion between short and long-distance transport networks); http://www.interconnect-project.eu/
[6] CLOSER (Connecting Long and Short distance networks for Efficient tRansport); http://www.closer-project.eu/
[7] PASHMINA (PAradigm SHifts Modelling and INnovative Approaches); http://www.pashmina-project.eu/
[8] TRANSvision http://www.mcrit.com/transvisions/

Table 2-2 Overview of the available NTS and tourism data sources

Country	Title	Source
Austria	Urlaubs- und Geschäftsreisen 2010	(Statistik Austria, 2010)
Belgium	Toerisme Reisonderzoek 2009	(Belgium Algemene Directie Statistiek en Economische Informatie, 2010)
Bulgaria	Trip of Bulgarian Residents in Abroad by Purpose and Visit by Country of Destination 2010	(Bulgaria National Statistical Institute, 2011)
Cyprus	Residents of Cyprus travelling abroad 2010	(Cyprus Ministry of Finance, 2011)
Czech Republic	Border Statistics 2005	(Czech Statistical Office, 2011)
Denmark	Danish Statistical Yearbook 2011	(Statistics Denmark, 2011)
Estonia	Travelling of Estonian Residents 2010	(Statistics Estonia, 2011)
Finland	National Travel Survey 2005	(Ministry of Transport and Communications Finland et al., 2006)
France	Evolution des volumes et carácteristiques des voyages à longue distance, Service d'estudes sur les transports, les routes et leur aménagements 2010	(Ministère de l'Ecologie du Développement durable des Transports et du Logement, 2010)
Germany	Mobilität in Deutschland 2008	(infas Institut für angewandte Sozialwissenschaft GmbH, 2010)
Greece	Number of Trips made by Greek residents 2009	(Hellenic Statistical Authority (EL.STAT.), 2011)
Hungary	Domestic tourist trips of the population 2009	(Hungarian Central Statistical Office, 2011)
Ireland	Household Travel Survey 2010	(Central Statistics Office Ireland, 2010)
Italy	Trips and holidays in Italy and abroad	(Istat, 2011)
Latvia	Available tables on Tourism	(Latvijas Statistika, 2011)
Lithuania	Flows of Visitors 2010	(Statistics Lithuania, 2011)
Luxembourg	STATECLuxembourg	(STATEC Luxembourg, 2010)
Malta	Transport statistics 2010	(National Statistics Office Malta, 2010)
Netherlands	Central Bureau voor de Statistiek	(Central Bureau voor de Statistiek, 2010)
Poland	Tourism in 2009	(CENTRAL STATISTICAL OFFICE, 2010)
Portugal	Estatísticas do Turismo 2010	(Instituto Nacional de Estatística, 2011)
Romania	Romanian Tourism - In Figures 2007	(National Institute of Statistics, 2011)
Slovenia	Rapid Reports, Tourism	(Statistical Office of the Republic of Slovenia, 2011)
Slovakia	Number of holidays, overnights and total tourism expenditures 2009	(Statistical Office of the Slovak Republic, 2011)
Spain	Movilia 2007	(Espana Ministerio de Fomento, 2007)
Sweden	RES 2005-2006 The National Travel Survey	(Swedish Institute for Transport and Communications Analysis (SIKA), 2007)
United Kingdom	National Travel Survey 2009	(Department for Transport, 2011)

2.2 EUROSTAT TOURISM DEMAND DATA

2.2.1 Introduction

This section summaries key trends of tourism data based on the Eurostat tourism demand database. Eurostat is the most consistent database; it comprises domestic and outbound tourism data (excluding day-trips) collected by EU member states. EU member states collect statistics on travel by residents aged 15 and older via household surveys. The Eurostat database is organised via a data navigation tree[9]. The data available from the Eurostat tourism demand database are:

- Number of tourists
- Number of tourism trips
- Number of tourism nights
- Expenditure on tourism trips

Tourism trip data are provided at NUTS 0 level. The following key statistics are included in the database:

- Number of trips - by month of departure - annual and quarterly data
- Number of trips - by length of stay - annual data
- Number of trips - by type of organisation of the trip - annual data
- Number of trips - by main mode of transport used - annual data
- Number of trips - by main mode of accommodation used - annual and quarterly data
- Number of trips - by sex - annual and quarterly data
- Number of trips - by age - annual data
- Number of trips (x1000)
- Number of trips - geographical breakdown - annual data

Table 2-3 Available long-distance travel data from Eurostat

Eurostat tourism demand data	**Number trips**		**Main mode of transport**
Length of stay	**1plus nights**	**4plus nights**	**4plus nights**
Trip purpose	• holiday • business	• holiday • visiting friends and relatives (VFR)	• holiday • VFR

Trips in the Eurostat database are categorised by duration of the trips (number of overnight stays) and not by distance. As it can be seen in Table 2-3 Eurostat distinguishes between overnight stays involving at least 1 night long (1plus nights) and stays involving at least 4 nights (4plus nights). Although these data do not give us exact information about the length of the trip, it can be assumed that stays of 4plus nights imply longer trip distances than stays of 1plus nights. These two categories of duration of the stay are subdivided by trip purpose; 1plus night trips are split into holiday and business trips while 4plus nights are slit into holiday and visiting friends and relatives" (VFR). Mode split data are available only for 4plus night trips (subdivided by the two different trip purposes, namely holiday and VFR).

Even though the Eurostat database is the most coherent database, there are some shortcomings concerning the data quality, especially in relation to the modelling needs of ORIGAMI.

- Concerning the long-distance trip information, the biggest lack in data concerns the distance travelled. Without this information it is impossible to calculate trip length distributions.

[9] http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database

- Tourism data provided on long-distance travel are just available on NUTS 0 level. Even on country level there are some data missing, for example Malta and Portugal. In general, the more detailed the spatial level is, the less data are available.

2.2.2 Definition of Tourism in the Tourism Demand Database

The definition of tourism and the purpose for a trip are precisely defined in the Domain: TOUR – Tourism paper of the Eurostat database (Eurostat):

- *Tourism is defined as activity of persons travelling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business and other purposes.*
- *Visitors are defined as people who stay at least one night in a collective or private accommodation in the place/country visited. Day trips data are not collected in this database.*
- *Number of trips are trips made by tourists, i.e. overnight trips.*
- *Domestic tourism comprises the activities of residents of a given country travelling to and staying in places only within that country but outside their usual environment.*
- *Outbound tourism comprises the activities of residents of a given country travelling to and staying in places outside that country and outside their usual environment.*

Each trip is designated by its main purpose (the one without which the trip would not have taken place). Holidays which include visiting friends and relatives are defined as holiday. The main purposes in the Eurostat data are the following:

- *Holiday*
- *Business*
- *Visiting friends and relatives (VFR)*

2.2.3 Number of Trips per Year

Holiday trips 1plus and 4plus nights

Table 2-4 shows that, in 2009, Germans were responsible for the highest absolute number of holiday trips (224.5 million trips), followed by French (202.3 million trips) and Spain (122.2 million trips).

Table 2-4 Absolute number of holiday trips and share of 4plus nights trips in 1plus nights trips (country and year)

Country/ 2009	Absolute number of all holiday						Share of 4plus nights in 1plus nights
	1plus nights trips			4plus nights trips			
	Total	Domestic trips	Outbound trips	Total	Domestic trips	Outbound trips	
Austria	17,196,056	9,018,161	8,177,895	9,284,498	3,314,700	5,969,799	54.0%
Belgium	10,674,364	2,894,175	7,780,189	7,021,946	1,058,133	5,963,812	65.8%
Bulgaria	7,861,455	7,101,352	760,103	2,993,001	2,464,654	528,347	38.1%
Cyprus	1,781,612	996,968	784,644	897,050	212,274	684,776	50.4%
Czech Republic	26,378,697	20,513,802	5,864,895	10,453,006	5,912,289	4,540,717	39.6%
Denmark	22,466,538	16,932,903	5,533,636	6,141,689	2,627,530	3,514,159	27.3%
Estonia	1,392,000	788,000	604,000	485,272	119,044	366,228	34.9%
Finland	30,203,000	25,245,000	4,959,000	7,315,000	4,998,000	2,317,000	24.2%
France	202,284,090	181,699,363	20,584,728	95,284,623	79,301,024	15,983,599	47.1%
Germany	224,495,892	152,172,440	72,323,451	105,907,126	47,790,318	58,116,808	47.2%
Greece	13,476,535	12,490,662	985,873	7,719,732	6,917,568	802,164	57.3%
Hungary	18,520,576	14,617,725	3,902,851	6,059,633	3,651,568	2,408,065	32.7%
Ireland	10,638,000	5,430,000	5,208,000	5,080,000	1,207,000	3,873,000	47.8%
Italy	80,798,686	66,278,076	14,520,611	39,349,359	28,600,869	10,748,490	48.7%
Latvia	4,152,450	3,342,895	809,555	832,373	317,875	514,498	20.0%
Lithuania	3,219,440	2,164,123	1,055,317	1,061,369	417,476	643,893	33.0%
Luxembourg	1,369,637	7,776	1,361,862	820,219	:	818,988	59.9%
Malta	:	:	172,432	:	:	140,618	:
Netherlands	29,637,000	14,075,000	15,562,000	19,078,000	6,702,000	12,376,000	64.4%
Poland	31,634,000	27,061,000	4,573,000	16,025,000	12,186,000	3,839,000	50.7%
Portugal	:	:	:	4,325,538	3,424,880	900,659	:
Romania	12,163,663	11,361,324	802,339	5,419,968	4,737,499	682,469	44.6%
Slovakia	6,061,597	3,425,775	2,635,822	4,346,998	2,066,909	2,280,089	71.7%
Slovenia	4,331,597	2,230,041	2,101,556	1,697,000	476,000	1,222,000	39.2%
Spain	122,166,790	113,783,185	8,383,602	39,567,101	33,582,835	5,984,272	32.4%
Sweden	36,474,000	27,873,000	8,602,000	12,393,000	6,661,000	5,732,000	34.0%
United Kingdom	118,492,726	72,726,130	:	69,060,262	30,005,212	39,055,050	58.3%

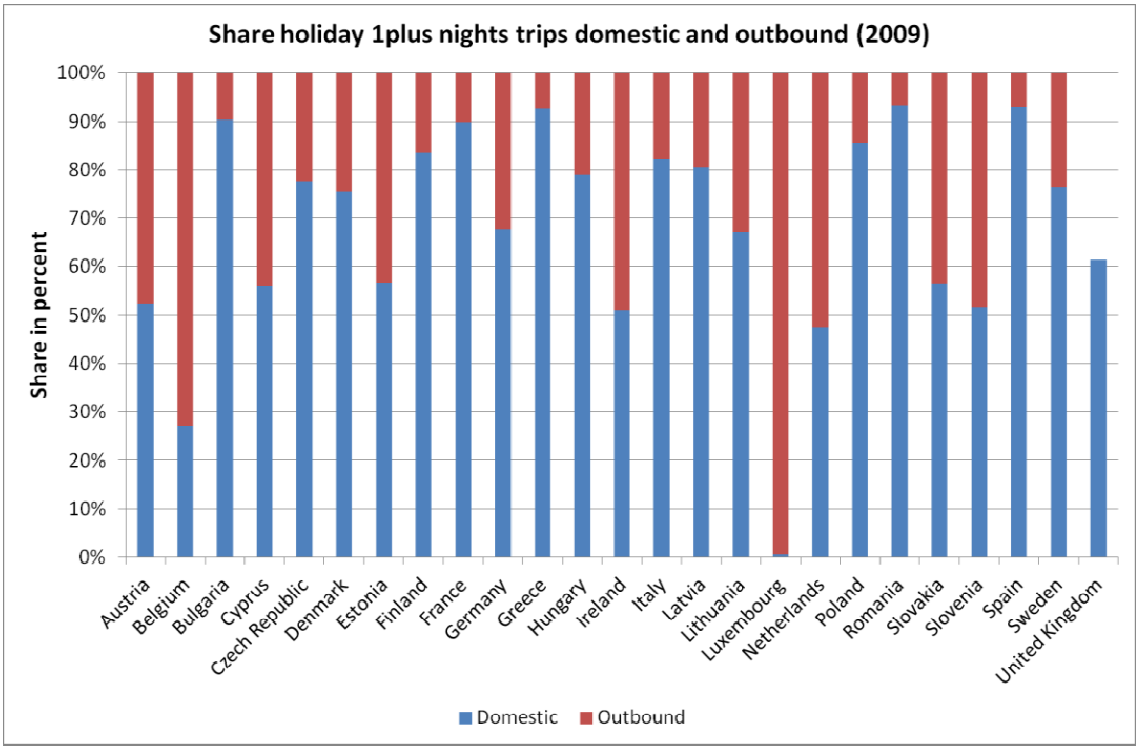
Source: (Eurostat, 2011d)
Note:":" data not available

For the holiday trips with duration of at least one night, the domestic share is highest in Romania (93.4%) and Spain (93.1%) followed by Greece (92.7%) and Bulgaria (90.3%). The outbound share is highest in Belgium and Luxembourg (unsurprisingly because they have such small territories). For trips with duration of at least four nights, the domestic share is highest in Spain (89.2%) and lowest. in small countries or islands. (Table 2-5, Figure 2-1 and Figure 2-2).

Table 2-5 Domestic and outbound percentage shares of holiday trips

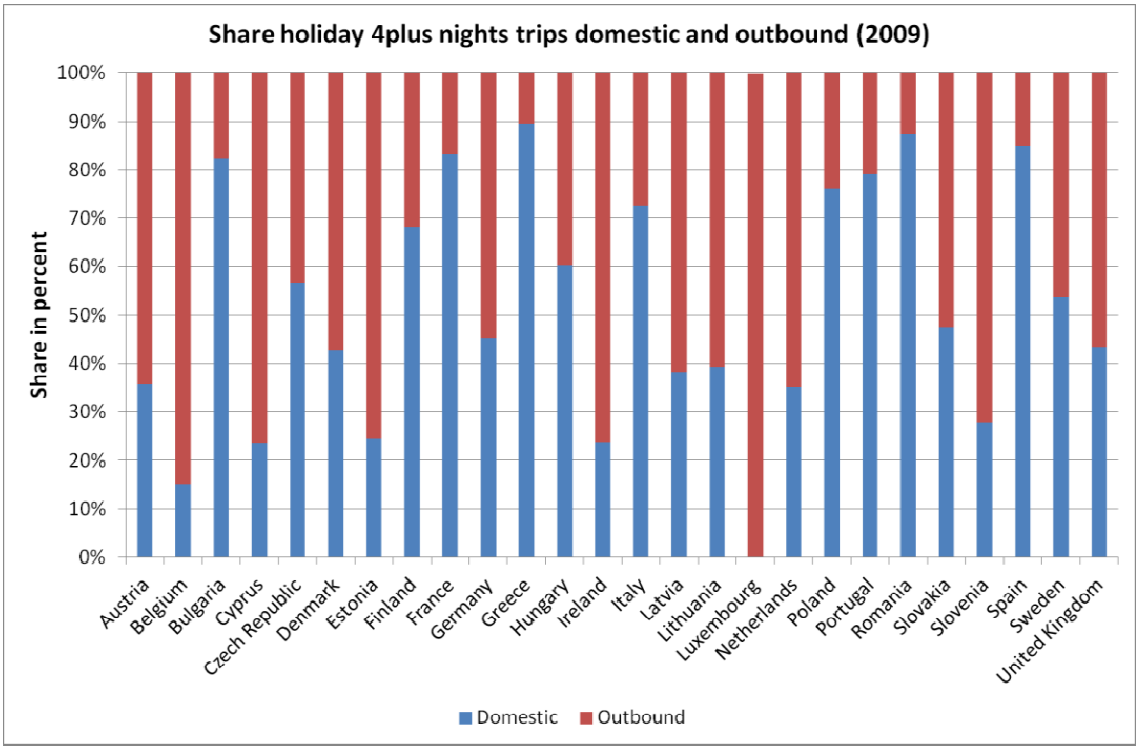
Country/2009	Shares of holiday 1plus night trips			Shares of holiday 4plus night trips		
	Total	domestic trips	outbound trips	Total	domestic trips	outbound trips
Austria	100	52.4	47.6	100	35.7	64.3
Belgium	100	27.1	72.9	100	15.1	84.9
Bulgaria	100	90.3	9.7	100	82.3	17.7
Cyprus	100	56.0	44.0	100	23.7	76.3
Czech Republic	100	77.8	22.2	100	56.6	43.4
Denmark	100	75.4	24.6	100	42.8	57.2
Estonia	100	56.6	43.4	100	24.5	75.5
Finland	100	83.6	16.4	100	68.3	31.7
France	100	89.8	10.2	100	83.2	16.8
Germany	100	67.8	32.2	100	45.1	54.9
Greece	100	92.7	7.3	100	89.6	10.4
Hungary	100	78.9	21.1	100	60.3	39.7
Ireland	100	51.0	49.0	100	23.8	76.2
Italy	100	82.0	18.0	100	72.7	27.3
Latvia	100	80.5	19.5	100	38.2	61.8
Lithuania	100	67.2	32.8	100	39.3	60.7
Luxembourg	100	0.6	99.4	100	0.2	99.8
Malta	:	:	:	:	:	:
Netherlands	100	47.5	52.5	100	35.1	64.9
Poland	100	85.5	14.5	100	76.0	24.0
Portugal	:	:	:	100	79.2	20.8
Romania	100	93.4	6.6	100	87.4	12.6
Slovakia	100	56.5	43.5	100	47.5	52.5
Slovenia	100	51.5	48.5	100	28.0	72.0
Spain	100	93.1	6.9	100	84.9	15.1
Sweden	100	76.4	23.6	100	53.7	46.3
United Kingdom	100	61.4	38.6	100	43.4	56.6

Source: (Eurostat, 2011d), own calculation
Note:":" data not available; Luxembourg: Eurostat data are inconsistent



Source: (Eurostat, 2011d), own calculation
Note: Malta, Portugal no data available; United Kingdom collect only domestic trips

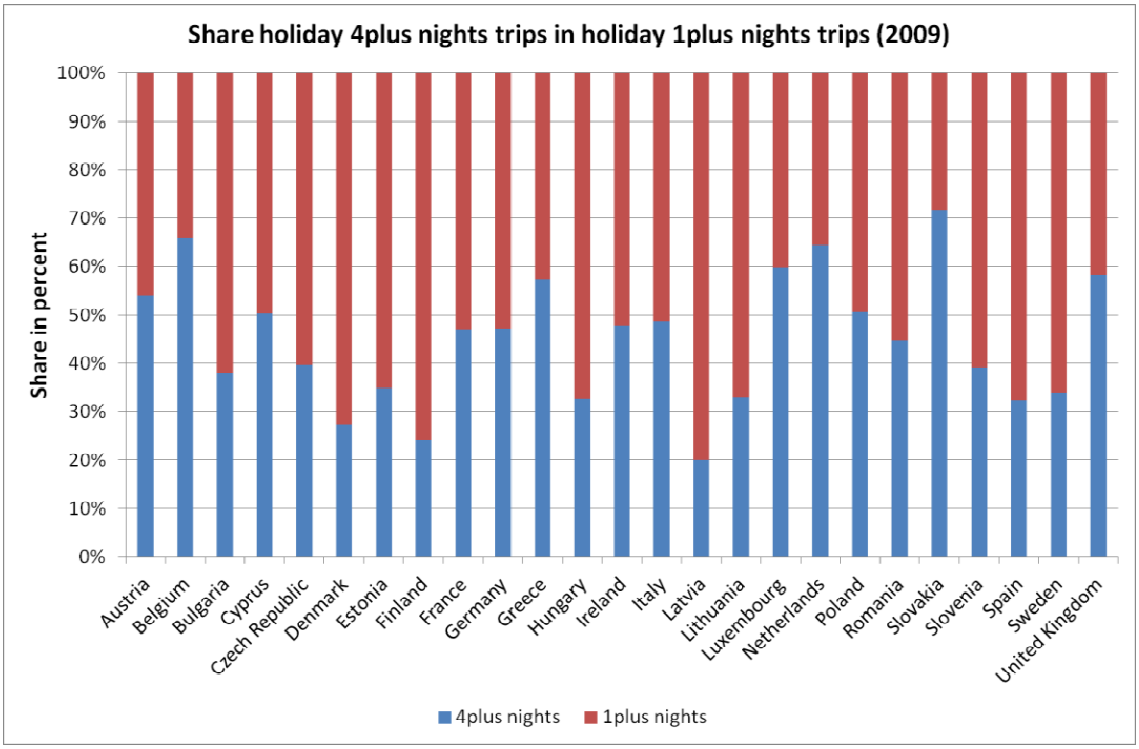
Figure 2-1 Domestic and outbound shares of holiday 1plus nights trips (2009)



Source: (Eurostat, 2011d), own calculation
Note: Malta no data available; Luxembourg collect only outbound trips

Figure 2-2 Domestic and outbound share of holiday 4plus nights trips (2009)

Figure 2-3 reveals that the long (4plus nights) share of holidays is highest in Slovakia (71.7%), Belgium (65.8%) and Netherlands (64.4%) and lowest in Latvia (20.0%).



Source: (Eurostat, 2011d), own calculation
Note: Malta, Portugal no data available

Figure 2-3 4plus nights share of 1plus nights holiday trips (2009)

Visits to relatives and friends (VFR) trips 4plus nights

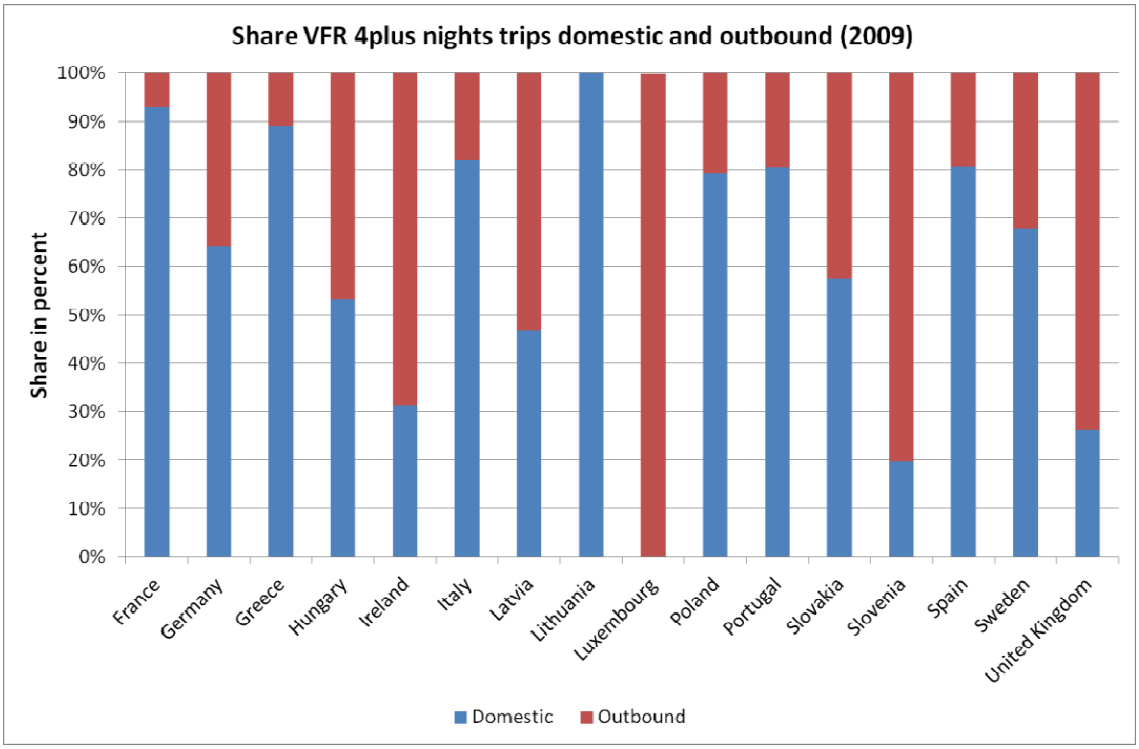
For those countries for which data exists, French residents (39.7 million trips) do the highest number of trips to visit friends and relatives, followed by Germany (27.0 million trips) and United Kingdom (12.2 million trips) (Table 2-6).

Table 2-6 Absolute number and percentage share of visits to relatives and friends trips 4plus nights trips

Country/2009	Absolute number			Percentage share		
	Total	Domestic trips	Outbound trips	Total	Domestic trips	Outbound trips
Austria	:	:	:	:	:	:
Belgium	:	:	:	:	:	:
Bulgaria	:	:	:	:	:	:
Cyprus	:	:	:	:	:	:
Czech Republic	:	:	:	:	:	:
Denmark	:	:	:	:	:	:
Estonia	:	:	:	:	:	:
Finland	:	:	:	:	:	:
France	39,651,123	36,902,856	2,748,267	100	93.1	6.9
Germany	27,005,101	17,340,649	9,664,453	100	64.2	35.8
Greece	1,874,356	1,669,875	204,481	100	89.1	10.9
Hungary	1,691,392	900,021	791,371	100	53.2	46.8
Ireland	1,187,000	371,000	816,000	100	31.3	68.7
Italy	8,994,828	7,371,894	1,622,934	100	82.0	18.0
Latvia	514,740	241,369	273,371	100	46.9	53.1
Lithuania	153,151	153,151	:	100	100.0	:
Luxembourg	205,002	:	204,693	100	0.2	99.8
Malta	:	:	34,730	:	:	:
Netherlands	:	:	985,000	:	:	:
Poland	5,005,000	3,969,000	1,036,000	100	79.3	20.7
Portugal	1,189,044	957,583	231,461	100	80.5	19.5
Romania	:	:	:	:	:	:
Slovakia	1,008,190	579,634	428,556	100	57.5	42.5
Slovenia	229,000	45,000	184,000	100	19.7	80.3
Spain	8,488,134	6,853,215	1,634,919	100	80.7	19.3
Sweden	4,692,000	3,186,000	1,506,000	100	67.9	32.1
United Kingdom	12,208,983	3,240,347	8,968,636	100	26.5	73.5

Source: (Eurostat, 2011d)
Note:":" data not available

Figure 2-4 shows that the domestic share of VFR trips is highest in France (93.1%) and lowest in Slovenia (19.7%).



Source: (Eurostat, 2011d), own calculation Note: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, Malta, Netherlands, Romania data not available; Lithuania collect only domestic trips and Luxembourg only outbound trips

Figure 2-4 Domestic and outbound shares of visits to relatives and friends 4plus nights (2009)

Business trips 1plus nights

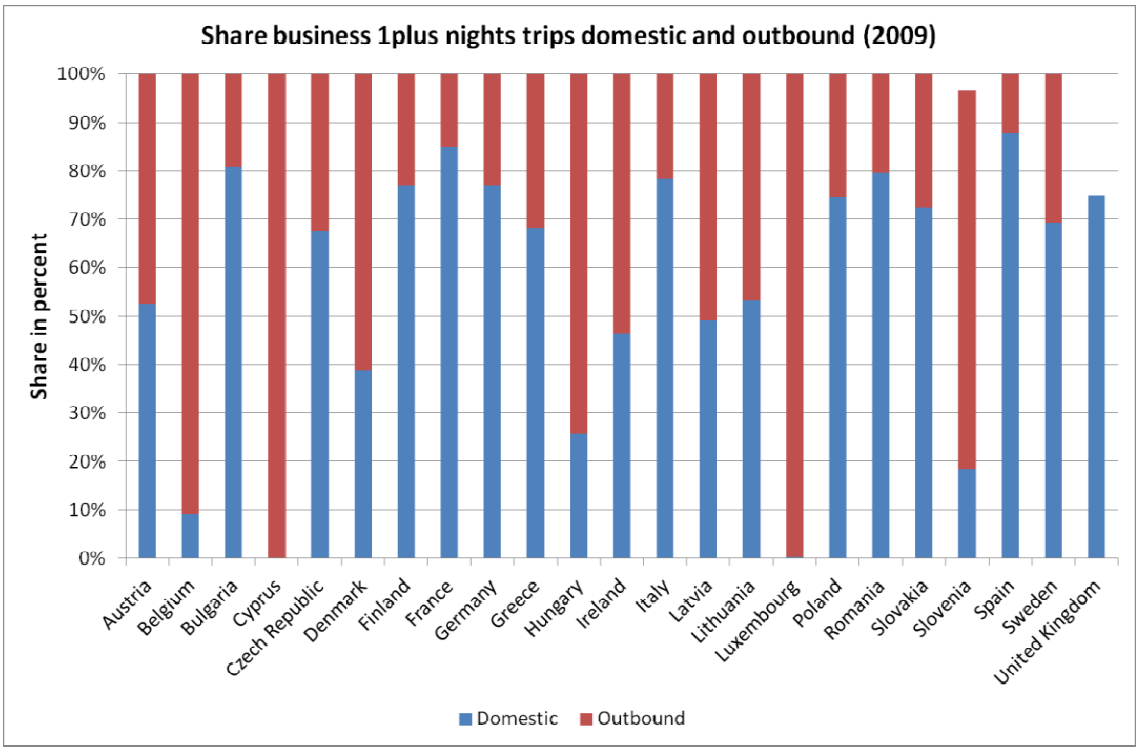
German residents (58.8 million trips) do the highest number of business trips, followed by Spanish residents (25.8 million trips) and United Kingdom residents (24.9 million trips) (Table 2-7).

Table 2-7 Absolute number and percentage share of Business trips 1plus nights

Country/2009	Absolute number			Percentage share		
	Total	Domestic trips	Outbound trips	Total	Domestic trips	Outbound trips
Austria	4,096,627	2,153,491	1,943,136	100	52.6	47.4
Belgium	1,204,584	110,021	1,094,563	100	9.1	90.9
Bulgaria	634,192	512,265	121,927	100	80.8	19.2
Cyprus	239,198	:	239,198	100	:	100.0
Czech Republic	2,326,871	1,573,829	753,044	100	67.6	32.4
Denmark	2,288,425	886,836	1,401,589	100	38.8	61.2
Estonia	:	:	150,000	:	:	:
Finland	4,161,000	3,210,000	951,000	100	77.1	22.9
France	24,920,105	21,144,806	3,775,299	100	84.9	15.1
Germany	57,991,075	44,767,620	13,223,455	100	77.2	22.8
Greece	880,343	599,995	280,348	100	68.2	31.8
Hungary	878,692	225,289	653,403	100	25.6	74.4
Ireland	1,115,000	518,000	598,000	100	46.5	53.6
Italy	15,421,782	12,087,110	3,334,673	100	78.4	21.6
Latvia	520,023	255,586	264,437	100	49.1	50.9
Lithuania	499,602	266,503	233,099	100	53.3	46.7
Luxembourg	323,798	595	323,203	100	0.2	99.8
Malta	:	:	61,761	:	:	:
Netherlands	:	:	:	:	:	:
Poland	4,625,000	3,448,000	1,177,000	100	74.6	25.4
Portugal	:	:	:	:	:	:
Romania	363,393	289,310	74,083	100	79.6	20.4
Slovakia	2,164,316	1,569,927	594,389	100	72.5	27.5
Slovenia	618,313	114,459	483,855	97	18.5	78.3
Spain	25,776,284	22,650,088	3,126,196	100	87.9	12.1
Sweden	5,880,000	4,081,000	1,800,000	100	69.4	30.6
United Kingdom	24,852,343	18,579,442	:	100	74.8	25.2

Source: ((Eurostat, 2011d)
Note:":" data not available, Eurostat data are inconsistent for Slovenia

Figure 2-5 shows that the domestic share of business trips is highest in Spain (87.9%) and lowest in Belgium (9.1%).



Source: ((Eurostat, 2011d), own calculation
Note: Estonia, Malta, Netherlands, Portugal data not available; Cyprus collects only outbound and United Kingdom only domestic trips; Eurostat data are inconsistent for Slovenia

Figure 2-5 Domestic and outbound shares of business trips of 1plus nights (2009)

Holiday trips by age group 4plus nights

Germans have the highest number of holiday trips of 4plus nights in the age groups 15 – 24 years (14.8 million trips), 45 – 64 years (34.2 million trips) and 65 years and over (25.6 million trips). France is leading in the age group 25 – 44 years (31.4 million trips) (Table 2-8).

Table 2-8 Absolute number of holidays of at least 4 nights trips by each age group

Country/2009	Total	15 - 24 years	25 - 44 years	45 - 64 years	65 years and over	Age not specified
Austria	:	:	:	:	:	:
Belgium	7,021,945	783,627	2,576,167	2,717,415	944,736	:
Bulgaria	:	:	:	:	:	:
Cyprus	897,050	131,609	404,948	288,956	67,011	4,526
Czech Republic	:	:	:	:	:	:
Denmark	6,141,688	1,079,773	2,100,255	2,081,100	880,560	:
Estonia	:	:	:	:	:	:
Finland	7,314,000	1,195,000	2,450,000	2,781,000	888,000	:
France	95,284,623	12,168,055	31,370,159	31,116,166	20,630,243	:
Germany	105,907,125	14,788,300	31,232,902	34,274,679	25,611,244	:
Greece	7,719,732	1,275,105	2,891,551	2,278,517	1,274,559	:
Hungary	6,059,633	781,652	2,267,496	2,238,728	771,757	:
Ireland	5,080,000	593,000	1,177,000	2,311,000	999,000	:
Italy	39,349,359	4,682,485	16,156,376	12,862,991	5,647,507	:
Latvia	832,373	166,877	359,677	214,980	90,839	:
Lithuania	1,061,369	196,605	520,265	268,408	76,091	:
Luxembourg	820,220	99,197	326,735	275,341	118,947	:
Malta	:	:	:	:	:	:
Netherlands	19,078,000	2,332,000	5,955,000	7,608,000	3,183,000	:
Poland	16,025,000	4,210,000	6,019,000	4,419,000	1,377,000	:
Portugal	4,325,538	583,149	1,621,948	1,397,508	722,933	:
Romania	:	:	:	:	:	:
Slovakia	4,346,997	753,782	1,905,347	1,347,485	340,383	:
Slovenia	1,698,000	333,000	639,000	547,000	179,000	:
Spain	39,567,104	10,526,499	13,104,259	10,728,485	5,207,861	:
Sweden	12,393,000	2,000,000	4,443,000	4,269,000	1,681,000	:
United Kingdom	69,060,263	6,536,823	25,989,496	24,507,531	11,318,766	707,647

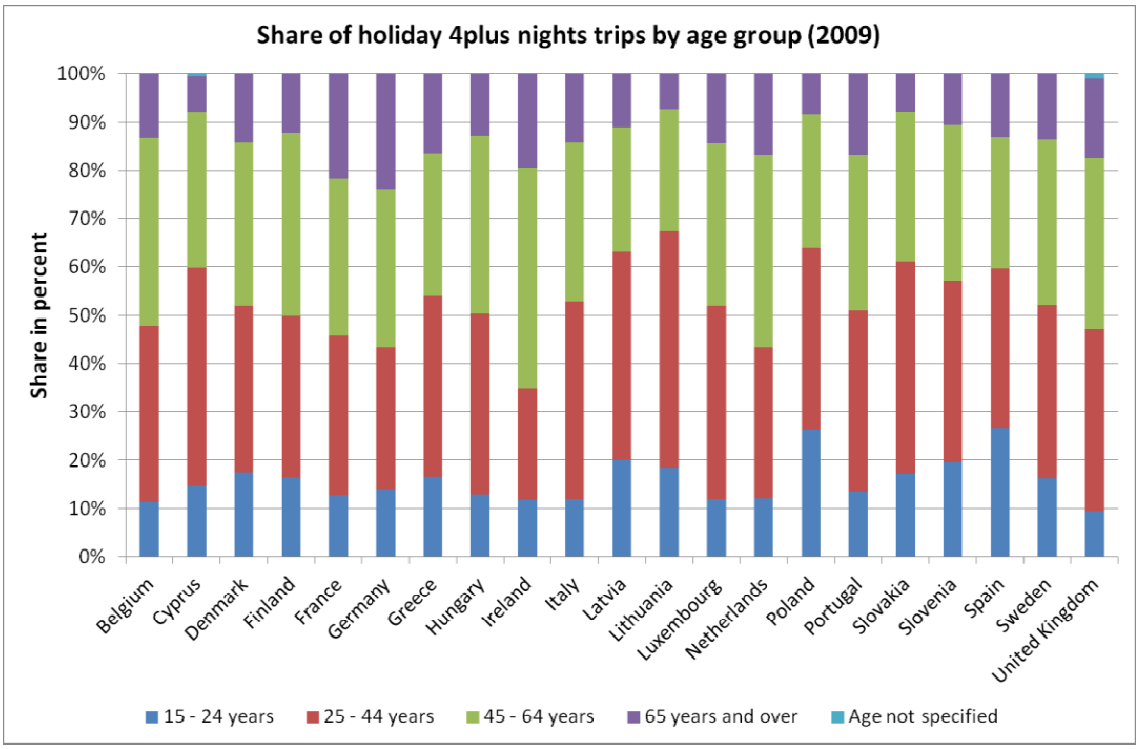
Source: (Eurostat, 2011d)
Note:":" data not available

Table 2-9 and Figure 2-6 reveal that age group 15–24 years has the highest share in Spain (26.6%), that age group 25–44 years has the highest share in Lithuania (49.0%), that age group 45 – 64 years has the highest share in Ireland (45.5%) and that age group 65 years and over has the highest share in Germany (24.2%).

Table 2-9 Percentage share of holidays of 4plus nights by each age group

Country/2009	Total	15 - 24 years	25 - 44 years	45 - 64 years	65 years and over	Age not specified
Austria	:	:	:	:	:	:
Belgium	100	11.2	36.7	38.7	13.5	:
Bulgaria	:	:	:	:	:	:
Cyprus	100	14.7	45.1	32.2	7.5	0.5
Czech Republic	:	:	:	:	:	:
Denmark	100	17.6	34.2	33.9	14.3	:
Estonia	:	:	:	:	:	:
Finland	100	16.3	33.5	38.0	12.1	:
France	100	12.8	32.9	32.7	21.7	:
Germany	100	14.0	29.5	32.4	24.2	:
Greece	100	16.5	37.5	29.5	16.5	:
Hungary	100	12.9	37.4	36.9	12.7	:
Ireland	100	11.7	23.2	45.5	19.7	:
Italy	100	11.9	41.1	32.7	14.4	:
Latvia	100	20.0	43.2	25.8	10.9	:
Lithuania	100	18.5	49.0	25.3	7.2	:
Luxembourg	100	12.1	39.8	33.6	14.5	:
Malta	:	:	:	:	:	:
Netherlands	100	12.2	31.2	39.9	16.7	:
Poland	100	26.3	37.6	27.6	8.6	:
Portugal	100	13.5	37.5	32.3	16.7	:
Romania	:	:	:	:	:	:
Slovakia	100	17.3	43.8	31.0	7.8	:
Slovenia	100	19.6	37.6	32.2	10.5	:
Spain	100	26.6	33.1	27.1	13.2	:
Sweden	100	16.1	35.9	34.4	13.6	:
United Kingdom	100	9.5	37.6	35.5	16.4	1.0

Source: (Eurostat, 2011d), own calculation
Note:":" data not available



Source: (Eurostat, 2011d), own calculation
Note: Austria, Bulgaria, Estonia, Malta, Romania data not available

Figure 2-6 Share of holiday 4plus nights trips by age group (2009)

2.2.4 Trip Rates

Trip rates (trips per person per year) are calculated by dividing the absolute trip numbers per year by the population over 15 years on country level. People 15 years and older are assumed to travel on their own.

Holiday trips 1plus and 4plus nights

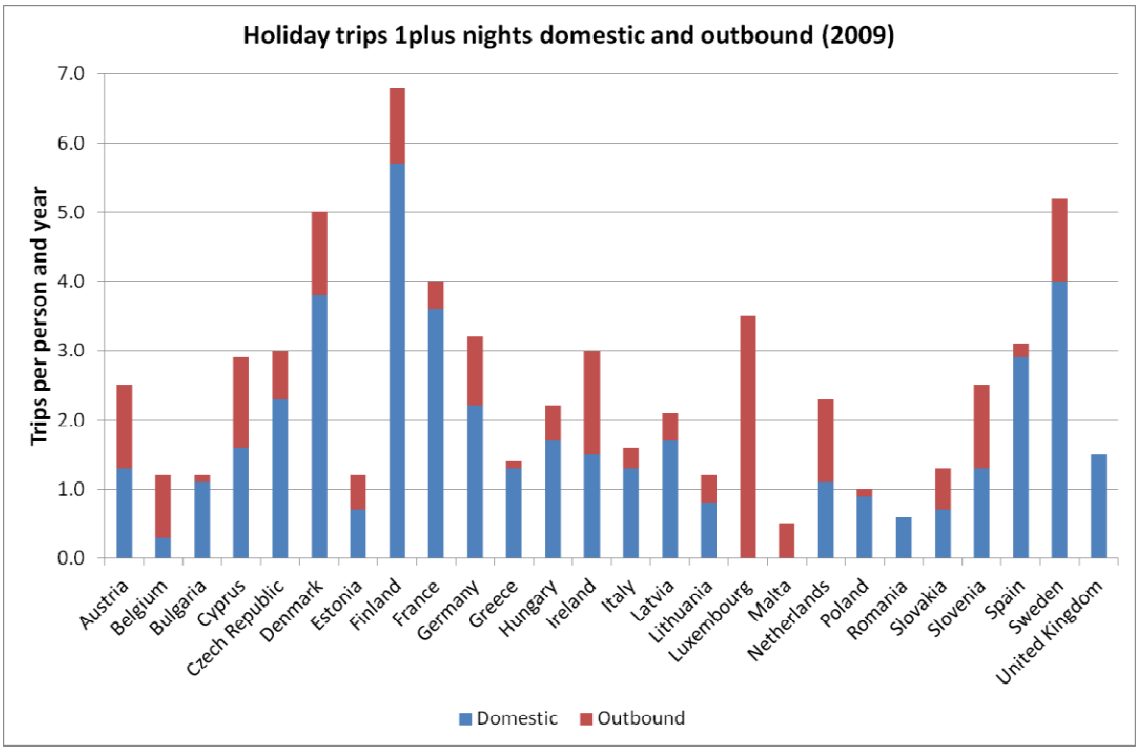
Table 2-10 shows that, in 2009, the number of holidays of 1plus night trips per capita was in Finland (6.8 trips). Finland also has the highest number of domestic 1plus nights trips per capita (5.7 trips) and Luxembourg residents have the highest number of outbound trips 1plus trips per capita (3.5 trips). The trip rate for holidays of 4plus nights follow a similar trend – with Luxembourg having the highest per capita trip rate (2.1 trips). The highest number of domestic trips per capita was reported in Finland (1.1 trips) and the highest number of outbound trips per capita in Luxemburg (2.1 trips).

Table 2-10 Per capita holiday trip rates, 1plus nights and 4plus nights (per person per year)

Country/2009	Trip rate for all holidays of 1plus nights			Trip rate for holidays of 4plus nights		
	Total	Domestic trips	Outbound trips	Total	Domestic trips	Outbound trips
Austria	2.5	1.3	1.2	1.4	0.5	0.9
Belgium	1.2	0.3	0.9	0.8	0.1	0.7
Bulgaria	1.2	1.1	0.1	0.5	0.4	0.1
Cyprus	2.9	1.6	1.3	1.4	0.3	1.1
Czech Republic	3.0	2.3	0.7	1.2	0.7	0.5
Denmark	5.0	3.8	1.2	1.4	0.6	0.8
Estonia	1.2	0.7	0.5	0.4	0.1	0.3
Finland	6.8	5.7	1.1	1.6	1.1	0.5
France	4.0	3.6	0.4	1.9	1.6	0.3
Germany	3.2	2.2	1.0	1.5	0.7	0.8
Greece	1.4	1.3	0.1	0.8	0.7	0.1
Hungary	2.2	1.7	0.5	0.7	0.4	0.3
Ireland	3.0	1.5	1.5	1.4	0.3	1.1
Italy	1.6	1.3	0.3	0.8	0.6	0.2
Latvia	2.1	1.7	0.4	0.5	0.2	0.3
Lithuania	1.2	0.8	0.4	0.3	0.1	0.2
Luxembourg	3.5	0.0	3.5	2.1	:	2.1
Malta	:	:	0.5	:	:	0.4
Netherlands	2.3	1.1	1.2	1.4	0.5	0.9
Poland	1.0	0.9	0.1	0.5	0.4	0.1
Portugal	:	:	:	0.5	0.4	0.1
Romania	0.6	0.6	0.0	0.3	0.3	0.0
Slovakia	1.3	0.7	0.6	1.0	0.5	0.5
Slovenia	2.5	1.3	1.2	1.0	0.3	0.7
Spain	3.1	2.9	0.2	1.1	0.9	0.2
Sweden	5.2	4.0	1.2	1.8	1.0	0.8
United Kingdom	2.4	1.5	:	1.4	0.6	0.8

Source: (Eurostat, 2011d), own calculation
Note:":" data not available

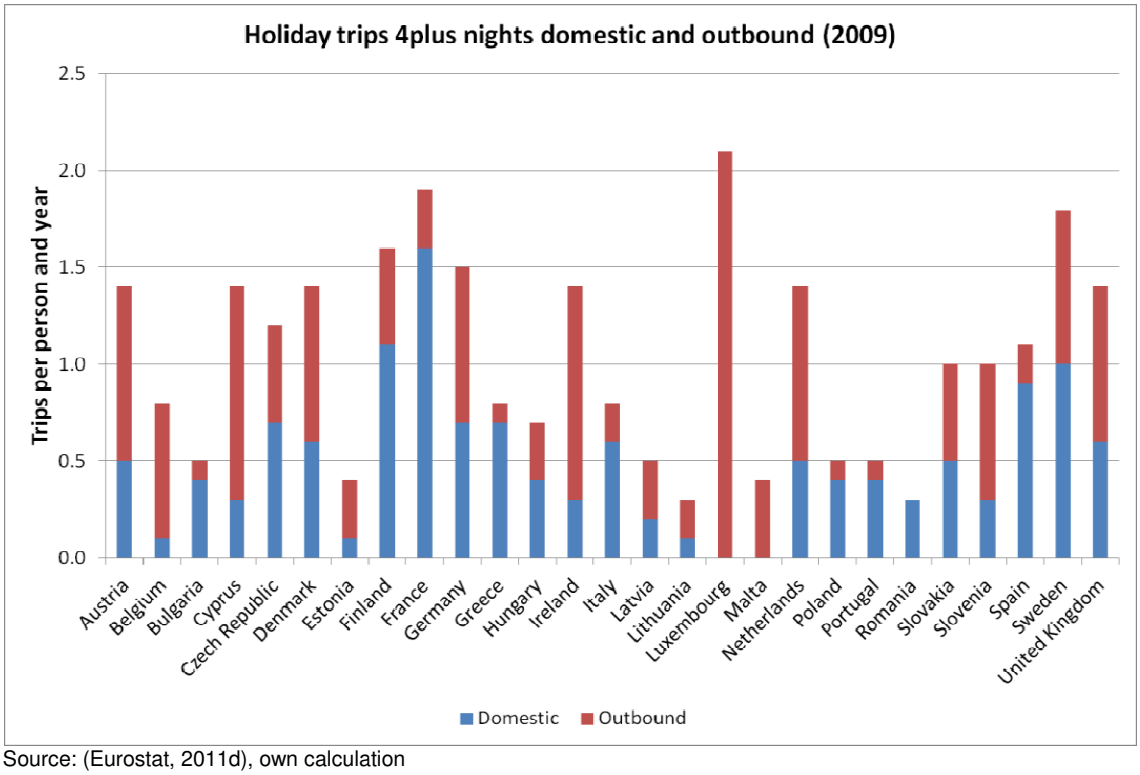
Scandinavian countries have much higher trip rates than the rest of Europe and most of their holiday trips are domestic. Other countries where the domestic share of short duration holiday trips is high are France, Spain, Czech Republic and Germany. The outbound share of holiday trips is highest in Luxembourg, which is reasonable due to the small size of the country. The shares for domestic and outbound trips are almost equal in Austria, Ireland the Netherlands and Slovenia (Figure 2-7).



Source: (Eurostat, 2011d), own calculation
Note: Portugal data not available

Figure 2-7 Per capita trip rate for holiday trips of 1plus nights, domestic and outbound (2009)

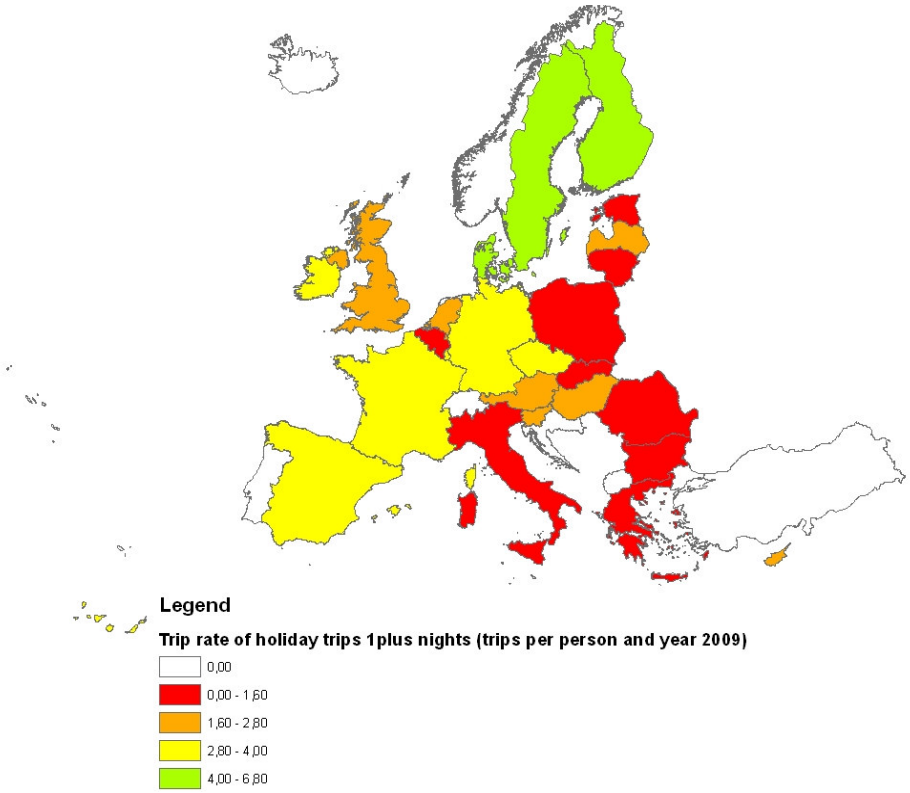
The per capita trip rate for holidays of 4plus nights is highest in Luxemburg (2.1 trips) and low in New Member States such as Romania (0.3 trips) and Lithuania (0.3 trips) (Figure 2-8).



Source: (Eurostat, 2011d), own calculation

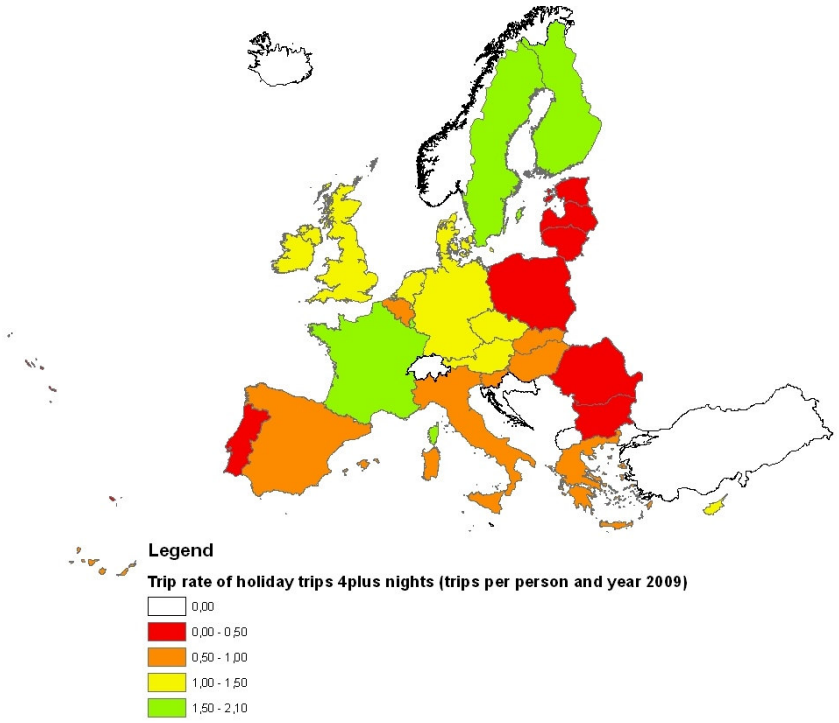
Figure 2-8 Per capita trip rate for holiday trips of 4plus nights, domestic and outbound (2009)

Figure 2-9 and Figure 2-10 show the spatial distribution of the holiday trip rates of the EU 27 member countries.



Source: (Eurostat, 2011d), own calculation
Note: Malta, Portugal data not available

Figure 2-9 Map of per capita trip rate for holidays of 1plus nights (2009)



Source: (Eurostat, 2011d), own calculation
Note: Malta data not available

Figure 2-10 Map of per capita trip rate for holidays of 4plus nights (2009)

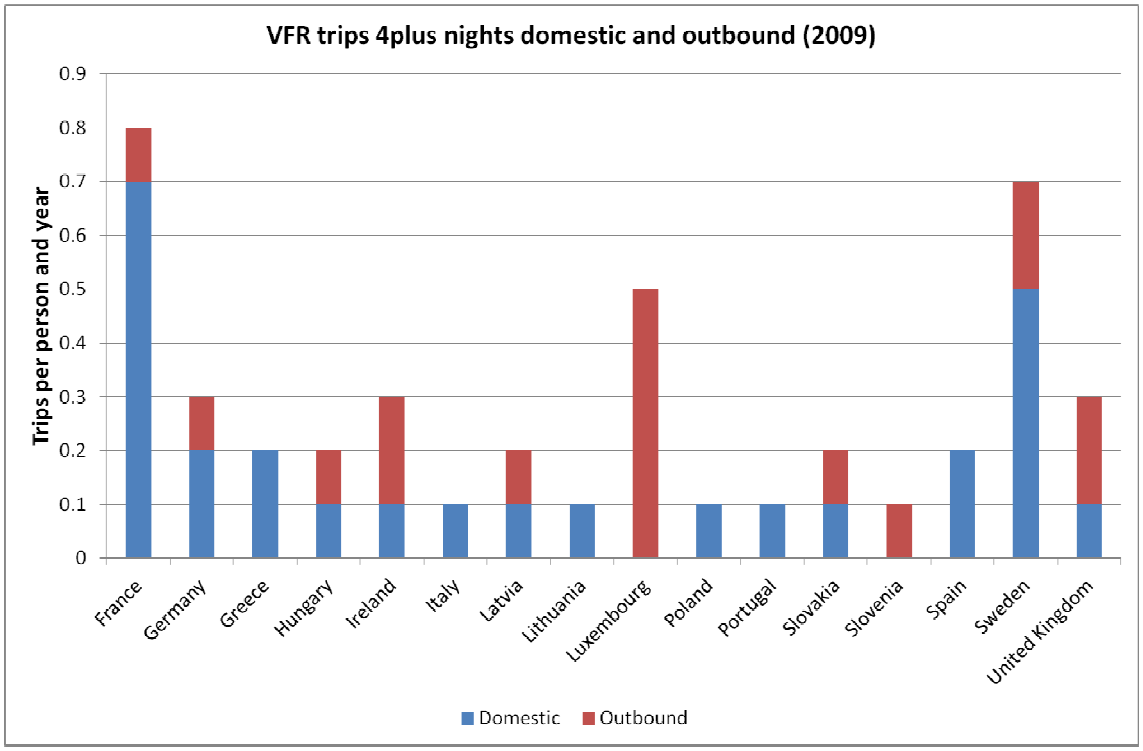
Visits to friends and relatives of 4plus nights

Concerning visits to friends and relatives lasting at least 4 nights, France has the highest per capita trip rate for total trips (0.8 trips) and for domestic trips (0.7 trips) while Luxembourg has the highest per capita trip rate for outbound trips (0.5 trips) (Table 2-11 and Figure 2-11).

Table 2-11 Per capita trip rate for 4plus night visits to friends and relatives (per person per year)

Country/2009	Total	Domestic trips	Outbound trips
Austria	:	:	:
Belgium	:	:	:
Bulgaria	:	:	:
Cyprus	:	:	:
Czech Republic	:	:	:
Denmark	:	:	:
Estonia	:	:	:
Finland	:	:	:
France	0.8	0.7	0.1
Germany	0.3	0.2	0.1
Greece	0.2	0.2	0.0
Hungary	0.2	0.1	0.1
Ireland	0.3	0.1	0.2
Italy	0.1	0.1	0.0
Latvia	0.2	0.1	0.1
Lithuania	0.1	0.1	:
Luxembourg	0.5	:	0.5
Malta	:	:	0.1
Netherlands	:	:	0.1
Poland	0.1	0.1	0.0
Portugal	0.1	0.1	0.0
Romania	:	:	:
Slovakia	0.2	0.1	0.1
Slovenia	0.1	0.0	0.1
Spain	0.2	0.2	0.0
Sweden	0.7	0.5	0.2
United Kingdom	0.3	0.1	0.2

Source: (Eurostat, 2011d) own calculation
Note:":" data not available



Source: (Eurostat, 2011d), own calculation
Note: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, Malta, Netherlands, Romania data not available; Lithuania collect only domestic trips and Luxembourg only outbound trips

Figure 2-11 Trip rate of visiting friends and relatives trips 4plus nights domestic and outbound (2009)

Business trips 1plus nights

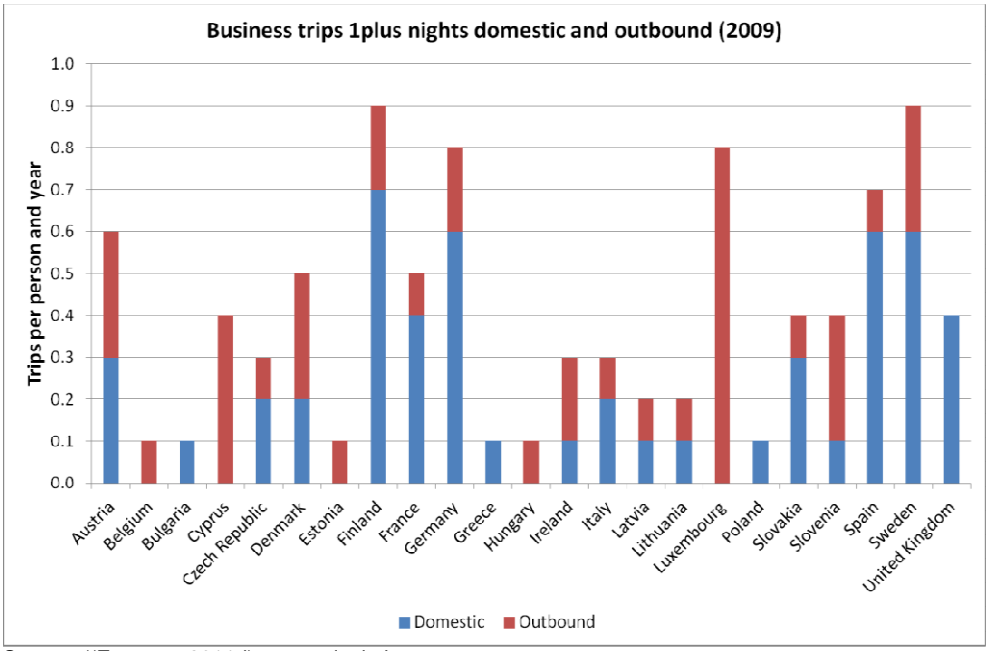
Table 2-12 and Figure 2-12 show, that Finland has the highest trip rates of total business trips (0.9 trips) and domestic business trips (0.7 trips). Luxembourg has the highest value for outbound trips (0.8 trips).

Table 2-12 Per capita trip rate for business trips of 1plus nights (per person per year)

Country/2009	Total	Domestic trips	Outbound trips
Austria	0.6	0.3	0.3
Belgium	0.1	0.0	0.1
Bulgaria	0.1	0.1	0.0
Cyprus	0.4	:	0.4
Czech Republic	0.3	0.2	0.1
Denmark	0.5	0.2	0.3
Estonia	:	:	0.1
Finland	0.9	0.7	0.2
France	0.5	0.4	0.1
Germany	0.8	0.6	0.2
Greece	0.1	0.1	0.0
Hungary	0.1	0.0	0.1
Ireland	0.3	0.1	0.2
Italy	0.3	0.2	0.1

Latvia	0.2	0.1	0.1
Lithuania	0.2	0.1	0.1
Luxembourg	0.8	0.0	0.8
Malta	:	:	0.2
Netherlands	:	:	:
Poland	0.1	0.1	0.0
Portugal	:	:	:
Romania	0.0	0.0	0.0
Slovakia	0.4	0.3	0.1
Slovenia	0.4	0.1	0.3
Spain	0.7	0.6	0.1
Sweden	0.9	0.6	0.3
United Kingdom	0.4	0.4	:

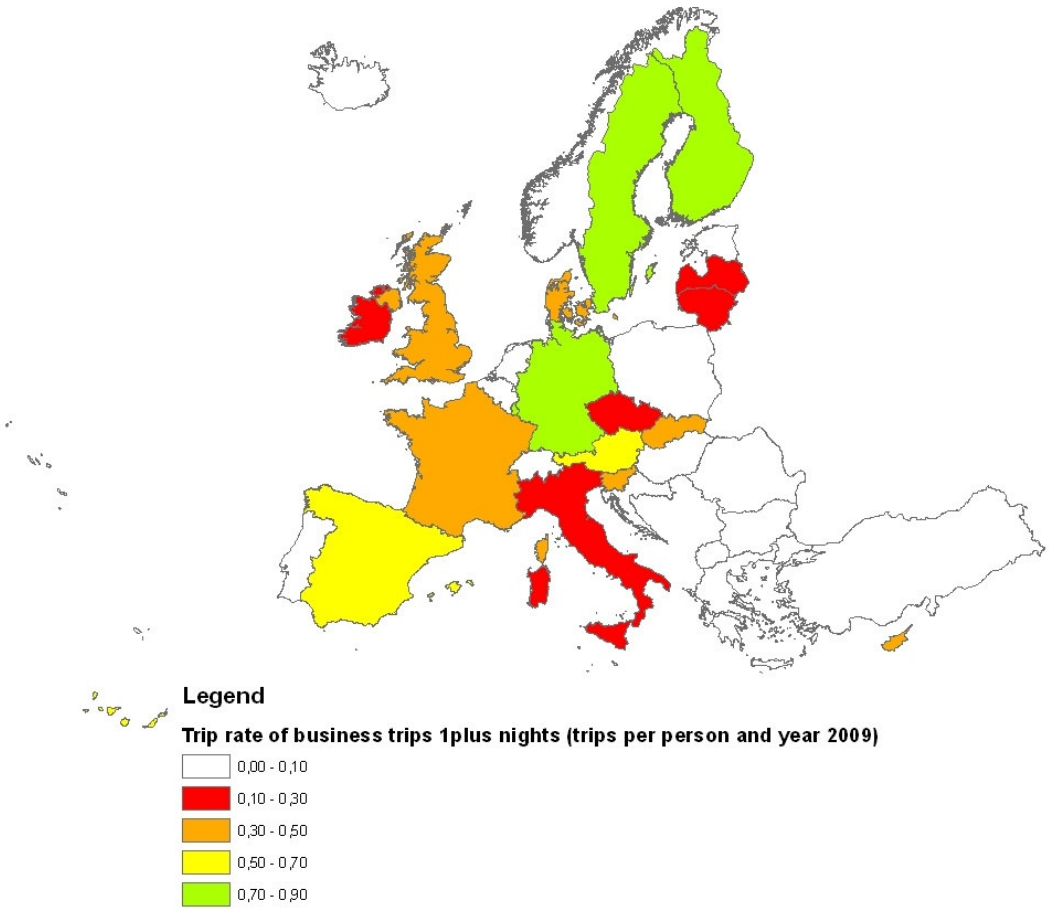
Source: (Eurostat, 2011d), own calculation
Note:":" data not available



Source: ((Eurostat, 2011d), own calculation
Note: Estonia, Malta, Netherlands, Portugal data not available; Cyprus collects only outbound and United Kingdom only domestic trips

Figure 2-12 Per capita trip rate for business trips of 1plus nights, domestic and outbound (2009)

Figure 2-13 shows the spatial distribution of the per capita trip rate for business trips of at least one night's duration for the EU 27 member countries.



Source: (Eurostat, 2011d) own calculation
Note: Estonia, Malta, Netherlands, Portugal data not available

Figure 2-13 Map of per capita trip rates for business trips of 1plus nights (2009)

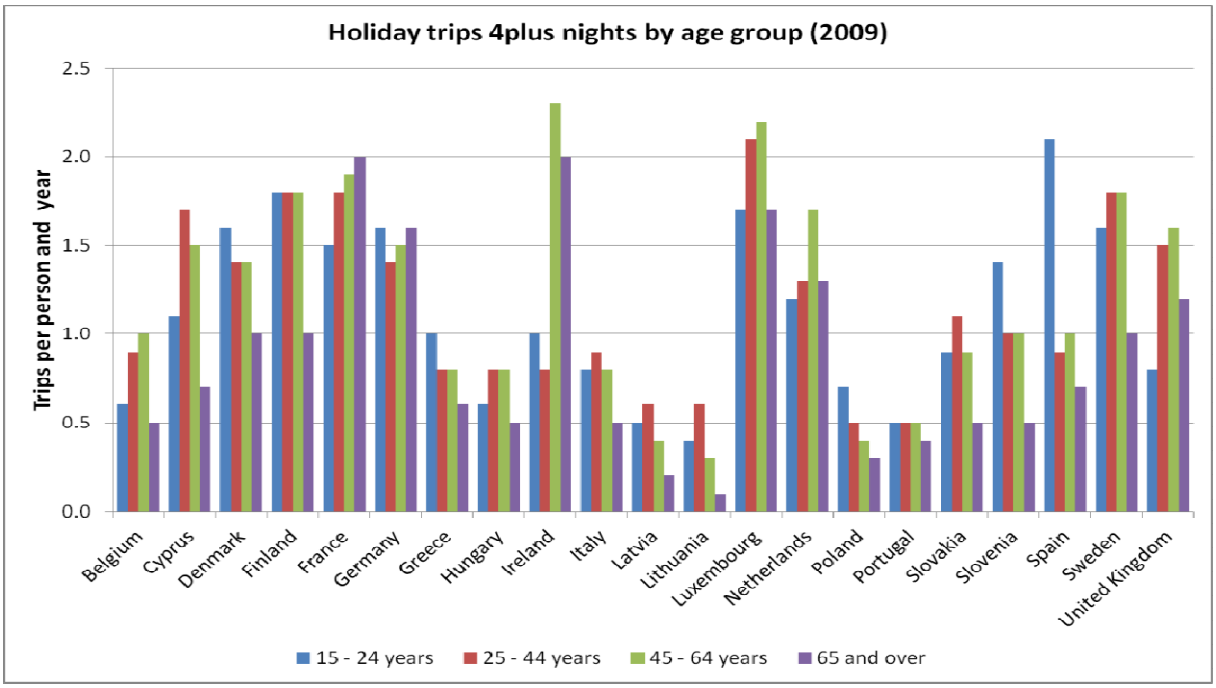
Holiday trips by age group 4plus nights

Concerning holidays of at least 4 nights duration; among people in of the age group 15–24 years, Spain has the highest per capita trip rate (2.1 trips). For the age group 25–44 years, Luxembourg has the highest per capita trip rate (2.1 trips). Among those aged 45-64, Ireland has the highest per capita trip rate (2.3 trips). Among those aged 65 and over, the highest per capita trip rates are found in Ireland and in France (both 2.0 trips) (Table 2-13 and Figure 2-14).

Table 2-13 Per capita trip rate for holidays of 4plus nights by age group (per person per year)

Country/2009	15 - 24 years	25 - 44 years	45 - 64 years	65 years and over
Austria	:	:	:	:
Belgium	0.6	0.9	1.0	0.5
Bulgaria	:	:	:	:
Cyprus	1.1	1.7	1.5	0.7
Czech Republic	:	:	:	:
Denmark	1.6	1.4	1.4	1.0
Estonia	:	:	:	:
Finland	1.8	1.8	1.8	1.0
France	1.5	1.8	1.9	2.0
Germany	1.6	1.4	1.5	1.6
Greece	1.0	0.8	0.8	0.6
Hungary	0.6	0.8	0.8	0.5
Ireland	1.0	0.8	2.3	2.0
Italy	0.8	0.9	0.8	0.5
Latvia	0.5	0.6	0.4	0.2
Lithuania	0.4	0.6	0.3	0.1
Luxembourg	1.7	2.1	2.2	1.7
Malta	:	:	:	:
Netherlands	1.2	1.3	1.7	1.3
Poland	0.7	0.5	0.4	0.3
Portugal	0.5	0.5	0.5	0.4
Romania	:	:	:	:
Slovakia	0.9	1.1	0.9	0.5
Slovenia	1.4	1.0	1.0	0.5
Spain	2.1	0.9	1.0	0.7
Sweden	1.6	1.8	1.8	1.0
United Kingdom	0.8	1.5	1.6	1.2

Source: (Eurostat, 2011d), own calculation
Note:":" data not available



Source: (Eurostat, 2011d), own calculation
Note: Austria, Bulgaria, Czech Republic; Estonia, Malta, Romania data not available

Figure 2-14 Per capita trip rate for 4plus night holidays by age group (2009)

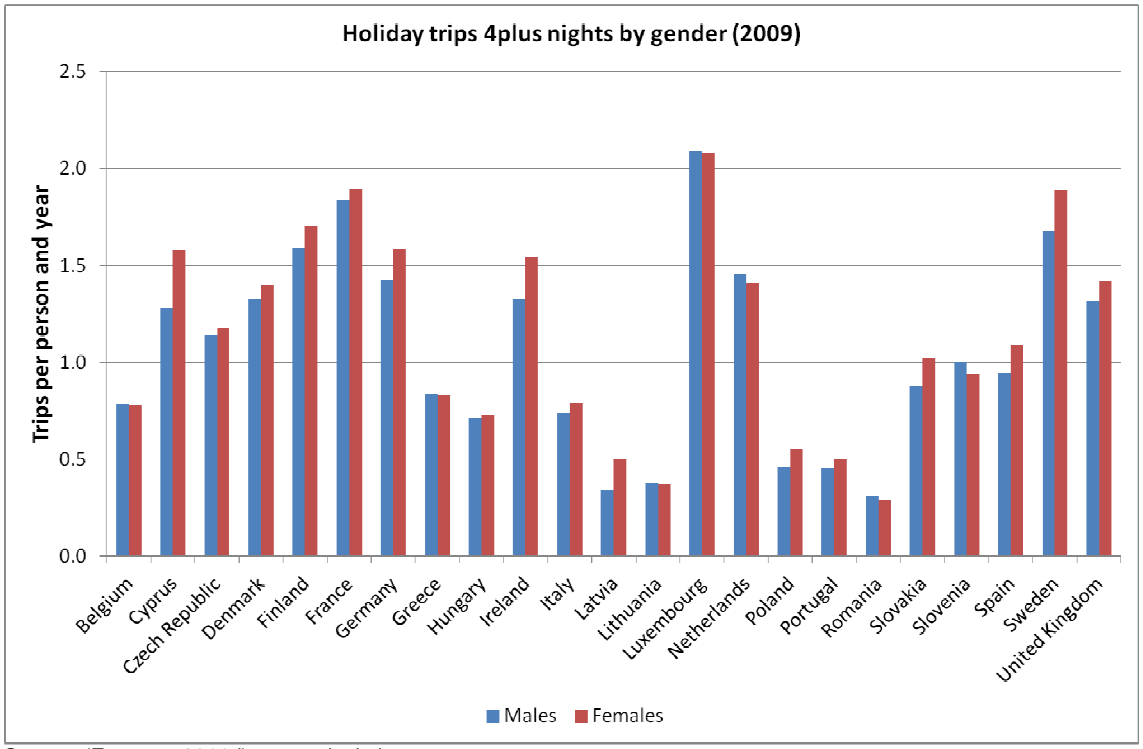
Holiday trips of 4plus nights by gender

Females have a slight higher trip rate than males. However, in Luxembourg, which has the highest trip rate for males and for females, the rate is the same (both 2.1) for males and for females (Table 2-14 and Figure 2-15).

Table 2-14 Trip rate for holidays of 4plus nights by each gender

Country/2009	Males 15 years or over	Females 15 years or over
Austria	:	:
Belgium	0.8	0.8
Bulgaria	:	:
Cyprus	1.3	1.6
Czech Republic	1.1	1.2
Denmark	1.3	1.4
Estonia	:	:
Finland	1.6	1.7
France	1.8	1.9
Germany	1.4	1.6
Greece	0.8	0.8
Hungary	0.7	0.7
Ireland	1.3	1.5
Italy	0.7	0.8
Latvia	0.3	0.5
Lithuania	0.4	0.4
Luxembourg	2.1	2.1
Malta	:	:
Netherlands	1.5	1.4
Poland	0.5	0.6
Portugal	0.5	0.5
Romania	0.3	0.3
Slovakia	0.9	1.0
Slovenia	1.0	0.9
Spain	0.9	1.1
Sweden	1.7	1.9
United Kingdom	1.3	1.4

Source: (Eurostat, 2011d)
Note:":" data not available



Source: (Eurostat, 2011d), own calculation
Note: Austria, Bulgaria, Estonia, Malta data not available

Figure 2-15 Trip rate by gender holiday 4plus nights (2009)

2.2.5 Modal Split

The report "The Domain: TOUR – Tourism"[10] provides a definition of the means of transport by the respondent; namely: *The principal mode of transport used is the means of transport used for the longest part of the trip*[11]. The modes include the following.

- *Air*
  - *Scheduled flight*
  - *Non –scheduled flight, including taxi flight*
  - *Other air transport*
  - *Rental of aircraft*
  - *Other*
- *Sea*
  - *Ferry on inland waterway*
  - *Ferry on sea or coast*
  - *Cruise or other passenger transport (water taxi, excursion, sightseeing) on inland waterway and on sea or coast*
  - *Other waterway transport: Rental of vessels, pleasure boat, including rowing boat and other*
- *Railway*
  - *High speed train, other interurban railway, urban railway, underground*
- *Bus, coach*
  - *Scheduled motor coach and urban and suburban buses, trolley buses and trams*
  - *Non-scheduled, rental of buses, touring and sightseeing*
- *Private and hired vehicles*
  - *Private vehicle: Cycle, moped, motorcycle, passenger car (excluding taxi and rented automobile) (including cars belonging to friends and relatives)*
  - *Vehicle rental: Rented automobile (excluding buses), taxi, other rented vehicle*

[10] http://epp.eurostat.ec.europa.eu/cache/ITY_SDDS/Annexes/tour_dem_esms_an1.pdf, Accessed: 31/01/2011
[11] No information is given whether this definition refers to the longest part in terms of time or distance.

- *Other*
  - *On foot, animal drawn vehicles and riding, funicular, cable cars and ski-lift transport*

Holiday trips 4plus nights

United Kingdom residents make the highest number of air trips (34.4 million trips) and sea trips (4.5 million trips). French residents make the highest number of railway trips (12.3 million trips) and private and hired vehicles trips (67.7 million trips), while Germany has the highest number of bus trips (7.1 million trips) (Table 2-15).

Table 2-15 Number of holiday trips 4plus nights by mode of transport

Country/2009	Total	Air	Sea	Railway	Bus/ Coach	Private & hired vehicles	Other	Not specified
Austria	9,284,498	2,667,225	27,547	723,364	660,399	5,059,273	146,691	:
Belgium	7,021,946	2,198,619	67,721	352,431	388,311	3,976,750	38,114	:
Bulgaria	2,993,001	313,573	:	184,198	723,221	1,763,540	8,469	:
Cyprus	897,050	:	:	:	:	:	:	:
Czech Republic	10,453,006	1,421,589	:	695,827	1,589,460	6,530,791	210,172	:
Denmark	6,141,689	2,205,454	136,628	486,746	278,651	3,003,751	25,656	4,803
Estonia	485,272	191,399	57,979	21,016	71,852	140,829	2,195	:
Finland	7,315,000	1,931,000	354,000	593,000	251,000	4,133,000	53,000	:
France	95,284,623	11,964,235	951,319	12,328,356	2,052,630	67,715,835	195,546	76,703
Germany	105,907,126	26,107,210	1,740,330	10,997,431	7,138,524	59,882,618	:	:
Greece	7,719,732	795,215	1,406,030	76,197	644,651	4,723,566	74,073	:
Hungary	6,059,633	887,620	3,298	558,137	392,980	4,200,086	17,512	:
Ireland	5,080,000	3,455,000	236,000	94,000	69,000	1,207,000	18,000	:
Italy	39,349,359	8,752,674	2,165,404	2,754,732	1,849,948	23,777,425	49,176	:
Latvia	832,373	383,315	10,561	67,979	162,040	205,644	2,834	:
Lithuania	1,061,369	306,899	11,855	45,612	114,893	579,898	2,212	:
Luxembourg	820,219	328,982	9,485	46,162	31,374	403,714	502	:
Malta	:	:	:	:	:	:	:	:
Netherlands	19,078,000	4,942,000	246,000	617,000	748,000	12,480,000	45,000	:
Poland	16,025,000	1,326,000	:	2,467,000	2,493,000	9,571,000	168,000	:
Portugal	4,325,538	811,879	55,269	89,032	245,673	3,122,283	1,403	:
Romania	5,419,968	:	:	:	:	:	:	:
Slovakia	4,346,998	852,520	:	488,422	906,475	2,079,544	20,036	:
Slovenia	1,697,000	195,000	24,000	34,000	99,000	1,345,000	:	:
Spain	39,567,101	7,315,569	831,163	2,878,607	5,578,623	22,794,127	163,904	:
Sweden	12,393,000	4,714,000	366,000	1,040,000	553,000	5,713,000	6,000	:
United Kingdom	69,060,262	34,446,361	4,485,800	3,817,382	2,223,154	23,424,318	289,456	373,790

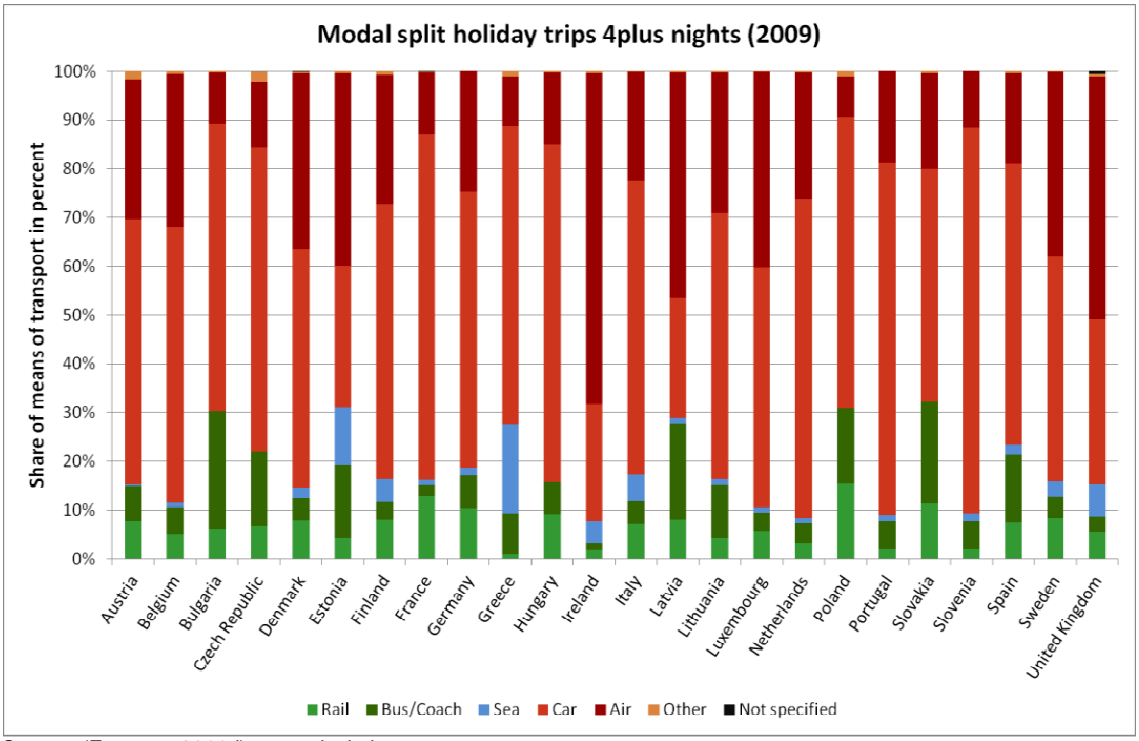
Source: (Eurostat, 2011d)
Note:":" data not available

Table 2-16 and Figure 2-16 show that Ireland is the country with the highest share of its trips by air (68%), that Greece has the highest share of its trips by sea (18%), that Poland has the highest share of its trips by rail (15%) and that Slovenia has the highest share of its trips by private and hired vehicles (79%).

Table 2-16 Percentage modal split for holiday trips of 4plus nights

Country/2009	Total	Air	Sea	Railway	Bus/Coach	Private and hired vehicles	Other	Transport mode not specified
Austria	100	28.7	0.3	7.8	7.1	54.5	1.6	:
Belgium	100	31.3	1.0	5.0	5.5	56.6	0.5	:
Bulgaria	100	10.5	:	6.2	24.2	58.9	0.3	:
Cyprus	:	:	:	:	:	:	:	:
Czech Republic	100	13.6	:	6.7	15.2	62.5	2.0	:
Denmark	100	35.9	2.2	7.9	4.5	48.9	0.4	0.1
Estonia	100	39.4	11.9	4.3	14.8	29.0	0.5	:
Finland	100	26.4	4.8	8.1	3.4	56.5	0.7	:
France	100	12.6	1.0	12.9	2.2	71.1	0.2	0.1
Germany	100	24.7	1.6	10.4	6.7	56.5	:	:
Greece	100	10.3	18.2	1.0	8.4	61.2	1.0	:
Hungary	100	14.6	0.1	9.2	6.5	69.3	0.3	:
Ireland	100	68.0	4.6	1.9	1.4	23.8	0.4	:
Italy	100	22.2	5.5	7.0	4.7	60.4	0.1	:
Latvia	100	46.1	1.3	8.2	19.5	24.7	0.3	:
Lithuania	100	28.9	1.1	4.3	10.8	54.6	0.2	:
Luxembourg	100	40.1	1.2	5.6	3.8	49.2	0.1	:
Malta	:	:	:	:	:	:	:	:
Netherlands	100	25.9	1.3	3.2	3.9	65.4	0.2	:
Poland	100	8.3	:	15.4	15.6	59.7	1.0	:
Portugal	100	18.8	1.3	2.1	5.7	72.2	0.0	:
Romania	:	:	:	:	:	:	:	:
Slovakia	100	19.6	:	11.2	20.9	47.8	0.5	:
Slovenia	100	11.5	1.4	2.0	5.8	79.3	:	:
Spain	100	18.5	2.1	7.3	14.1	57.6	0.4	:
Sweden	100	38.0	3.0	8.4	4.5	46.1	0.0	:
United Kingdom	100	49.9	6.5	5.5	3.2	33.9	0.4	0.5

Source: (Eurostat, 2011d) own calculation
Note:":" data not available



Source: (Eurostat, 2011d) own calculation
Note: Cyprus, Malta, Romania data not available

Figure 2-16 Modal split of holiday trips 4plus nights (2009)

Domestic holiday trips 4plus nights

The highest number of domestic holiday air trips was reported for Spain (3.2 million trips). Greece leads the number sea trips (1.4 million trips), France (11.5 million trips) the number of railway trips, Spain (5.3 million trips) the number of bus trips and France (63.8 million trips) the number of private and hired vehicles (Table 2-17).

Table 2-17 Number of domestic holiday trips 4plus nights by each means of transport

Country/2009	Total	Air	Sea	Railway	Bus/Coach	Private and hired vehicles	Other	Transport mode not specified
Austria	3,314,700	1,441	:	396,751	149,255	2,726,924	40,329	:
Belgium	1,058,134	:	:	91,256	24,087	935,733	7,057	:
Bulgaria	2,464,654	114,285	:	155,532	562,816	1,628,881	3,140	:
Cyprus	212,274	:	:	:	:	:	:	:
Czech Republic	5,912,289	:	:	571,090	657,633	4,514,150	166,126	:
Denmark	2,627,530	67,714	75,919	338,277	89,111	2,040,837	10,869	4,803
Estonia	119,044	:	:	:	29,936	78,912	:	:
Finland	4,998,000	125,000	98,000	553,000	205,000	3,976,000	43,000	:
France	79,301,024	2,077,240	529,866	11,497,782	1,126,798	63,824,064	170,721	74,553
Germany	47,790,318	781,303	:	9,041,517	2,775,343	35,052,330	:	:
Greece	6,917,568	326,857	1,370,210	76,197	543,767	4,530,744	69,793	:
Hungary	3,651,568	2,618	3,298	558,137	390,249	2,680,738	16,528	:
Ireland	1,207,000	21,000	10,000	68,000	50,000	1,045,000	12,000	:
Italy	28,600,869	2,164,518	1,328,779	2,438,760	1,281,399	21,357,376	30,037	:
Latvia	317,875	:	:	29,206	107,498	178,337	2,834	:
Lithuania	417,476	:	:	5,158	50,364	359,967	1,987	:
Luxembourg	:	:	:	:	:	:	:	:
Malta	:	:	:	:	:	:	:	:
Netherlands	6,702,000	:	86,000	284,000	53,000	6,248,000	31,000	:
Poland	12,186,000	12,000	:	2,398,000	1,390,000	8,276,000	110,000	:
Portugal	3,424,880	158,935	34,982	88,238	178,996	2,962,326	1,403	:
Romania	4,737,499	:	:	:	:	:	:	:
Slovakia	2,066,909	:	:	371,804	399,789	1,283,323	11,994	:
Slovenia	476,000	:	:	:	18,000	445,000	:	:
Spain	33,582,835	3,228,092	469,583	2,811,837	5,284,313	21,623,911	160,834	:
Sweden	6,661,000	274,000	195,000	949,000	345,000	4,892,000	6,000	:
United Kingdom	30,005,212	1,324,779	31,057	2,338,658	2,223,154	23,424,318	289,456	373,790

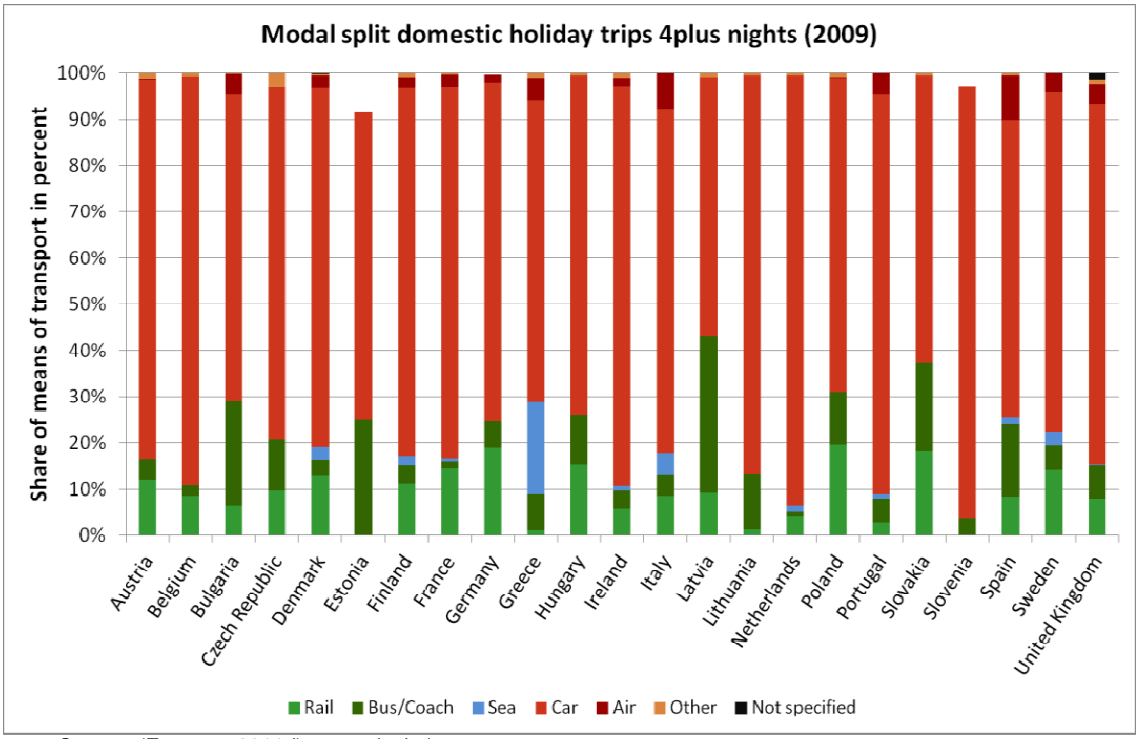
Source: (Eurostat, 2011d)
Note:":" data not available

For domestic holiday trips of at least four nights, Spain has the highest share of its trips by air (10%), Greece the highest share of its trips by sea (20%), Poland the highest share of its trips by rail (20%), Latvia the highest share of its trips by bus (34%) and Netherlands and Slovenia have the highest share of their trips by private and hired vehicles (both 93%) (Table 2-18 and Figure 2-17).

Table 2-18 Percentage modal split for domestic holiday trips of 4plus nights

Country/2009	Total	Air	Sea	Railway	Bus/Coach	Private and hired vehicles	Other	Transport mode not specified
Austria	100	0.0	:	12.0	4.5	82.3	1.2	:
Belgium	100	:	:	8.6	2.3	88.4	0.7	:
Bulgaria	100	4.6	:	6.3	22.8	66.1	0.1	:
Cyprus	:	:	:	:	:	:	:	:
Czech Republic	100	:	:	9.7	11.1	76.4	2.8	:
Denmark	100	2.6	2.9	12.9	3.4	77.7	0.4	0.2
Estonia	100	:	:	:	25.1	66.3	:	8.6
Finland	100	2.5	2.0	11.1	4.1	79.6	0.9	:
France	100	2.6	0.7	14.5	1.4	80.5	0.2	0.1
Germany	100	1.6	:	18.9	5.8	73.3	:	:
Greece	100	4.7	19.8	1.1	7.9	65.5	1.0	:
Hungary	100	0.1	0.1	15.3	10.7	73.4	0.5	:
Ireland	100	1.7	0.8	5.6	4.1	86.6	1.0	:
Italy	100	7.6	4.6	8.5	4.5	74.7	0.1	:
Latvia	100	:	:	9.2	33.8	56.1	0.9	:
Lithuania	100	:	:	1.2	12.1	86.2	0.5	:
Luxembourg	:	:	:	:	:	:	:	:
Malta	:	:	:	:	:	:	:	:
Netherlands	100	:	1.3	4.2	0.8	93.2	0.5	:
Poland	100	0.1	:	19.7	11.4	67.9	0.9	:
Portugal	100	4.6	1.0	2.6	5.2	86.5	0.0	:
Romania	:	:	:	:	:	:	:	:
Slovakia	100	:	:	18.0	19.3	62.1	0.6	:
Slovenia	100	:	:	:	3.8	93.5	:	2.7
Spain	100	9.6	1.4	8.4	15.7	64.4	0.5	:
Sweden	100	4.1	2.9	14.2	5.2	73.4	0.1	:
United Kingdom	100	4.4	0.1	7.8	7.4	78.1	1.0	1.2

Source: (Eurostat, 2011d) own calculation
Note: ":" data not available; Estonia, Slovenia: Eurostat data are inconsistent



Source: (Eurostat, 2011d) own calculation
Note: Cyprus, Luxembourg, Malta, Romania: data not available; Estonia, Slovenia: Eurostat data are inconsistent

Figure 2-17 Modal split of domestic holiday trips 4plus nights (2009)

Outbound holiday trips 4plus nights

Table 2-19 reveals that United Kingdom (33.1 million trips) has the highest number on outbound holiday air trips and sea trips (4.5 million trips). Germany leads the number of railway trips (2 million trips), bus trips (4.4 million trips) and private and hired vehicles trips (24.8 million trips).

Table 2-19 Number of outbound holiday trips of 4plus nights by each means of transport

Country/2009	Total	Air	Sea	Railway	Bus/Coach	Private and hired vehicles	Other	Transport mode not specified
Austria	5,969,799	2,665,784	27,547	326,613	511,143	2,332,349	106,362	:
Belgium	5,963,812	2,198,619	67,721	261,175	364,224	3,041,016	31,057	:
Bulgaria	528,347	199,288	:	28,666	160,405	134,659	5,329	:
Cyprus	684,776	:	:	:	:	:	:	:
Czech Republic	4,540,717	1,421,589	:	124,737	931,827	2,016,642	44,047	:
Denmark	3,514,159	2,137,740	60,709	148,469	189,540	962,914	14,787	0
Estonia	366,228	190,442	50,483	20,426	41,916	61,917	:	:
Finland	2,317,000	1,807,000	256,000	41,000	46,000	157,000	10,000	:
France	15,983,599	9,886,995	421,452	830,573	925,831	3,891,772	24,825	2,150
Germany	58,116,808	25,325,908	1,641,517	1,955,914	4,363,181	24,830,288	:	:
Greece	802,164	468,358	35,820	:	100,884	192,822	4,280	:
Hungary	2,408,065	885,002	:	:	2,731	1,519,348	984	:
Ireland	3,873,000	3,434,000	226,000	25,000	20,000	162,000	6,000	:
Italy	10,748,490	6,588,157	836,625	315,972	568,549	2,420,049	19,138	:
Latvia	514,498	383,315	10,561	38,773	54,542	27,307	:	:
Lithuania	643,893	306,899	11,855	40,454	64,529	219,931	:	:
Luxembourg	818,988	328,982	9,485	46,162	30,823	403,033	502	:
Malta	140,618	136,803	3,814	:	:	:	:	:
Netherlands	12,376,000	4,942,000	160,000	333,000	695,000	6,232,000	14,000	:
Poland	3,839,000	1,314,000	:	69,000	1,103,000	1,295,000	58,000	:
Portugal	900,659	652,944	20,287	794	66,676	159,957	:	:
Romania	682,469	:	:	:	:	:	:	:
Slovakia	2,280,089	852,520	:	116,618	506,686	796,222	8,043	:
Slovenia	1,222,000	195,000	24,000	21,000	81,000	900,000	:	:
Spain	5,984,272	4,087,482	361,583	:	294,312	1,170,221	:	:
Sweden	5,732,000	4,440,000	171,000	91,000	209,000	821,000	:	:
United Kingdom	39,055,050	33,121,582	4,454,743	1,478,724	:	:	:	:

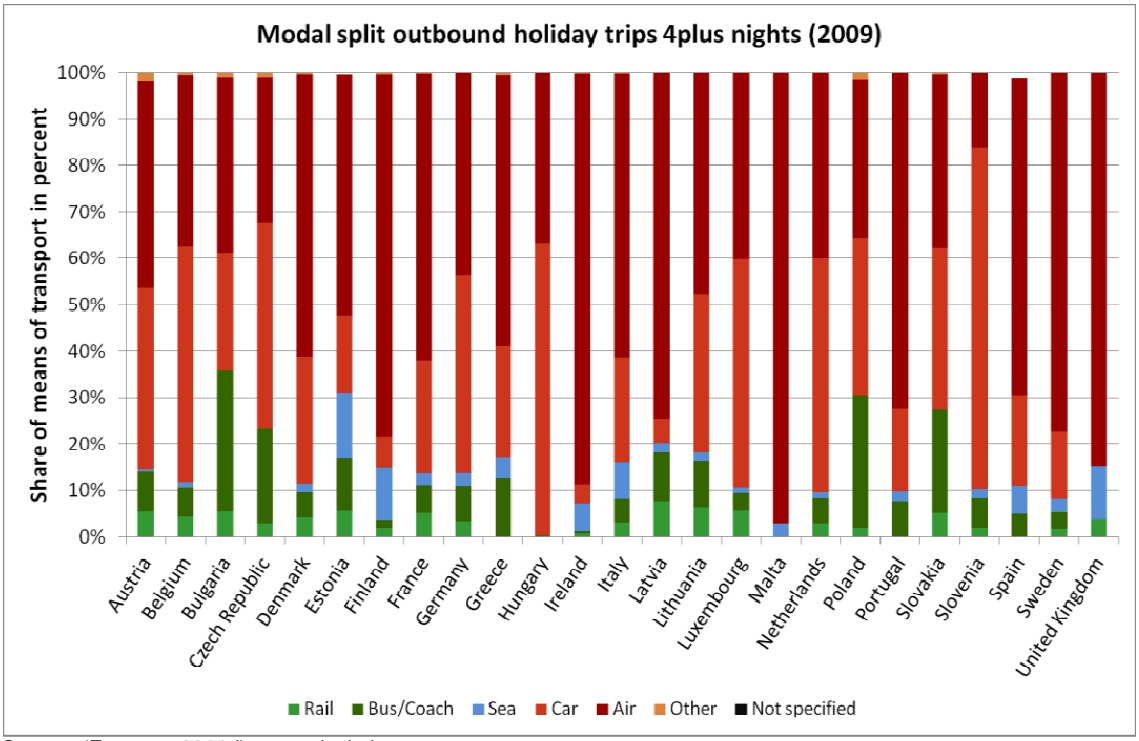
Source: (Eurostat, 2011d)
Note:":" data not available

For outbound holidays of at least four days duration, Malta has the highest share of its trips by air (97%), Estonia has the highest share of its trips by sea (14%), Latvia has the highest share of its trips by rail (8%), Bulgaria has the highest share of its trips by bus (30%) and Slovenia has the highest share of its trips by private and hired vehicles (74%) (Table 2-20 and Figure 2-18).

Table 2-20 Percentage modal split of outbound holiday trips of 4plus nights

Country/2009	Total	Air	Sea	Railway	Bus/Coach	Private and hired vehicles	Other	Transport mode not specified
Austria	100	44.7	0.5	5.5	8.6	39.1	1.8	:
Belgium	100	36.9	1.1	4.4	6.1	51.0	0.5	:
Bulgaria	100	37.7	:	5.4	30.4	25.5	1.0	:
Cyprus	:	:	:	:	:	:	:	:
Czech Republic	100	31.3	:	2.7	20.5	44.4	1.0	:
Denmark	100	60.8	1.7	4.2	5.4	27.4	0.4	0.0
Estonia	100	52.0	13.8	5.6	11.4	16.9	:	:
Finland	100	78.0	11.0	1.8	2.0	6.8	0.4	:
France	100	61.9	2.6	5.2	5.8	24.3	0.2	0.0
Germany	100	43.6	2.8	3.4	7.5	42.7	:	:
Greece	100	58.4	4.5	:	12.6	24.0	0.5	:
Hungary	100	36.8	:	:	0.1	63.1	0.0	:
Ireland	100	88.7	5.8	0.6	0.5	4.2	0.2	:
Italy	100	61.3	7.8	2.9	5.3	22.5	0.2	:
Latvia	100	74.5	2.1	7.5	10.6	5.3	:	:
Lithuania	100	47.7	1.8	6.3	10.0	34.2	:	:
Luxembourg	100	40.2	1.2	5.6	3.8	49.2	0.1	:
Malta	100	97.3	2.7	:	:	:	:	:
Netherlands	100	39.9	1.3	2.7	5.6	50.4	0.1	:
Poland	100	34.2	:	1.8	28.7	33.7	1.5	:
Portugal	100	72.5	2.3	0.1	7.4	17.8	:	:
Romania	:	:	:	:	:	:	:	:
Slovakia	100	37.4	:	5.1	22.2	34.9	0.4	:
Slovenia	100	16.0	2.0	1.7	6.6	73.6	:	:
Spain	100	68.3	6.0	:	4.9	19.6	:	1.2
Sweden	100	77.5	3.0	1.6	3.6	14.3	:	:
United Kingdom	100	84.8	11.4	3.8	:	:	:	:

Source: (Eurostat, 2011d)
Note:":" data not available; Spain: Eurostat data are inconsistent



Source: (Eurostat, 2011d) own calculation
Note: Cyprus, Romania: data not available; Spain: Eurostat data are inconsistent

Figure 2-18 Modal split of outbound holiday trips 4plus nights (2009)

2.3 NATIONAL TRAVEL SURVEYS (NTS)

This section focuses on modal split data for different distance bands.

In the case of Finland, the raw data of the NTS were available and the contained information concerning the following issues:

- Place of origin, place of destination, distance travelled;
- Time of departure, time of arrival, journey time;
- Means of transport;
- Journey purpose.

In contrast, French, German, Spanish, Swedish and UK data are processed data extracted from publications about their NTS. Comparison of data from different countries is difficult because each NTS uses different definitions of long-distance trips and different distance bands. Table 2-21 shows the NTS whose data are available for ORIGAMI, their survey date, their definition of long-distance trips and the reference sources.

Table 2-21 NTS data available to ORIGAMI

Country	Survey name	Survey date	Definition of long-distance trip	Source
Finland	The Finnish National Travel Survey 2004-05	2006	Trips over 100 km	(Ministry of Transport and Communications Finland et al., 2006)
France	French National Transport Survey (ENTD), *Evolution* des *volumes* et *caractéristiques* des *voyages* à *longue distance*	2007/2008	Trips over 80 km crow-fly distance, or at least one overnight stay, or destination is abroad	(Ministère de l'Ecologie du Développement durable des Transports et du Logement, 2010)
Germany	Mobilität in Deutschland 2008	2008	Overnight stay	(infas Institut für angewandte Sozialwissenschaft GmbH, 2010)
Spain	Movilia 2006/2007	2006/2007	Trips over 50 km	(Ministerio de Fomento, 2007)
Sweden	RES 2005 – 2006 The National Travel Survey	2005/2006	Trips over 100 km and trips over 300 km	(Swedish Institute for Transport and Communications Analysis (SIKA), 2007)
United Kingdom	National Travel Survey	2006/2009	Trips over 50 miles	(Department for Transport, 2011)

Table 2-22 to Table 2-27 and also Figure 2-19, show the modal splits for the different distance bands. Car dominates among the short distance bands. When travelling longer distances on the other hand, air has the highest shares. Furthermore it is noticeable that France has a high rail share in all distance bands below 3000 km.

Table 2-22 Percentage modal split per distance band (from Finnish NTS)

Finland	100 - 499 km	500 - 999 km	≥ 1,000 km
Car	80.4	45.5	7.8
Bus/Coach	8.0	6.6	2.5
Rail	7.5	14.9	1.9
Air	0.8	17.3	83.3
Sea	1.9	14.9	3.2
Other	1.4	0.8	1.3

Source: (Ministry of Transport and Communications Finland et al., 2006), own calculation

Table 2-23 Percentage modal split per distance band (from French NTS)

France	< 400 km	400 - 799 km	800 - 1,599 km	1,600 – 2,999 km	≥ 3,000 km
Car	85.5	74.4	68.2	54.3	19.5
Bus/Coach	1.8	2.7	2.8	3.4	5.0
Rail	11.1	21.3	23.1	23.8	3.3
Air	0.2	0.4	4.6	17.5	70.4
Sea	:	:	:	:	:
Other	1.4	1.2	1.3	1	1.8

Source: (Ministère de l'Ecologie du Développement durable des Transports et du Logement, 2010), own calculation
Note:":" data not available

Table 2-24 Percentage modal split per distance band (from German NTS)

Germany	< 249km	250 - 499 km	500 - 749 km	750 - 999 km	1,000 - 1,999	≥ 2,000 km
Car	73.0	71.0	57.0	53.0	31.0	3.0
Bus/Coach	2.0	4.0	6.0	9.0	8.0	1.0
Rail	22.0	22.0	26.0	16.0	7.0	1.0
Air	0.0	1.0	10.0	20.0	49.0	92.0
Sea	1.0	1.0	1.0	2.0	5.0	2.0
Other	2.0	1.0	1.0	1.0	1.0	1.0

Source: (infas Institut für angewandte Sozialwissenschaft GmbH, 2010)

Table 2-25 Percentage modal split per distance band (from Spanish NTS)

Spain	100 - 499 km	500 - 999 km	≥ 1,000 km
Car	78	45	3
Bus/Coach	10	9	2
Rail	6	7	1
Air	3	35	93
Sea	:	:	:
Other	2	4	2

Source: (Ministerio de Fomento, 2007), own calculation
Note:":" data not available

Table 2-26 Percentage modal split per distance band (from Swedish NTS)

Sweden	> 100 km
Car	68.0
Bus/Coach	7.0
Rail	11.0
Air	11.0
Sea	:
Other	3.0

Source: (Swedish Institute for Transport and Communications Analysis (SIKA), 2007), own calculation
Note:":" data not available

Table 2-27 Percentage modal split per distance bands (from Great Britain NTS)

United Kingdom	80.4 - 120.6 km	120.7 - 160.8 km	160.9 - 241.3 km	241.4 - 402.2 km	402.3 - 563.2 km	> 563.3 km
Car	83.0	83.0	82.0	77.0	69.0	40.0
Bus/Coach	3.0	4.0	5.0	6.0	8.0	4.0
Rail	12.0	11.0	12.0	15.0	16.0	9.0
Air	0.0	0.0	0.0	1.0	6.0	45.0
Sea	:	:	:	:	:	:
Other	1.0	2.0	1.0	1.0	1.0	2.0

Source: (Department for Transport, 2011), own calculation
Note:":" data not available

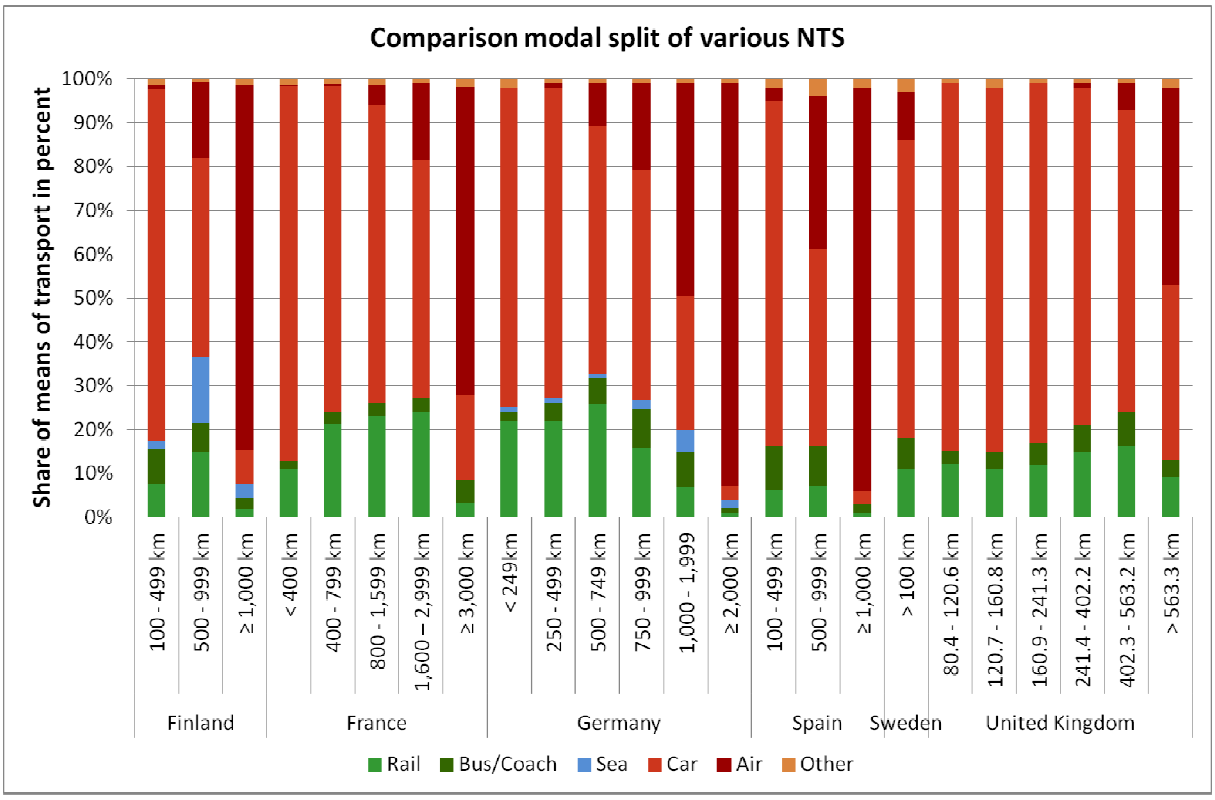


Figure 2-19 Comparison of modal split from various NTS

2.4 DATELINE

DATELINE (Design and Application of a Travel Survey for European Long-distance Trips based on an International Network of Expertise) is a household-level and person-level survey on long-distance travel of 86,000 residents in the EU 15 countries plus Switzerland. The survey was carried out from October, 2001 through October, 2002. The dataset contains travel date, destination, duration, travel mode and distance bands. Residents aged 15 years and over reported long-distance-travel of over 100 km crow-fly distance for the purposes:

- Holiday;
- Private;
- Business;
- Commuting.

(DATELINE Consortium, 2004) defines a journey as a series of trips starting and ending at home or a temporary location. Journeys that include a destination more than 100 km from the reference location (normally home) are long-distance journeys.

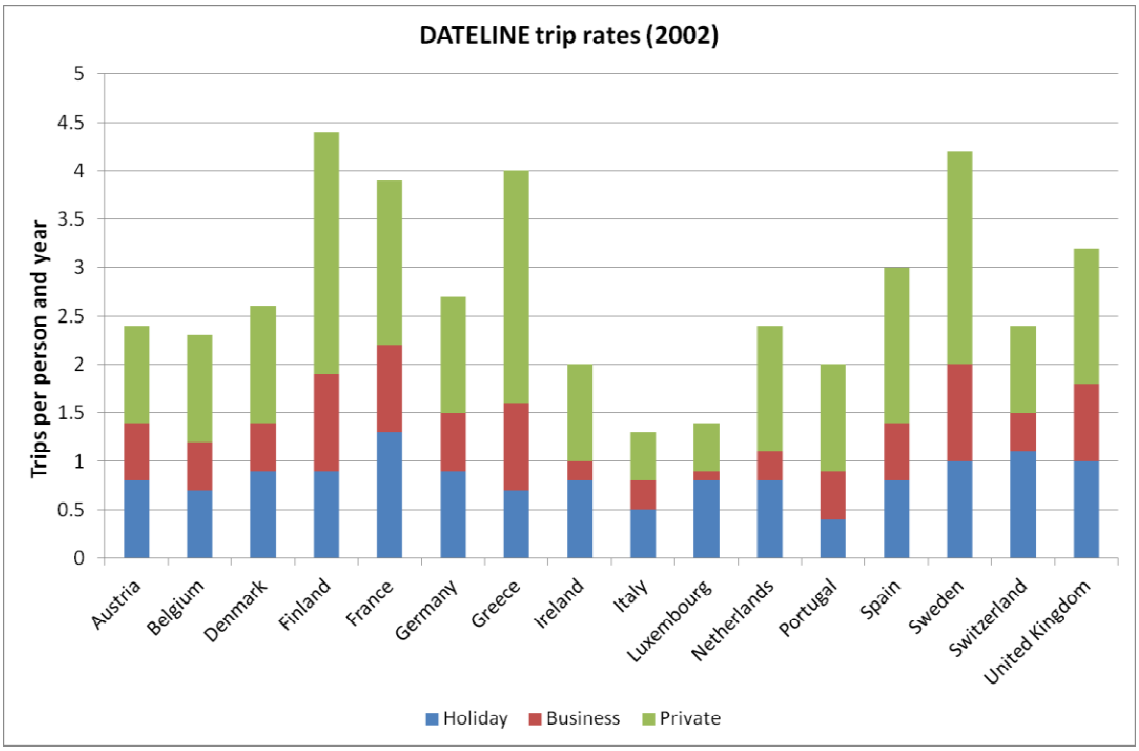
2.4.1 Trip Rates

Germany has the highest number of journeys (185 thousand trips) and the highest number of overnight stays (159 thousand trips). France has the highest holiday trip rate (1.3 trips), Finland and Sweden have the highest business trip rate (1.0 trips) and Finland has the highest private trip rate (2.5 trips). Turning to the overall trip rate per capita, Finland has the highest rate (4.4 trips) and Italy the lowest (1.3 trips). Trip rates for long-distance journeys with at least one overnight stay vary between Finland, Sweden (3.4 trips) and Italy, Portugal (1.1 trips) (Table 2-28 and Figure 2-20).

Table 2-28 DATELINE >100 km journeys and trip rates (per person per year)

Country/2002	Journeys total	Trip rates			
		Holiday	Business	Private	Total
Austria	15,532	0.8	0.6	1.0	2.4
Belgium	21,519	0.7	0.5	1.1	2.3
Denmark	11,251	0.9	0.5	1.2	2.6
Finland	18,591	0.9	1.0	2.5	4.4
France	177,323	1.3	0.9	1.7	3.9
Germany	184,734	0.9	0.6	1.2	2.7
Greece	35,223	0.7	0.9	2.4	4.0
Ireland	5,540	0.8	0.2	1.0	2.0
Italy	59,425	0.5	0.3	0.5	1.3
Luxembourg	484	0.8	0.1	0.5	1.4
Netherlands	30,685	0.8	0.3	1.3	2.4
Portugal	16,839	0.4	0.5	1.1	2.0
Spain	99,617	0.8	0.6	1.6	3.0
Sweden	30,218	1.0	1.0	2.2	4.2
Switzerland	13,784	1.1	0.4	0.9	2.4
United Kingdom	151,111	1.0	0.8	1.4	3.2

Source: (KITE, 2007) based on DATELINE survey



Source: (KITE, 2007) based on DATELINE survey

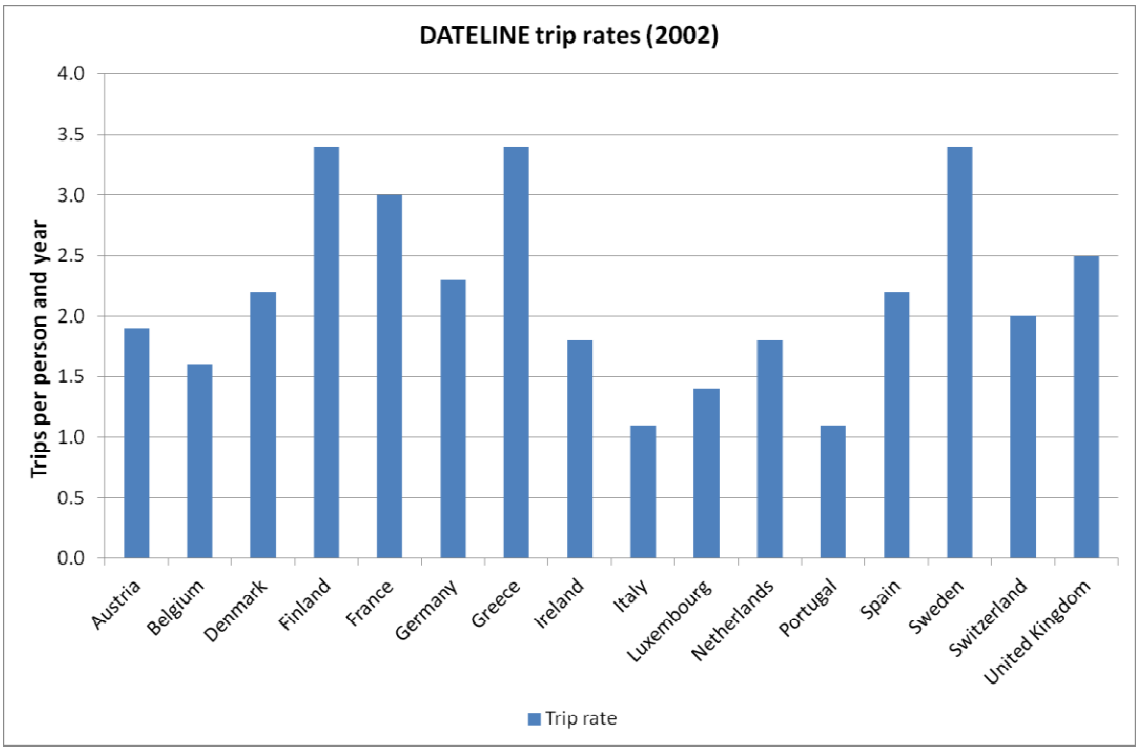
Figure 2-20 DATELINE trip rates by purpose (2002)

Trip rates for long-distance journeys with at least one overnight stay vary between Finland, Sweden (3.4 trips) and Italy, Portugal (1.1 trips) (Table 2-29 and Figure 2-21).

Table 2-29 DATELINE long-distance journeys with an overnight stay (per person per year)

Country/2002	Overnight stays total	Trip rate
Austria	12,581	1.9
Belgium	15,063	1.6
Denmark	9,339	2.2
Finland	14,315	3.4
France	136,539	3.0
Germany	158,871	2.3
Greece	30,292	3.4
Ireland	5,097	1.8
Italy	48,134	1.1
Luxembourg	479	1.4
Netherlands	22,400	1.8
Portugal	9,598	1.1
Spain	73,717	2.2
Sweden	24,174	3.4
Switzerland	11,303	2.0
United Kingdom	116,355	2.5

Source: (KITE, 2007) based on DATELINE survey



Source: (KITE, 2007) based on DATELINE survey

Figure 2-21 DATELINE trip rates (2002)

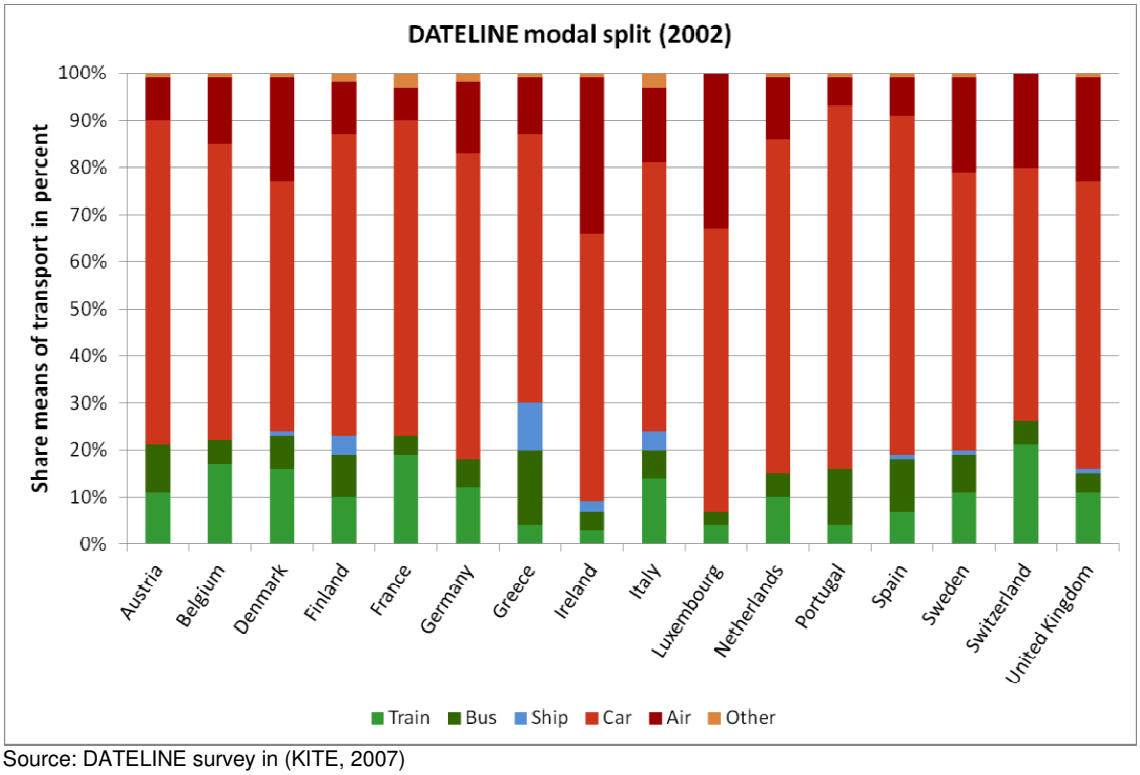
2.4.2 Modal Split

In general car has the highest share of trips, highest in Portugal (77%) and the lowest in Denmark (53%). The bus and ship mode shares are highest in Greece (16% and 10% respectively). The rail mode share is highest in Switzerland (21%). The air mode share is highest in Ireland and Luxembourg (both 33%) (Table 2-30 and Figure 2-22).

Table 2-30 DATELINE percentage modal split

Country/2002	Modal split					
	Car	Bus	Train	Air	Ship	Other
Austria	69	10	11	9	0	1
Belgium	63	5	17	14	0	1
Denmark	53	7	16	22	1	1
Finland	64	9	10	11	4	2
France	67	4	19	7	0	3
Germany	65	6	12	15	0	2
Greece	57	16	4	12	10	1
Ireland	57	4	3	33	2	1
Italy	57	6	14	16	4	3
Luxembourg	60	3	4	33	0	0
Netherlands	71	5	10	13	0	1
Portugal	77	12	4	6	0	1
Spain	72	11	7	8	1	1
Sweden	59	8	11	20	1	1
Switzerland	54	5	21	20	0	0
United Kingdom	61	4	11	22	1	1

Source: DATELINE survey in (KITE, 2007)



Source: DATELINE survey in (KITE, 2007)

Figure 2-22 DATELINE modal split (2002)

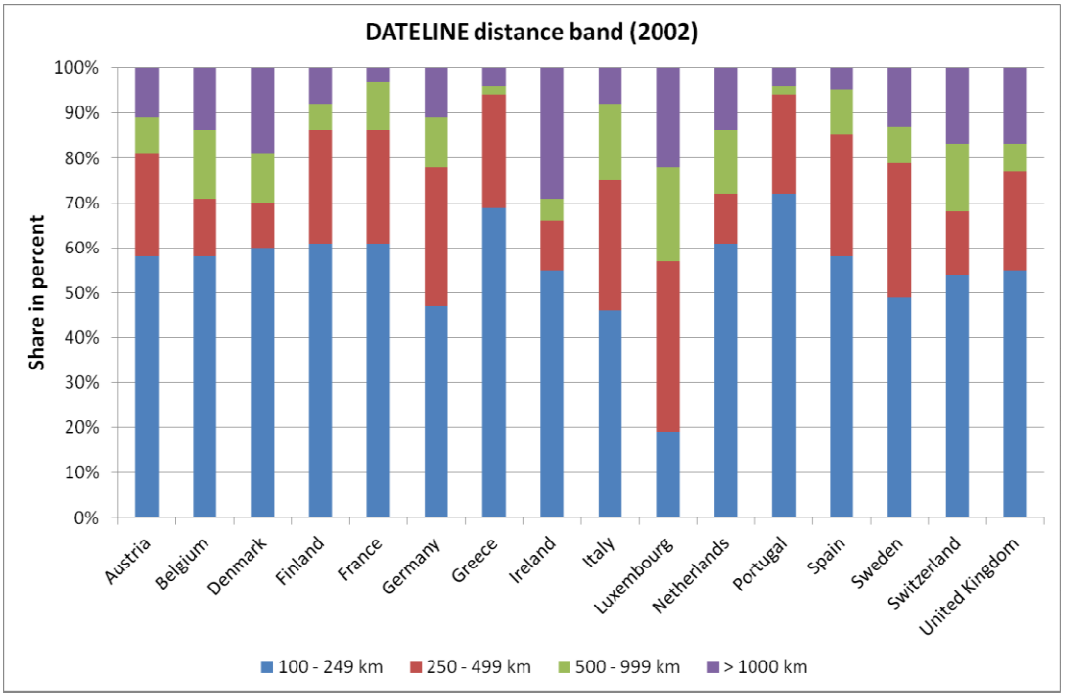
2.4.3 Distance Bands

Most countries have a high share of their long-distance travel in the lowest distance band (100 – 249 km). With exception of Luxembourg (19%), where the distance band 250 - 499 km has the highest share (Figure 2-23 and Table 2-31).

Table 2-31 DATELINE percentage share of trips in each distance band

Country/2002	Distance band			
	100 - 249 km	250 - 499 km	500 - 999 km	> 1000 km
Austria	58	23	8	11
Belgium	58	13	15	14
Denmark	60	10	11	19
Finland	61	25	6	8
France	61	25	11	3
Germany	47	31	11	11
Greece	69	25	2	4
Ireland	55	11	5	29
Italy	46	29	17	8
Luxembourg	19	38	21	22
Netherlands	61	11	14	14
Portugal	72	22	2	4
Spain	58	27	10	5
Sweden	49	30	8	13
Switzerland	54	14	15	17
United Kingdom	55	22	6	17

Source: (DATELINE Consortium, 2003)



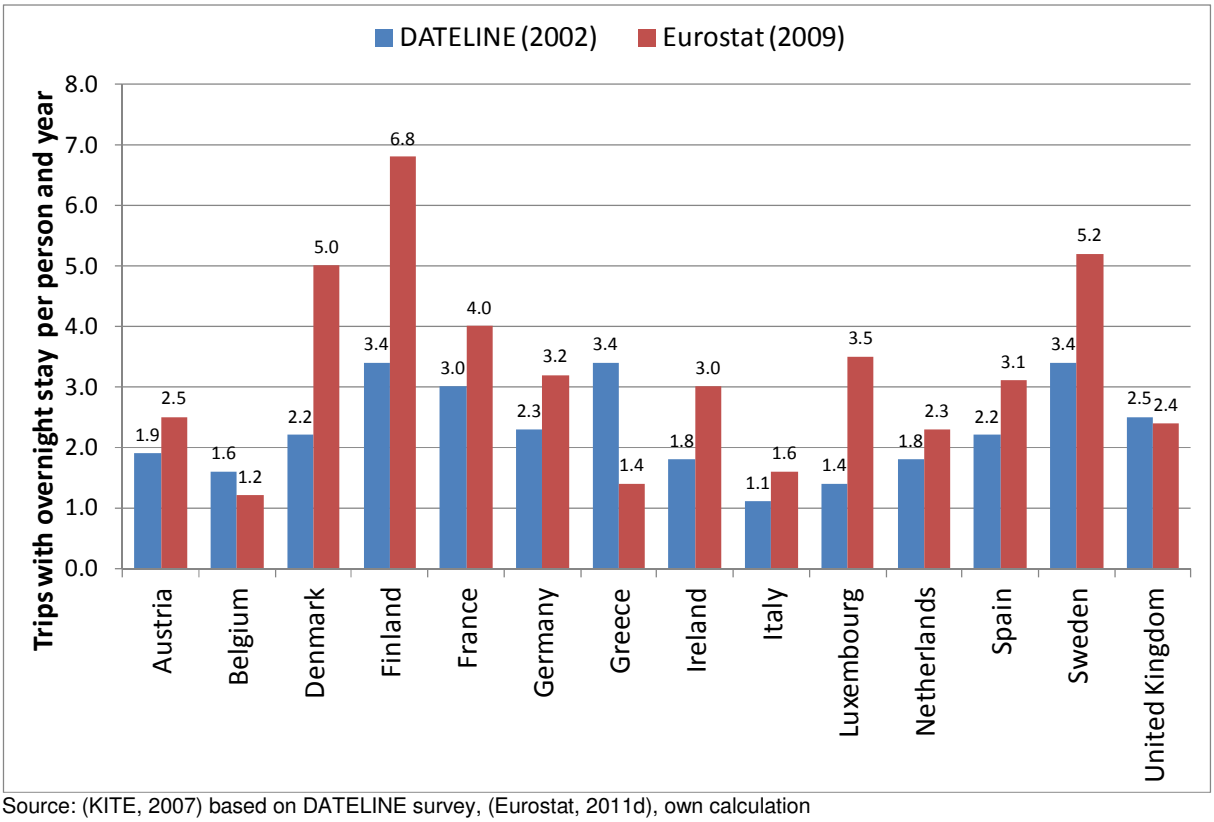
Source: (DATELINE Consortium, 2003)

Figure 2-23 DATELINE trips per distance band (2002)

2.5 COMPARISON OF THE DIFFERENT DATA SOURCES

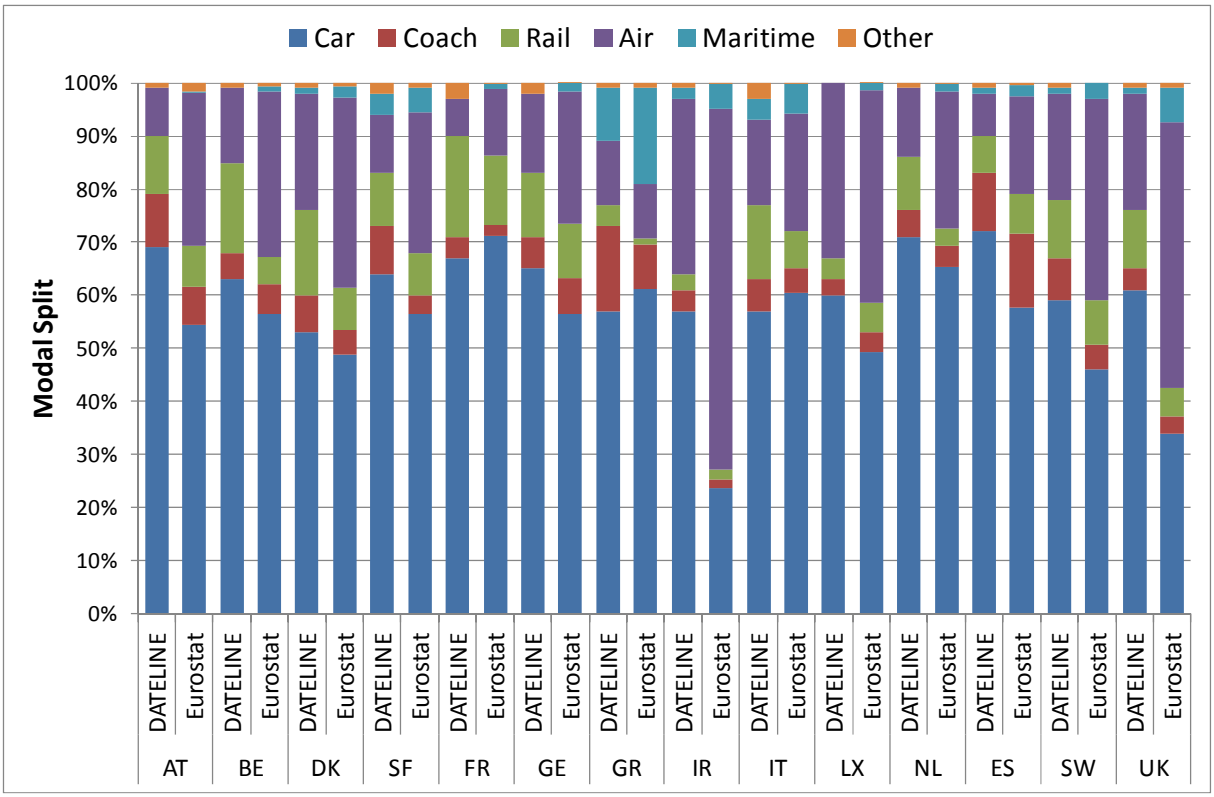
All three different types of data sources are based on household surveys. Eurostat is collecting data from household surveys in the EU27 plus some other countries. The basis for the different National Travel Surveys are household surveys in their respective countries. In DATELINE household surveys have been carried out in the EU15 plus Switzerland. Hence all of them represent the (long-distance) travel behaviour of their respective residents. Accordingly trips in and out of Europe by residents are included in the database but no trips by non residents.

Figure 2-24 shows a comparison of the trip rates per person per year for journeys with an overnight stay from the DATELINE and the Eurostat databases. For the majority of the countries where data are available from both sources Eurostat reports higher trip rates. Nevertheless the relative ranking among countries is with the exception of Greece relatively consistent. Figure 2-25 shows a comparison of the mode split data from the DATELINE and the Eurostat databases. Eurostat reports on the one hand higher shares for air trips for all countries except Greece and on the other hand lower shares for car trips for all countries except France Greece and Italy. The most significant outliers are Ireland and the UK. Due to its completeness concerning the coverage of the European countries the Eurostat database was selected as the most useful data source for the subsequent development of a model of long-distance travel and the forecast of future long-distance mobility.



Source: (KITE, 2007) based on DATELINE survey, (Eurostat, 2011d), own calculation

Figure 2-24 Comparison of trip rates with overnight stay DATELINE - Eurostat



Source: (KITE, 2007) based on DATELINE survey, (Eurostat, 2011d), own calculation

Figure 2-25 Comparison of mode split DATELINE – Eurostat

3 TRENDS AFFECTING LONG-DISTANCE TRIP MAKING

3.1 INTRODUCTION

The objective of this section is to identify country-specific trends influencing future long-distance mobility behaviour. These trends include economic growth, population growth, aging of population, changes in household structures, increasing access to cars. The first step of the work presented here was a brief review of existing literature concerning future long-distance travel demand. The results of the literature review are presented in section 3.2.

A set of national population cohort models and corresponding household composition models (based on system dynamics) which take these changes over time into account was built in order to quantify the impacts of these trends on future transport demand. The model output includes demand for long-distance trips disaggregated by age groups and household groups, and mode share trends for different distance classes. It does not include origin-destination information. A description of the model (LUNA - Simulating the demand for Long-distance travel Using a Non-OD-matrix based Approach) is given in section 3.3. A baseline scenario regarding economy, population and transport costs was defined and is presented in section 3.4. Forecasts for important drivers of future long-distance travel demand are presented and compared with other forecasts in Section 3.5. Finally forecasts of long-distance travel demand for the baseline scenario are presented in Section 3.6.

3.2 REVIEW OF STUDIES OF FUTURE TRENDS IN LONG-DISTANCE TRAVEL

3.2.1 (Petermann et al., 2006) – Future Trends in Tourism

This study reports:

- The relevant trends and their implications for tourism in Germany and by Germans, on the basis of a review and an analysis of current socio-demographic data.
- The impacts of the eastward expansion of the EU and considers what trends in vacation traffic can be expected in and from the new EU nations and to and from Germany.
- The current and future potential dangers to tourism and discusses possibilities for improving information, prevention and crisis management.

Conclusions:

- Demographic shift (aging society) will result changes in overall demand.
- Disposable income will not grow due to high unemployment or low incomes, high costs of an aging population (social and private) and a high tax and insurance burden.
- Permanent full time employment will decline and will be replaced by other forms of employment such as part time work, second and third jobs, temporary jobs, teleworking, and full or partial self-employment.
- The trend in working hours (longer working hours, greater proportion of multiple jobs) makes it likely that leisure will decrease.

3.2.2 (HS2, 2011) – Demand for Long-distance Travel

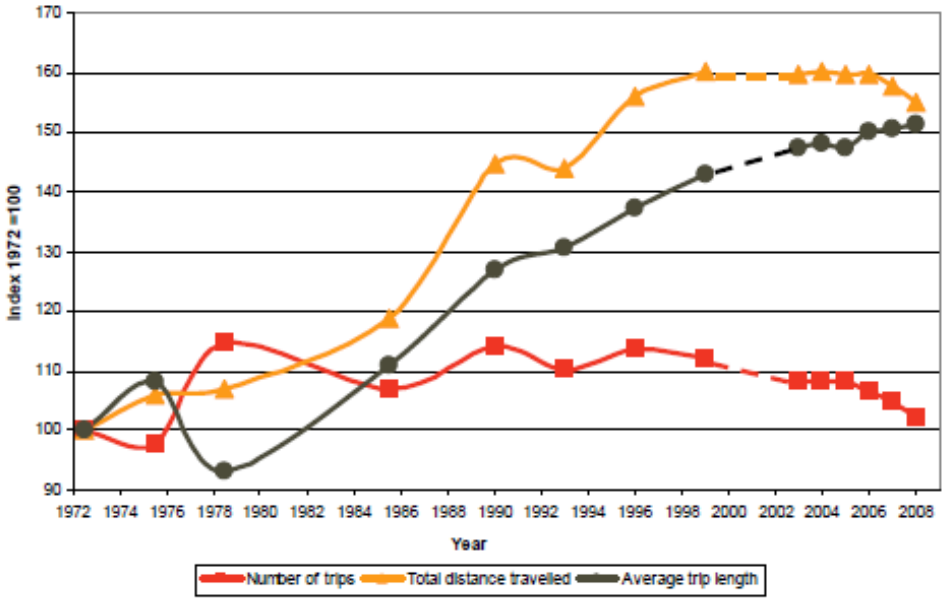
This study:

- Reports past trends in the demand for long-distance travel
- Explains how they forecast long-distance travel demand
- Sets out forecast results
- Explains the implications of future growth for users and transport networks, and the options to address the adverse impact of demand growth
- Discusses how High speed 2 would affect demand growth

Conclusions:

- The past 15 years have seen strong growth in rail demand, especially for long-distance travel. Growth was also strong in air demand prior to the effect of the increased security checks required in recent years. There has been much more modest growth in car demand, both for long-distance travel and for shorter distances.
- The evidence is that this growth has been driven primarily by economic growth, with population growth also playing a role. This is supported by evidence from the National travel Survey which shows that people in higher income groups make many more rail trips. Both the economy and population are forecast to continue to grow.
- Forecasts continue the past growth, but generally at a more modest level than seen on average over the last 15 years. Long-distance rail and air travel grow the fastest.

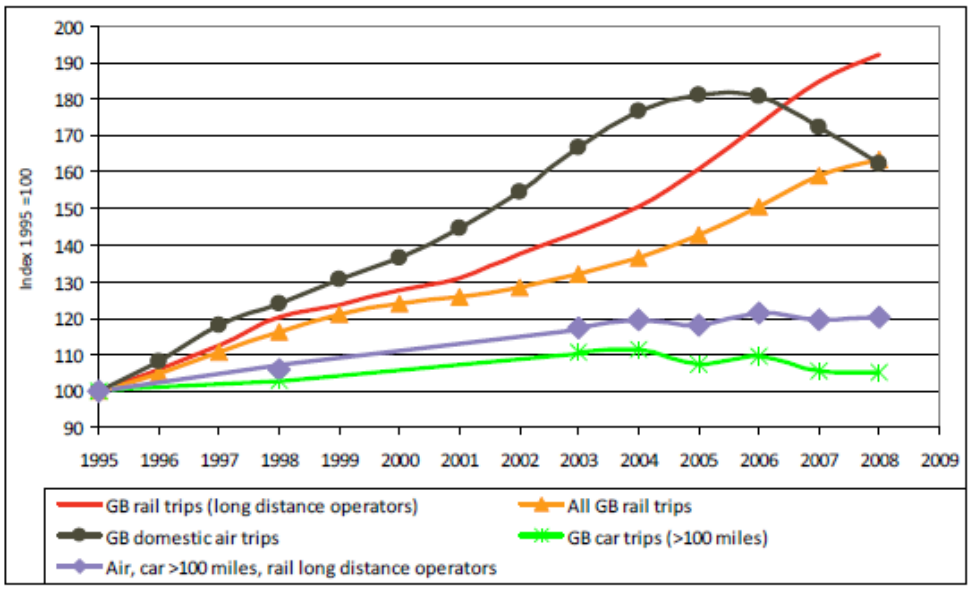
Great Britain's NTS collects long term trends in personal travel. Figure 3-1 reveals that total distance travelled and average trip length increase strongly. However the overall number of trips remains relatively constant.



Source: (HS2, 2011)

Figure 3-1 Number of trips, distance travelled, average trip length per person in Great Britain, all modes of transport

Figure 3-2 shows the strong increase of train and air trips, while car trips did only increase at a much lower rate. In recent years air trips have decreased. The authors of the study conclude that the reason for this decline are on the one hand increased security and check in times and on the other hand the recent economic recession.



Sources: Office of Rail Regulation (rail trips[3]), Civil Aviation Authority (air trips), car and all three modes trips are based on NTS trip rates, with population change from ONS. Data for successive years have been averaged over three years to smooth year to year variation.

Source: (HS2, 2011)

Figure 3-2 Long-distaince trips by mode, total trips per year, Great Britain

Table 3-1 shows that all modes will increase by 36% and mode air will have the maximum forecast increase from 0.2 trips to 0.4 trips (87%).

Table 3-1 Forecast chance long-distance trips Great Britain (average number of trips per person per year)

Mode	NTS 2008	2043	HS2 Ltd forecast change 2008 - 2043
Car	5.4	6.8	26%
Rail	0.9	1.4	61%
Air	0.2	0.4	87%
Other	0.5	0.8	68%
Total	7.0	9.5	36%

Source: (HS2, 2011)

Household income affects the trip rate, households within the lowest income band have the lowest trip rate (3.3 trips) and household with highest income have the maximum trip rate (13.8).

Table 3-2 Annual average long-distance trips per person (Great Britain) by income band (quintiles)

Household income bands (average income within band)	Rail	Car	Other modes	All modes
Lowest income band (£13,584)	0.6	2.2	0.5	3.3
2nd band (£19,918)	0.4	3.2	0.6	4.2
3rd band (£25,699)	0.6	4.6	0.6	5.8
4th band (£32,553)	1.0	6.5	0.7	8.2
Highest income band (£53,876)	2.0	10.7	1.1	13.8
All households (£29,126)	0.9	5.4	0.7	7.0

Source: (HS2, 2011)

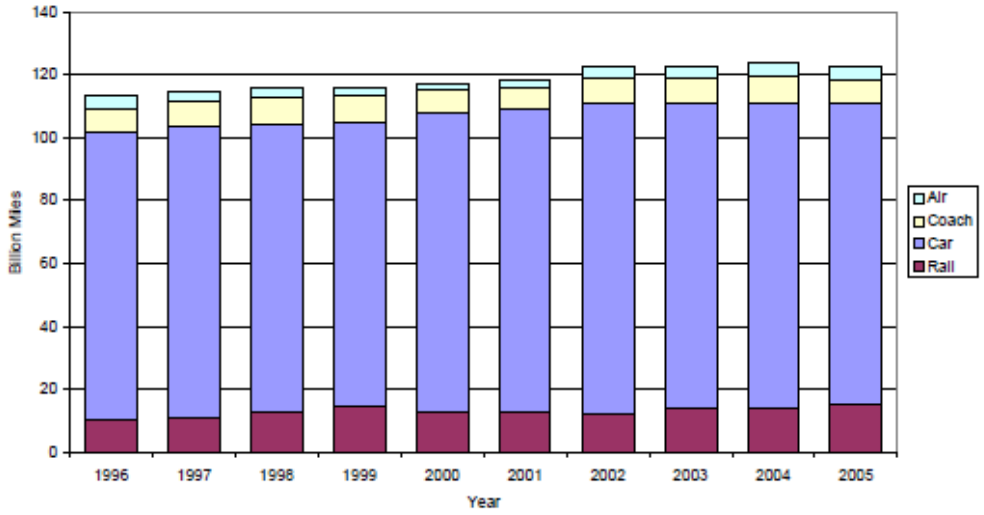
3.2.3 (Dargay, 2010) – The Prospects for Longer Distance Domestic Coach, Rail, Air and Car Travel in Britain

The main objective of this paper is to provide the prospects for long-distance travel in Great Britain in 2030. It does this by building a forecasting model which includes economic and demographic impacts, policy measures and developments in transport supply. The aggregate model produces national forecasts. The National Travel Survey provides the basis of the analysis and modelling. The following base values are the input data for the model.

- Long-distance-travel by mode (car, rail, coach, air);
- Journey purpose (business, commuting, leisure, visiting friends and relatives, holiday);
- Distance band (< 150 miles, 150+ miles one way);
- GDP;
- GB Population;
- Number of households in GB;
- Household size;
- Household disposable income;
- Privately owned cars;
- Domestic airfares – business and leisure, separately;
- Motoring cost index;
- Rail fare index;
- Bus fare index;
- Motor fuel price index;
- Retail price index;
- Revenue per pkm for non-local bus;
- Average traffic speed.

Long-distance travel in Great Britain

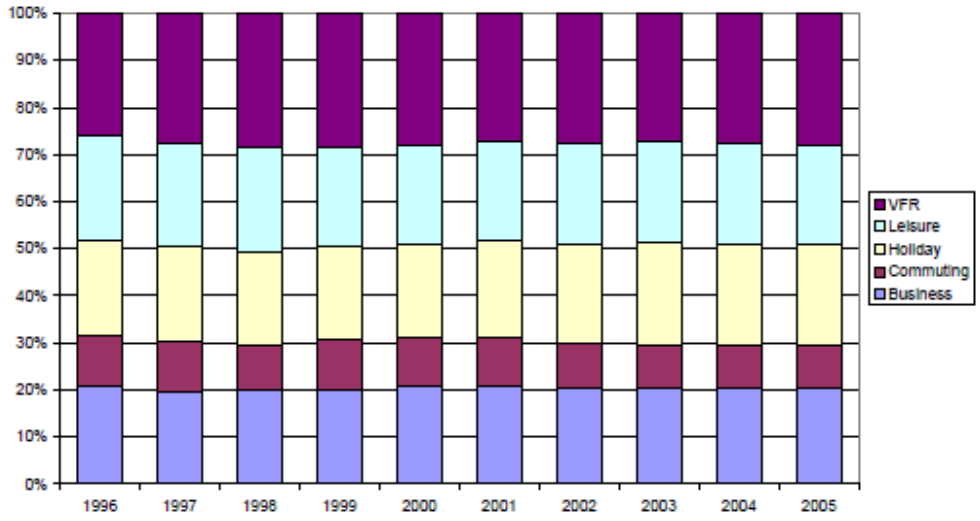
Figure 3-3 shows the estimates of long-distance travel by mode. Long-distance travel increases at about 0.9% per year over the 10 year time period. *During this time period long-distance travel accounts for between 114 and 124 billion miles per year* (Dargay, 2010) p. 19.



Source: (Dargay, 2010)

Figure 3-3 Long-distance travel by mode by British residents in GB, 3-year moving average for median year shown, estimates based on the 1995-2006 NTS

Concerning trip purposes, VFR has the highest share (28%) followed by leisure and holiday (both 21%) and business (20%). While commuting accounts the smallest share (10%) (Figure 3-4).



Source: (Dargay, 2010)

Figure 3-4 Long-distance travel by purpose, percentage of total miles, 3-year moving average for median year shown, estimates based on 1995-2006 NTS

Both distance bands are dominated by car but car's dominance is greatest in distance band < 150 miles (84%) and in distance band 150+ miles (68%). All other modes increase in the longer distance band.

Table 3-3 Long-distance travel, mode shares (%) of distance travelled by distance band, 2002-2006 NTS

	Car	Rail	Coach	Air
< 150 miles	84	11	5	0
150+ miles	68	14	8	10

Source: (Dargay, 2010)

Impacts of long-distance travel

The paper examined the extent to which income, GDP and other impacts such as gender, age and household size have important influence on long-distance travel.

Socio-demographic and geographic projections of population

The population increase to 68.8 Million by 2030 and the number of households increases to 31.8 Million.

Table 3-4 Socio-demographic projections

						Average annual % change	
	1996	**2005**	**2010**	**2020**	**2030**	**1996-2010**	**2010-2030**
Population (mill.)	56.5	58.5	60.5	64.8	68.8	0.49	0.64
% Women	51.4	51	50.8	50.5	50.4	-0.08	-0.04
% 60 years +	20.7	21.2	22.6	24.6	27.9	0.62	1.07
% 1-adult hhs	14.2	16.8	17.9	20.1	21.8	1.7	0.98
% Working age	62.2	62.2	61.9	62.1	61.3	-0.04	-0.05
Households (mill.)	23	24.8	26.2	29.2	31.8	0.92	0.98

Source: (Dargay, 2010)

Economic projections

Table 3-5 shows three different projections of GDP. In the first and last row the GDP forecast from HM Treasury (HMT) April 2009 and February 2008) and the 2009 Budget report. In year 2011 the 2009 Budget report assume the highest growth rate per anno (3.6%) and the HMT the lowest (2.2%). However, from 2012 to 2030 the study estimates a GDP growth rate of 2.5% per year.

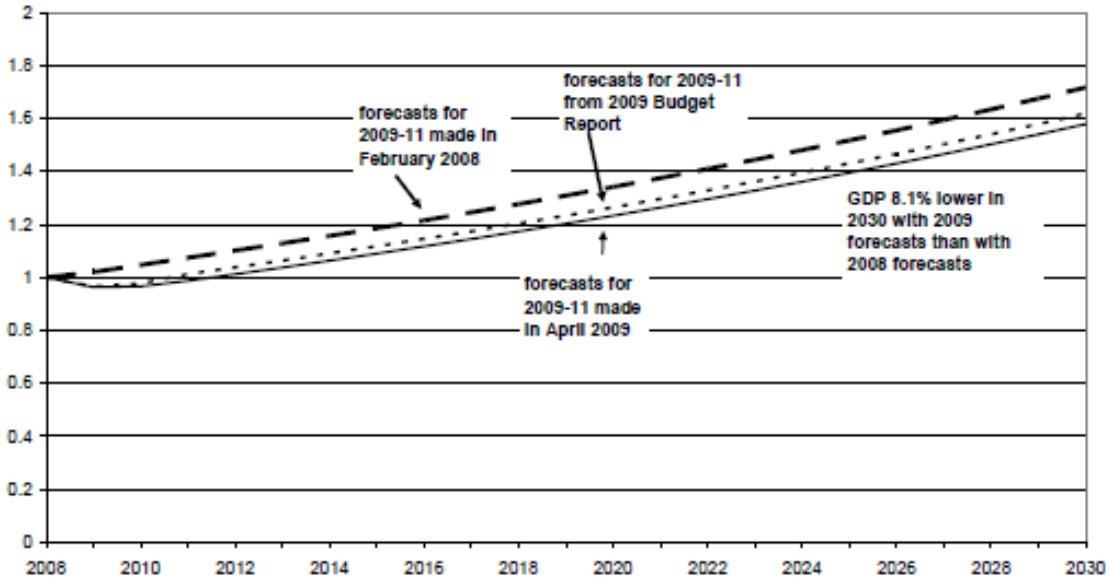
Table 3-5 Real GDP forecasts, annual % change

	2009	**2010**	**2011**	**2012 to 2030***
HMT (April 2009)	-3.7	0.3	2.2	2.5
2009 Budget Report	-3.5	1.25	3.6	2.5
HMT (February 2008)	2	2.6	2.6	2.5

*** historic average**

Source: (Dargay, 2010)

GDP will be 8.1% lower in 2030 with 2009 HTM forecast than with 2008 forecast. GDP will grow by around 1.5% per annum from 2012 (Figure 3-5).



Source: (Dargay, 2010)

Figure 3-5 Real GDP forecasts

Transport costs

Fuel prices

Table 3-6 show the crude oil projections by The Department of Energy and Climate Change (DECC). The real price will increase between 16% (Scenario 1) and 33% (Scenario 2).

Table 3-6 Crude oil price assumptions, 2008 US$/bbl, DECC (2009), 2008 price: $102/bbl

Scenario	2010	2015	2020	2025	2030
1	50	58	60	60	60
2	70	75	80	85	90
3	84	102	120	120	120
4	103	142	150	150	150

Source: (Dargay, 2010)

Motoring costs

Motoring costs depend on fuel costs, vehicle fuel efficiency and other non fuel costs motoring costs.

Air fares, Coach fares and rail fares

The study assumes that air fares will decline between 18 % (Scenario 1) and 9% (Scenario 4) in the next 20 years (Table 3-7). Coach fares are assumed to increase by 3%, and rail fares by 1%, per year in real terms.

Table 3-7 Domestic air fare projections, oil price scenario as in Table 30, $1.60/£ exchange rate, 2004 prices (Source: DfT)

Scenario	% change 2009 - 2020	% change 2009 - 2030
1	-15	-18
2	-15	-16
3	-8	-13
4	-3	-9

Source: (Dargay, 2010)

The base case

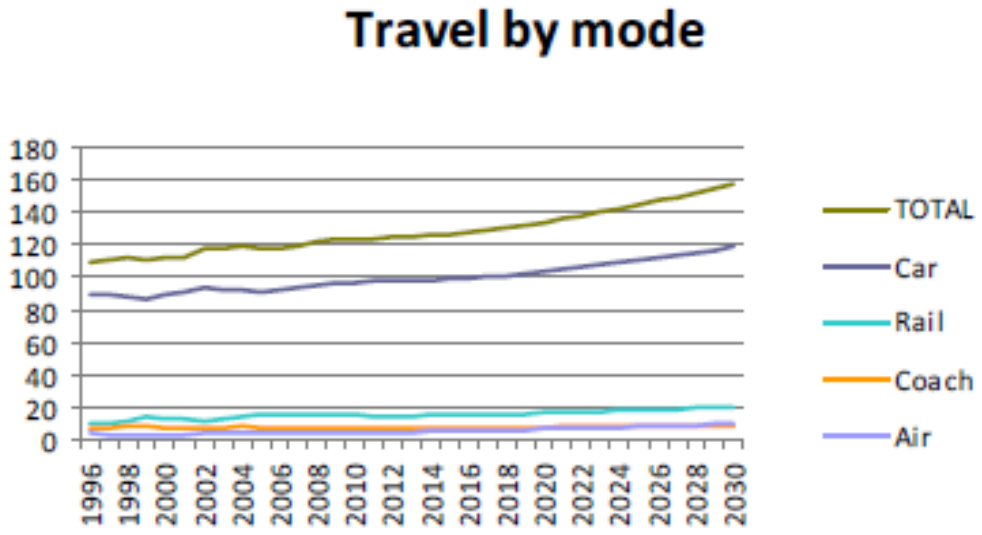
The forecasting model for year 2030 is based on cost, time, socio-economic and demographic impacts. Table 3-8 summaries the base case assumption of the study.

Table 3-8 Base case assumption

	% change 2009 - 2030	Source/assumptions
GDP	58	HM Treasury (April 2009)
Population	14	Office of National Statistics (ONS)
Petrol prices	27	Department of Energy and Climate Change (DECC)
Car fuel efficiency	23	1% per year
Per km fuel prices	4	as above
Motoring coasts	0.50	other motoring costs constant
Coach fares	3	other costs constant
Journey time roads	7.50	Department for Transport (DfT) (NMT 2008)
Rail fares	28	Retail Price Index(RPI) RPI+1%
Air fares	-12.50	DfT's efficient assumptions

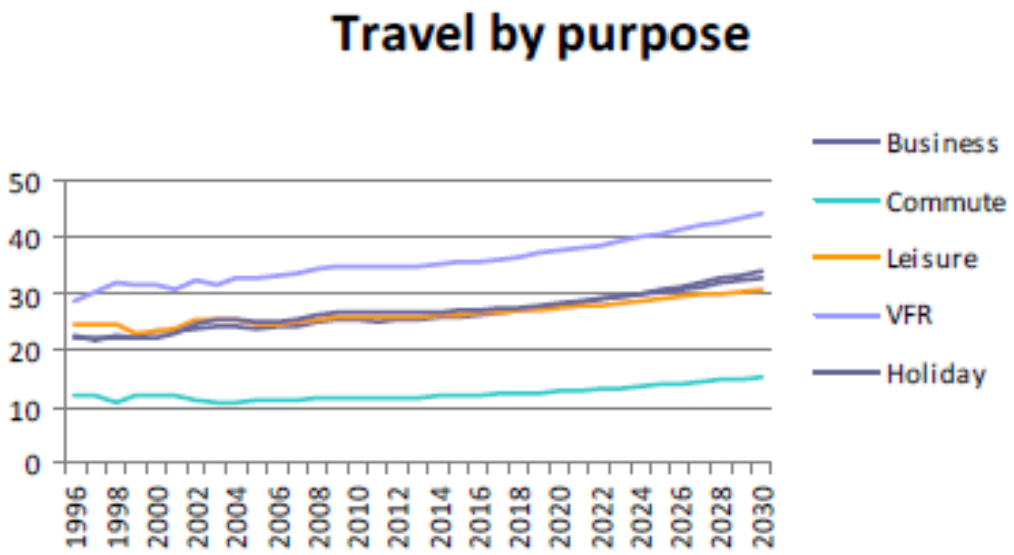
Source: (Dargay, 2010)

Figure 3-6 and Figure 3-7 reveal the model projections for the base case assumption. In total long-distance travel in person miles will increase 34% from 2005 to 2030. Car travel grows 30%, rail 35%, coach 25% and rail by 126%. Concerning purpose, business travel will increase 42%, commuting 39%, leisure 26%, VFR 34% and holiday by 31%.



Source: (Dargay, 2010)

Figure 3-6 Base Case projections for long-distance travel by mode, billions of person miles



Source: (Dargay, 2010)

Figure 3-7 Base Case projections for long-distance-travel by purpose, billions of person miles

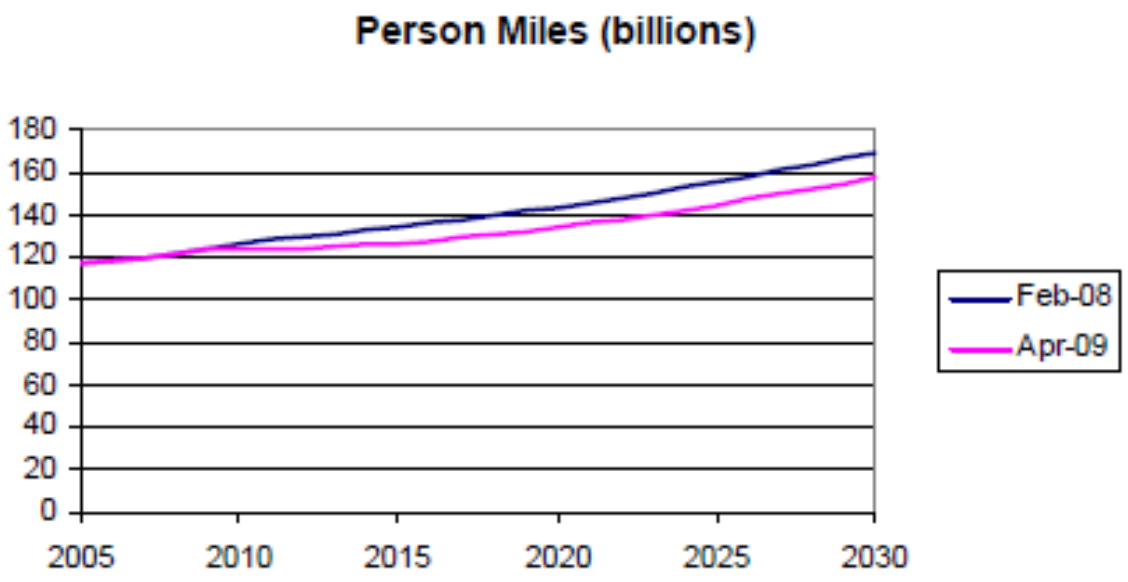
The report estimates the impact of economic recession on long-distance travel. The lower GDP forecast (HMT April 2009) affects long-distance travel. All modes decline, car travel -6%, rail -11%, coach -1%, air -17% and in total by -7% (Table 3-9).

Table 3-9 Long-distance travel forecasts for 2030, billion person miles, based on different GDP forecasts

GDP forecast	Car	Rail	Coach	Air	Total
HMT (April 2009)	118.5	20.1	8.6	9.9	157.1
HMT (February 2008)	125.9	22.7	8.7	11.9	169.2
% change from 2008	-6%	-11%	-1%	-17%	-7%

Source: (Dargay, 2010)

Figure 3-8 shows the effect of the recession on travelled person miles. The economic recession reduces person miles by 1.4% in 2009, by 5% in 2013 and by 7% in 2030.



Source: (Dargay, 2010)

Figure 3-8 Effect of economic recession on long-distance travel, based on GDP forecasts of February 2008 and April 2009

3.2.4 (Independent Transport Commission (ITC), 2010) – Long-distance Travel in Britain – Prospects in a Time of Uncertainty

The ITC published a study focused on journeys of 50 miles or more by car, train, coach and plane using data from the National Travel Survey and other data. A statistical model explains and forecasts long-distance travel demand in a relation to impacts such as income, metropolitan/rural area, travel costs and duration of the journey. The study is based on the previously summarised model of long-distance travel by Dargay. The Independent Transport Commission provides factors which affect the amount of long-distance travel.

- Income affects travel; as incomes grow or decline so does travel.
- Where people live affects long-distance travel; people living in metropolitan areas make fewer long trips, while those n rural areas make most.
- Cost affects the volume of long-distance travel; business travel and commuting are less affected, whilst holidays, leisure travel and visiting friends and relatives are more price sensitive.
- Travel time affects the demand, notably for car and train.

The official demographic and economic forecast suggests that long-distance-travel demand will increase by 34% overall by year 2030. Car grows by 30%, rail by 35%, coach by 25%, air by 126% (Table 3-10).

Table 3-10 Forecast growth of long-distance travel demand for different modes in different scenarios

Scenario	Percentage growth from 2005 to 2030				
	Car	Rail	Coach	Air	Total
Base case	**30**	**35**	**25**	**126**	**34**
Constant real rail fares	28	60	17	120	35
Road User Charging	27	48	27	123	33
Air fares: £10 APD	30	36	25	101	33
Air fares: -25%	30	33	24	154	35
Car: low efficiency	24	38	27	127	30
Car: high efficiency	36	31	22	125	38
Motoring costs 1% pa	19	42	30	128	26
GDP growth 1.25%	18	-1	26	45	18

Source: (Independent Transport Commission (ITC), 2010)

3.3 THE SYSTEM DYNAMICS LONG-DISTANCE TRAVEL MODEL LUNA

The System Dynamics based long-distance travel model LUNA (Simulating the demand for Long-distance travel Using a Non-OD-matrix based Approach) was specifically developed for the current project at the Institute of Transportation, Vienna University of Technology. The model is subdivided into the following four sub-modules:

- A population cohort model,
- A household formation model,
- A non-OD-matrix based transport demand model and
- The evaluation indicator module.

LUNA currently covers the EU27 member states plus Norway and Switzerland. LUNA forecasts the long-distance travel demand of the residents of these 29 countries. At the current stage only the purpose holiday is taken into account. The purposes business and visiting friends and family will follow within the work of WP7 Scenarios. The current forecasting period of LUNA is 2010 to 2050. The time step is defined as one year. LUNA was programmed utilising the System Dynamics software Vensim(r)[12]. Microsoft Excel(r) is used as data interface.

3.3.1 Population Cohort Model

The population is subdivided into 18 age groups in five year time steps (0-4 years, 5-9 years, 10-14 years, 15-19 years, 20-24 years, 25-29 years, 30-34 years, 35-39 years, 40-44 years, 45-49 years, 50-54 years, 55-59 years, 60-64 years, 65-69 years, 70-74 years, 75-79 years, 80-84 years and 85 and more years). The calculation of the population in each time step is described in Equation 3-1.

[12] See: www.vensim.com

$$P_{r,k}(t) = P_{r,k}(t-1) + A_{r,k-1}(t) - A_{r,k}(t) + B_{r,k0}(t) - D_{r,k(t)} + M_{r,k(t)}$$

Equation 3-1: Population by age group

Legend:
$P_{r,k}(t)$.....Population of age group k in region r in year t
$P_{r,k}(t-1)$.....Population of age group k in region r in year t-1
$A_{r,k-1}(t)$.....Ageing population leaving age group k-1 into age group k in region r in year t t (zero for age group 0 to 4 years)
$A_{r,k}(t)$.....Ageing population leaving age group k into age group k+1 in region r in year t (zero for age group 85 and more years)
$B_{r,k0}(t)$ .....Number of live births entering age group k0 (0 to 4 years) in region r in year t
$D_{r,k}(t)$ .....Number of deaths in age group k in region r in year t
$M_{r,k}(t)$.....Net migration of population of age group k into region r in year t

Figure 3-9 shows a screenshot of the implementation of the population cohort model in Vensim(r). Red elements indicate base year values which are imported from Excel(r) data files as constants. The term "T=0" in general points to base year values. The extension "xls" in general signals constants or data which are imported from Excel(r) data files. Blue elements mark time series data which are imported from Excel(r) scenario definition files.

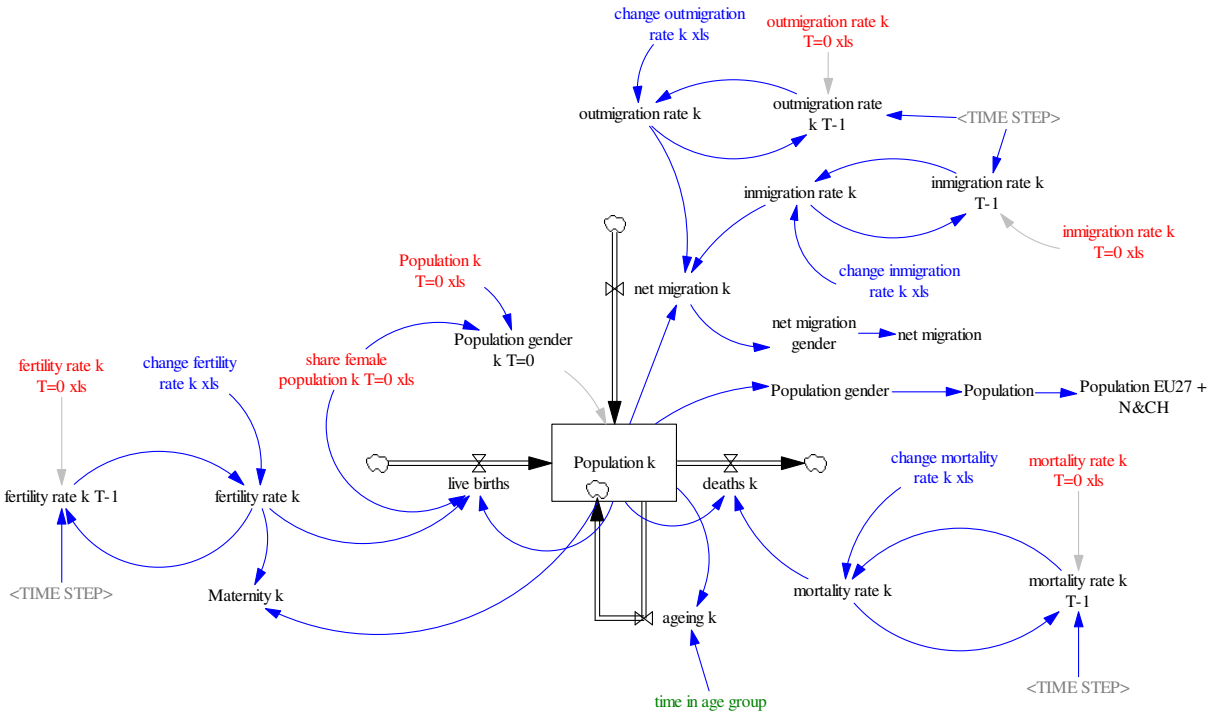


Figure 3-9 LUNA population cohort model in Vensim(r)

The development of the population by gender in the Netherlands is shown in Figure 3-10 as an example for a LUNA result.

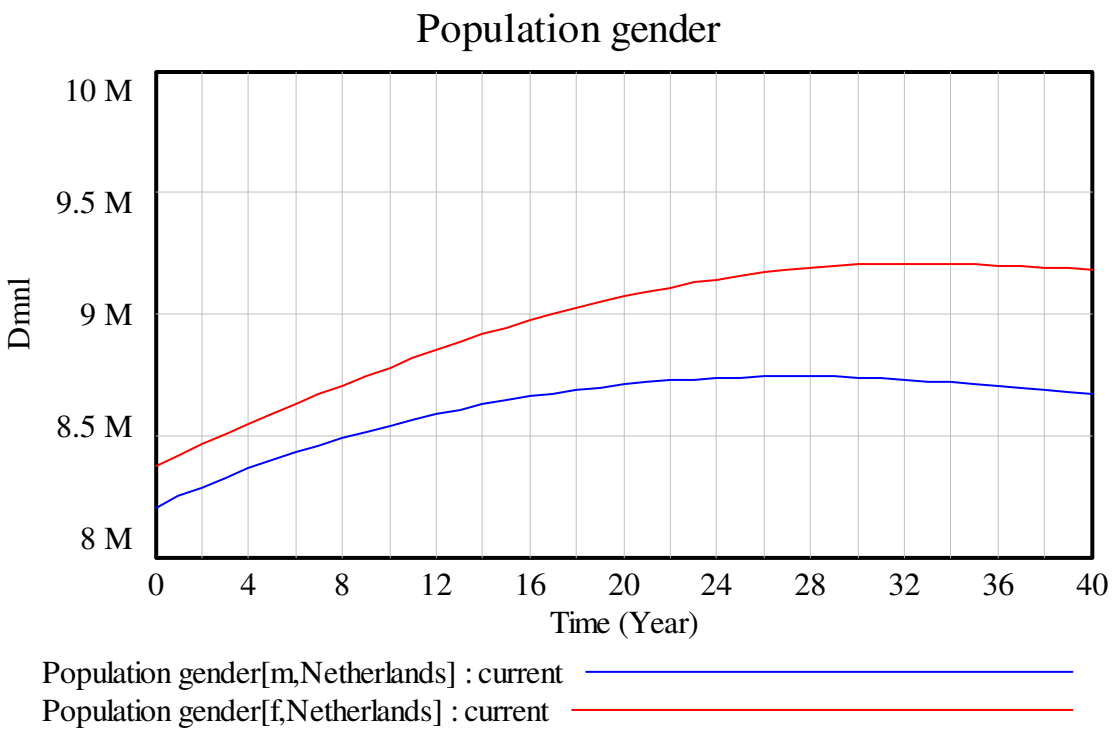


Figure 3-10 LUNA prediction population by gender the Netherlands 2010 to 2050

3.3.2 Household Formation Model

The LUNA household formation sub-model assigns the population of the different age groups to the different household types and income groups. The following household types are taken into account:

- Single person household 20 to 59 years,
- Two persons household 20 to 59 years,
- Family household with one child,
- Family household with two children,
- Family household with three or more children,
- Single parent HH with children,
- Three or more adults,
- Three or more adults with children,
- Two persons household 60 years and older and
- Single person household 60 years and older.

The household type definition corresponds with the data available from the Eurostat database.

Some of the household types have a clearly defined household size. E.g. a single household always consists of one person, etc. Nevertheless the four household types family household with three or more children, single parent HH with children, three or more adults and three or more adults with children do not have a clearly defined household size. The constraints of their minimum size and data about the national average household size have been used to calculate the household size of these household types (**Error! Reference source not found.**). The number of persons per household type and the share of households by household type (Eurostat, 2011e) are used to calculate the number of households by type. Finally the number of persons per age cohort is allocated to the household types utilising the information about household size and number of households by type (Figure 3-11).

Table 3-11 Persons per household type and region

Household type	Single person HH young	Two persons HH young	Family HH one child	Family HH two children	Family HH three and more	Single parent HH with child	Three or more adults	Three or more adults	Two persons HH	Single person HH
Belgium	1	2	3	4	5.5	2.7	3.5	4.6	2	1
Bulgaria	1	2	3	4	5.3	2.5	3.7	5.0	2	1
Czech Republic	1	2	3	4	5.3	2.4	3.3	4.5	2	1
Denmark	1	2	3	4	5.5	2.8	3.3	4.6	2	1
Germany	1	2	3	4	5.1	2.0	3.0	4.3	2	1
Estonia	1	2	3	4	5.4	2.6	3.6	4.7	2	1
Ireland	1	2	3	4	5.5	2.6	3.4	4.7	2	1
Greece	1	2	3	4	5.3	2.4	3.6	4.6	2	1
Spain	1	2	3	4	5.3	2.4	3.5	4.6	2	1
France	1	2	3	4	5.2	2.4	3.2	4.5	2	1
Italy	1	2	3	4	5.3	2.4	3.4	4.6	2	1
Cyprus	1	2	3	4	5.3	2.5	3.6	4.7	2	1
Latvia	1	2	3	4	5.3	2.6	3.7	4.9	2	1
Lithuania	1	2	3	4	5.4	2.7	3.6	4.9	2	1
Luxembourg	1	2	3	4	5.4	2.5	3.4	4.6	2	1
Hungary	1	2	3	4	5.4	2.5	3.5	4.7	2	1
Malta	1	2	3	4	5.4	2.5	3.7	4.8	2	1
Netherlands	1	2	3	4	5.2	2.3	3.1	4.4	2	1
Austria	1	2	3	4	5.4	2.5	3.6	4.7	2	1
Poland	1	2	3	4	5.4	2.5	3.7	5.0	2	1
Portugal	1	2	3	4	5.3	2.5	3.5	4.7	2	1
Romania	1	2	3	4	5.4	2.5	3.7	5.1	2	1
Slovenia	1	2	3	4	5.7	2.9	4.6	5.4	2	1
Slovakia	1	2	3	4	5.3	2.5	3.6	4.8	2	1
Finland	1	2	3	4	5.6	2.7	3.3	4.6	2	1
Sweden	1	2	3	4	5.0	2.0	3.0	4.0	2	1
United Kingdom	1	2	3	4	5.6	2.9	3.8	4.8	2	1
Norway	1	2	3	4	5.3	2.5	3.2	4.5	2	1
Switzerland	1	2	3	4	5.5	2.6	3.7	4.8	2	1

Source: (Eurostat, 2011e, Eurostat, 2011b), own calculations

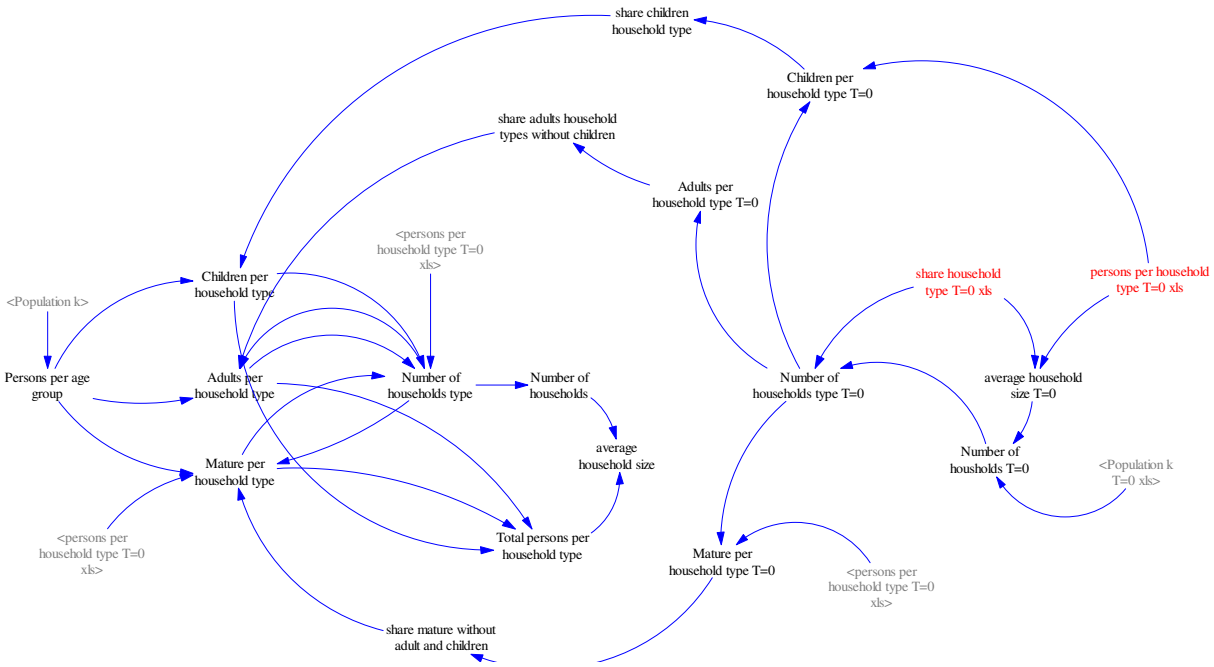


Figure 3-11 LUNA household formation model in Vensim(r)

Three different income groups are taken into account in LUNA:

- Households in the three lowest income deciles,
- Households in the four middle income deciles and
- Households in the three highest income deciles.

The base year median annual household income (Eurostat, 2011c) is used to calculate the base year median income per person and hour by household type (Figure 3-12).

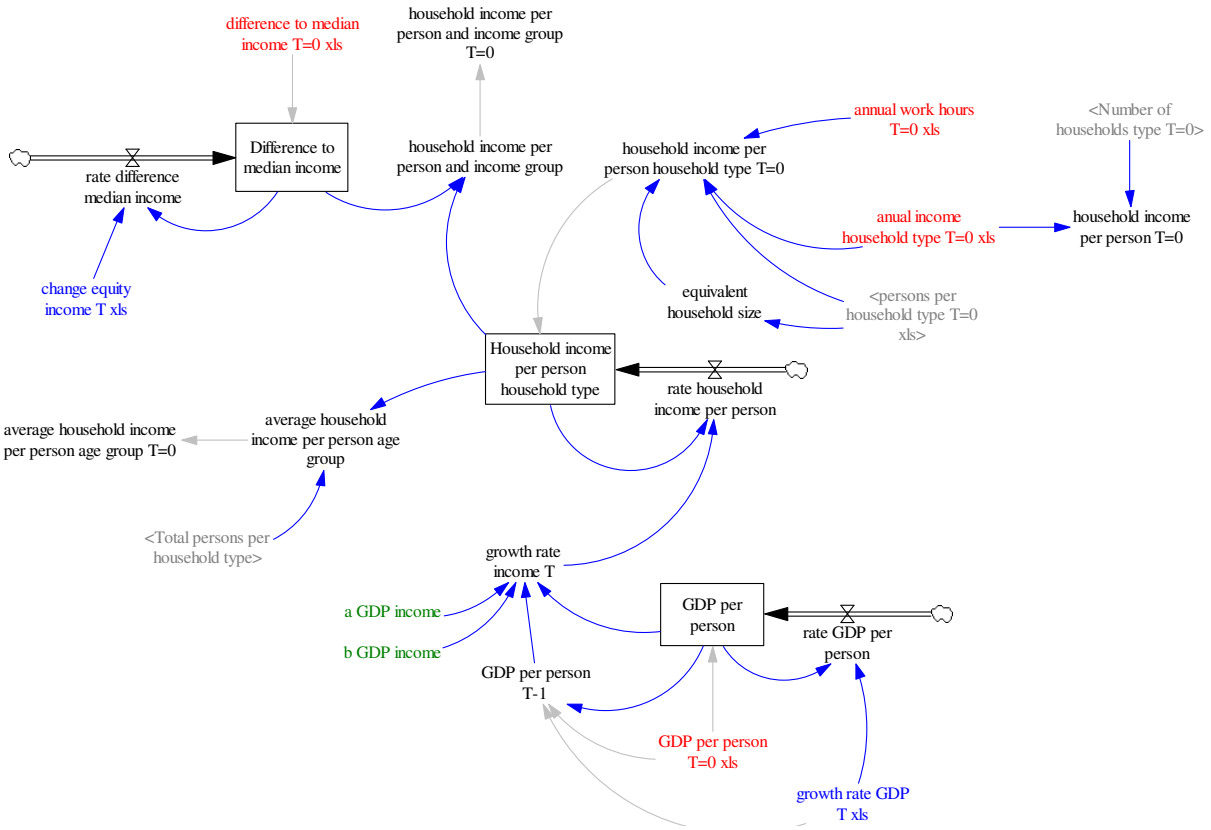


Figure 3-12 LUNA household income per person per household type and income group

The development of the household income for later years correlates with the GDP development (Equation 3-2).

$$I_r = a + b * GDP_r$$

Equation 3-2 Correlation between household income and GDP per person

Legend:
I_r.....Household income in region r (€/a)
a.....Parameter regression analysis (=1558.5)
b.....Parameter regression analysis (=0.4814)
GDP_r.....Gross domestic product per person in region r (€/a)

3.3.3 Transport Demand Model

The LUNA transport demand model consists of the following sub-models:

- A car availability model,
- A trip rate model, and
- A distance class and mode choice model.

Five different modes of transport are taken into account in the LUNA long-distance transport demand model:

- Private car,
- Bus and coach,
- Railway,
- Air, and

- Maritime.

Figure 3-13 shows a screenshot of the car-availability sub-model as programmed in Vensim(r).

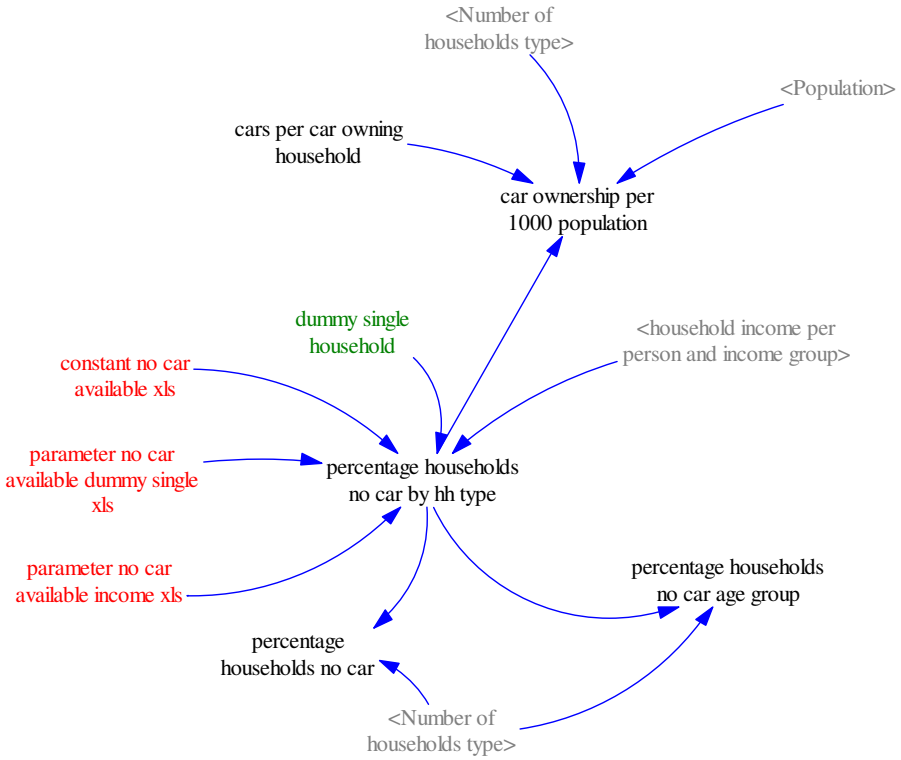


Figure 3-13 LUNA car availability sub-model in Vensim(r)

Car availability depends on the household type and the household income (Equation 3-3).

$$P_{h,r}^{no\ car} = a + b * S_r + c * I_{h,r}$$

Equation 3-3 Share of households without access to a car

Legend:
$P_{h,r}^{no\ car}$ .....Percentage of households of type h without a car in region r
a .....Regression coefficient (= 0.3077)
b .....Regression coefficient (= 0.4380)
S_r .....Dummy variable (1 if single household else 0)
c .....Regression coefficient (= -0.0230)
$I_{h,r}$ .....Household income per person household type h in region r

Figure 3-14 shows a screenshot of the equation tool in Vensim(r).

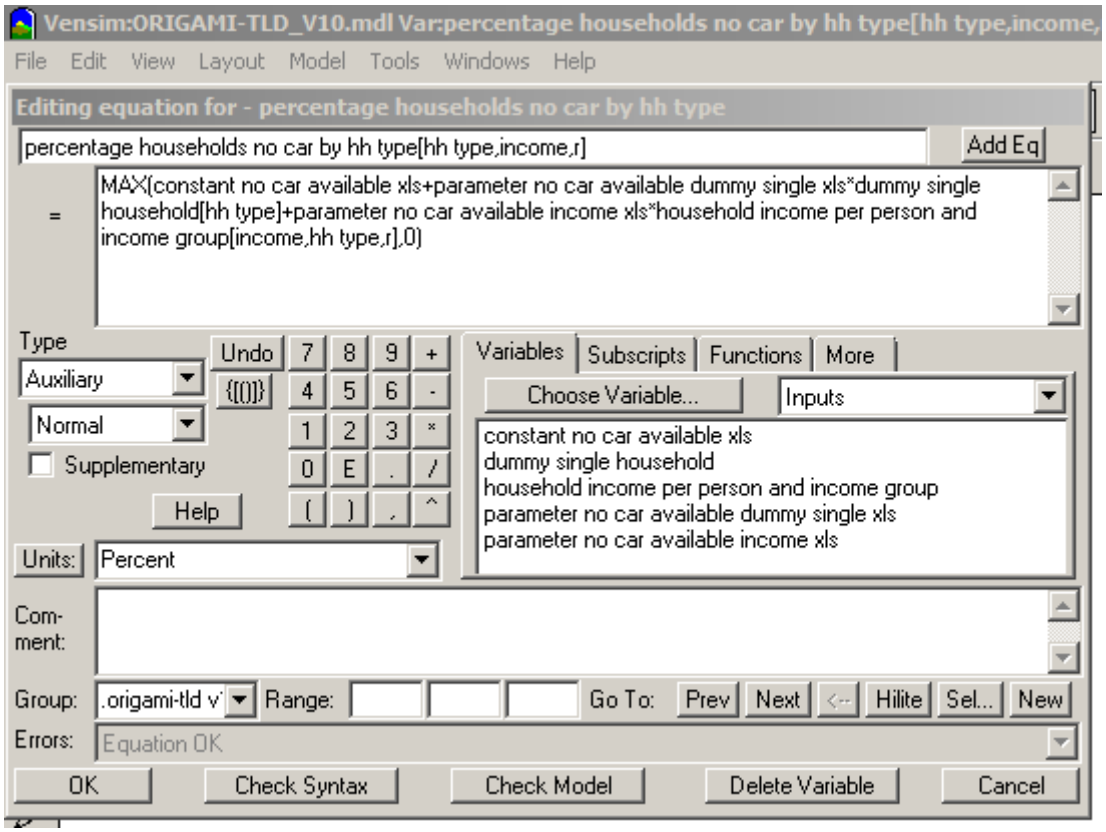


Figure 3-14 Screenshot calculation share of households without access to a car

Figure 3-15 shows a screenshot of the trip rate model as programmed in Vensim(r). Trip rates vary with household income and car availability.

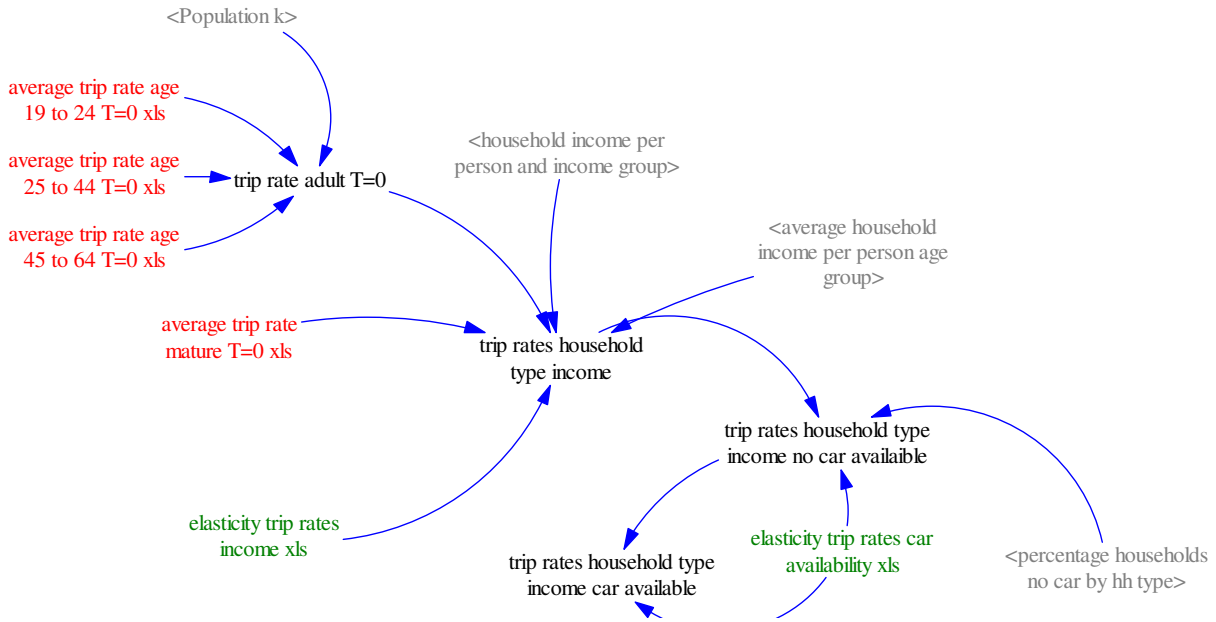


Figure 3-15 LUNA trip rate model in Vensim(r)

The distance class and mode choice sub-model uses so called friction factors to distribute the total demand for vacation trips to the different distance bands and modes of transport. Friction factors are indicators to measure the subjectively perceived effort in terms of time and money which is necessary to carry out a journey. Friction factors can be interpreted as a kind of generalised costs although measured in time rather than money. The concept of friction factors with subjective weighting factors for different parts of a journey stems from (Walther et al., 1997). Equation 3-4 shows the general definition of the friction factors.

$$f_{d,r}^{m} = \sum_{n} SW_{d,r}^{m,n} * t_{d,r}^{m,n} + \sum_{n} \frac{c_{d,r}^{m,n}}{\alpha_{r}^{m,n} * I_{r} * o_{d,r}^{m}}$$

Equation 3-4 Friction factor definition

Legend:
$f_{d,r}^{m}$ .....Friction factor for a vacation trip with mode m in distance band d originating in region r (h)
$SW_{d,r}^{m,n}$.....Subjective weighting factor for part n of a vacation trip with mode m in distance band d originating in region r (-)
$t_{d,r}^{m,n}$.....Time of part n of a vacation trip with mode m in distance band d originating in region r (h)
$c_{d,r}^{m,n}$.....Costs for part n of a vacation trip with mode m in distance band d originating in region r (€)
$\alpha_{r}^{m,n}$.....Parameter for willingness to pay for part n of a vacation trip with mode m originating in region r (-)
I_{r}.....Household income per person in region r (€/h)
$o_{d,r}^{m}$.....Occupancy rate of a private vehicle on a vacation trip with mode m in distance band d originating in region r (-), 1 if a public mode is used

Equation 3-5 shows the general form of the subjective weighting factors. The parameters a, b, c and α have been estimated by (Walther et al., 1997) for regional travel. The parameters for long-distance travel have been estimated by the developers of LUNA based on expert judgement and comparison with observed data about mode split and distance band shares.

$$SW_{d,r}^{m,n} = a + b * e^{c * t_{d,r}^{m,n}}$$

Equation 3-5 Subjective weighting factor definition

Legend:
$SW_{d,r}^{m,n}$.....Subjective weighting factor for part n of a vacation trip with mode m in distance band d originating in region r (-)
$t_{d,r}^{m,n}$.....Time of part n of a vacation trip with mode m in distance band d originating in region r (h)
a, b, c.....Parameters

Figure 3-16 to Figure 3-20 show screenshots of the friction factor calculation for the modes car, coach, rail, air and maritime. In general a journey consists of the access to the entrance point to the main mode (parking place, bus terminal, railway station, airport, harbour), waiting, check in and security procedures, in vehicle time, changing and egress from the main mode.

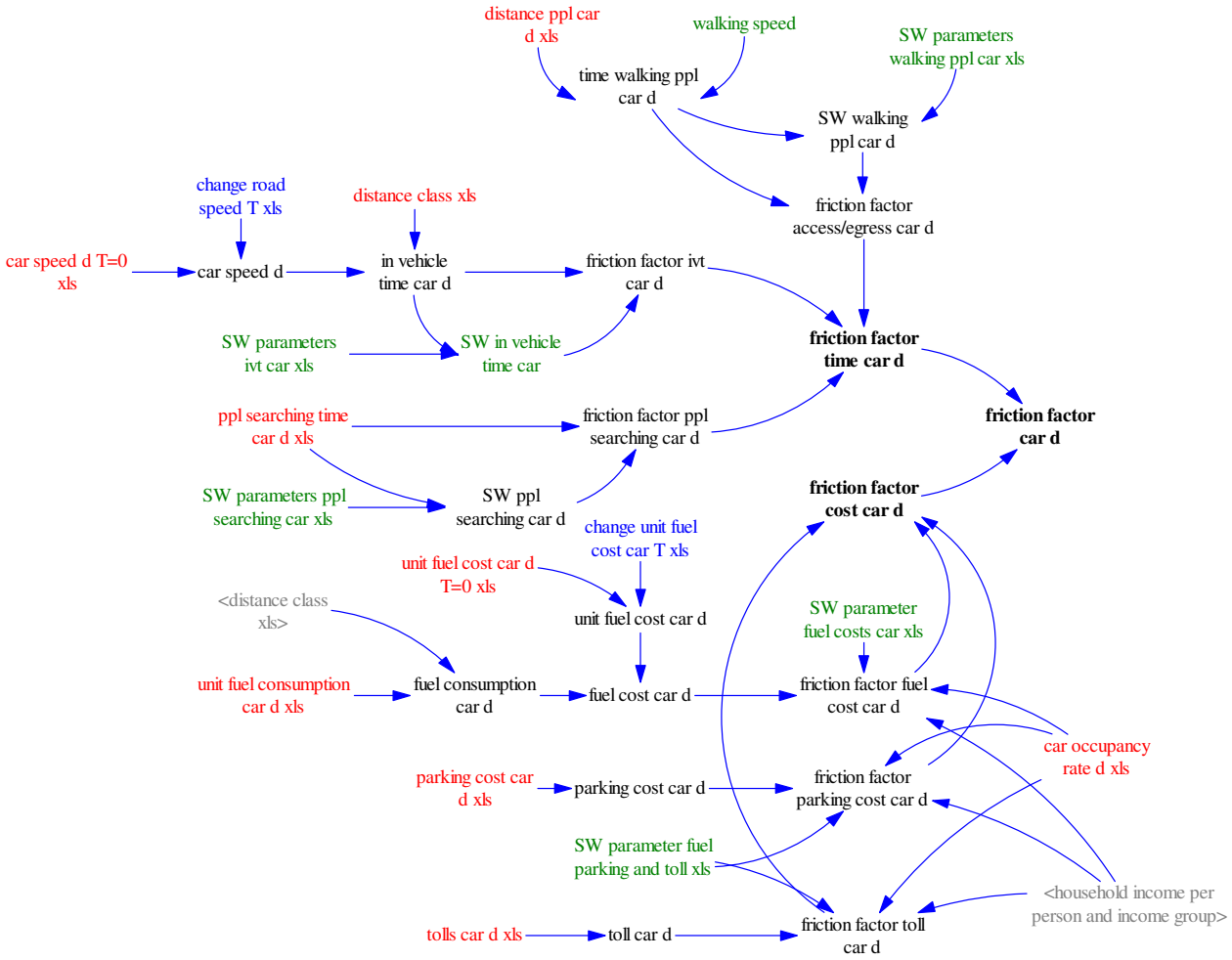


Figure 3-16 LUNA friction factor calculation mode car in Vensim(r)

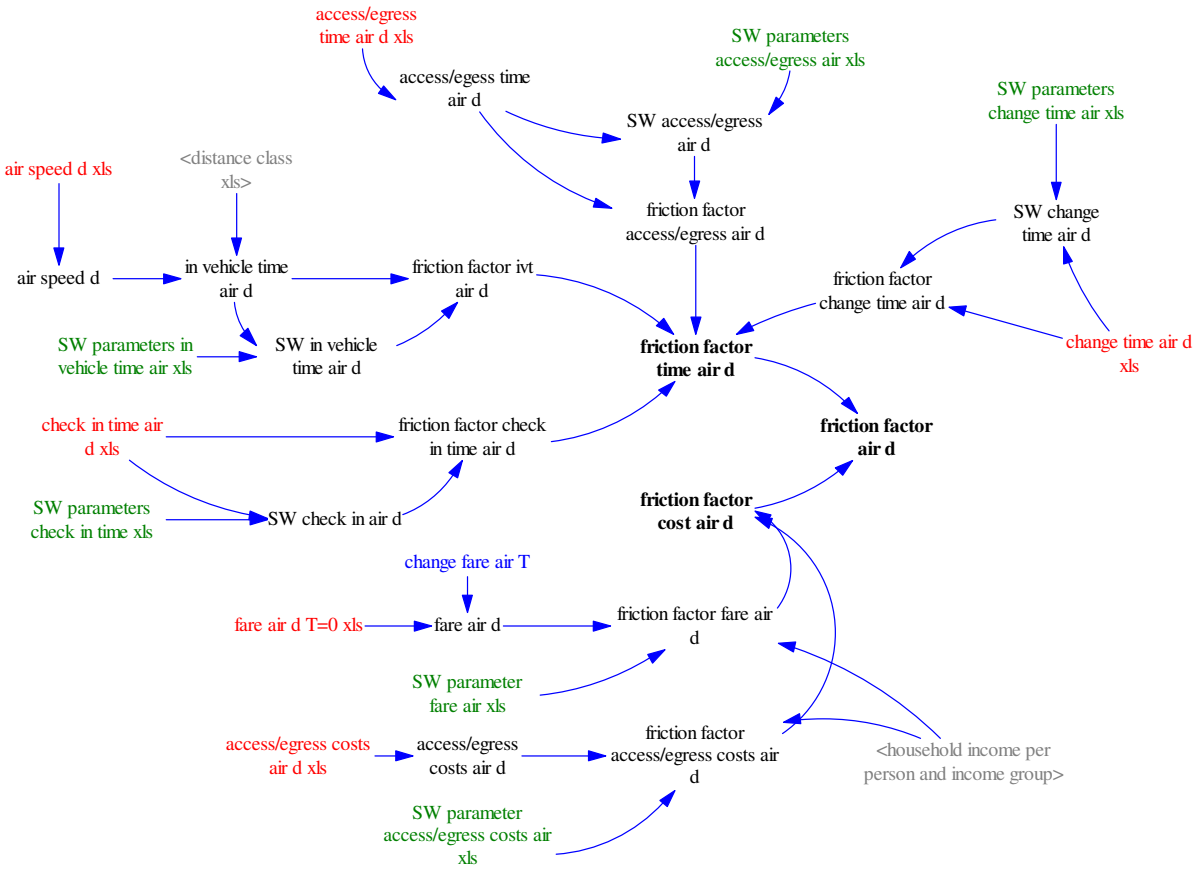


Figure 3-17 LUNA friction factor calculation mode coach in Vensim(r)

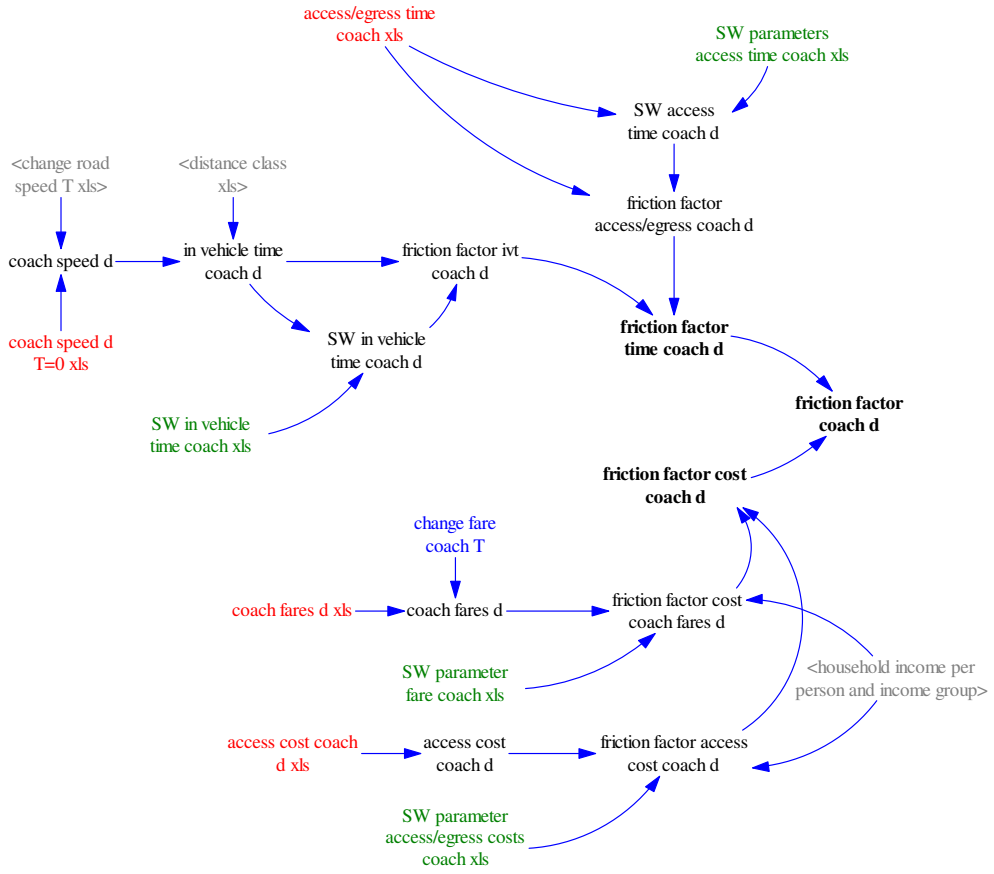


Figure 3-18 LUNA friction factor calculation mode rail in Vensim(r)

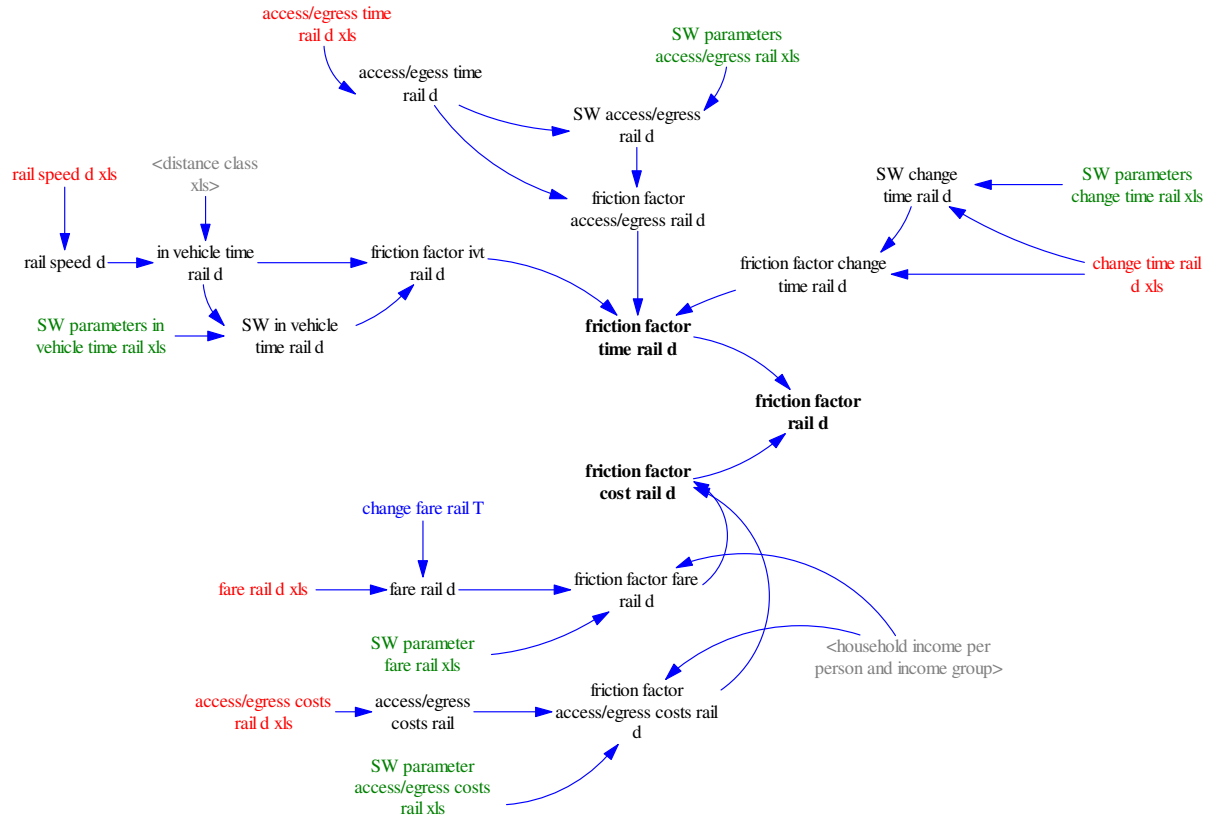


Figure 3-19 LUNA friction factor calculation mode air in Vensim(r)

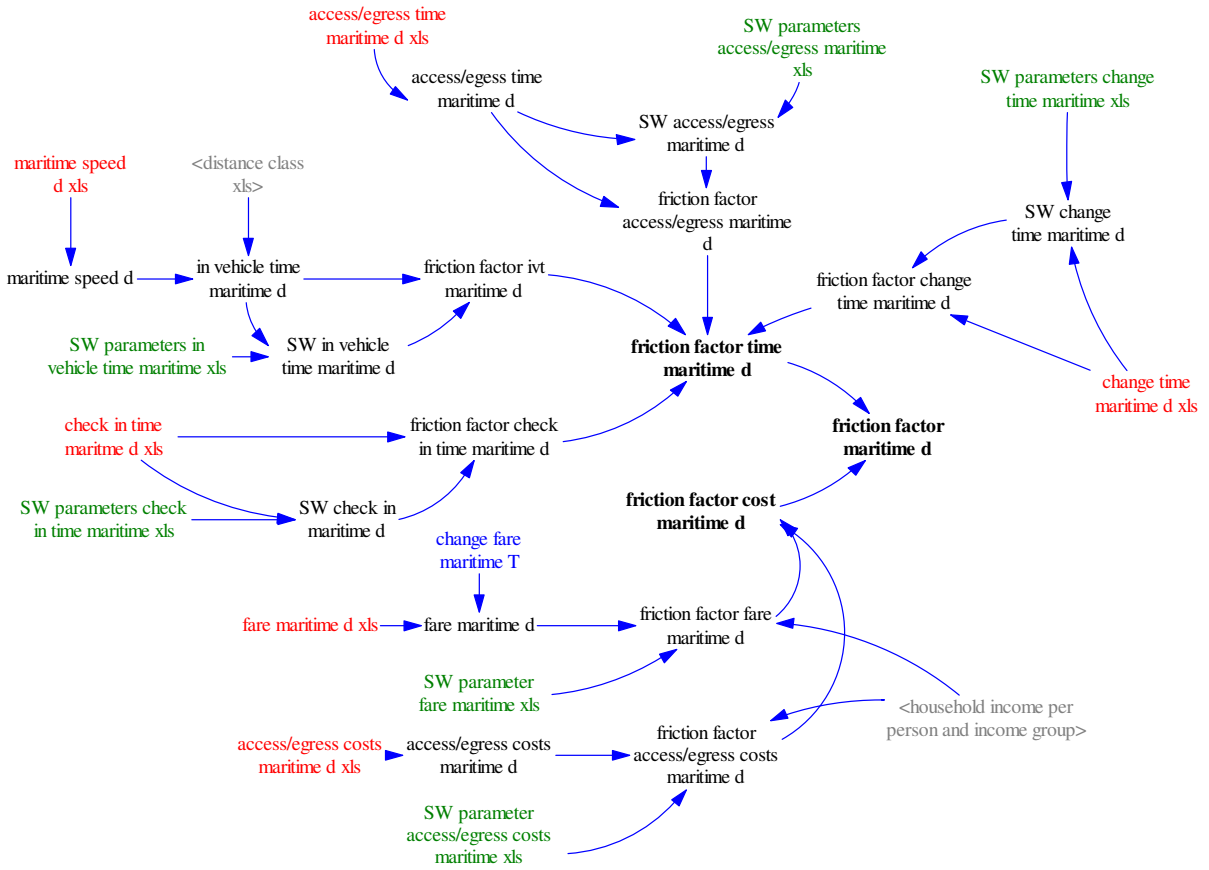


Figure 3-20 LUNA friction factor calculation mode air in Vensim(r)

Equation 3-6 and Figure 3-21 show the calculation of the number of vacation trips by mode, distance band and region.

$$T_{d,r}^{m} = P_r^{car} \frac{\frac{a_{d,r}^{m}}{f_{d,r}^{m}}}{\sum_{d,m} \frac{a_{d,r}^{m}}{f_{d,r}^{m}}} + P_r^{no\ car} \frac{\frac{a_{d,r}^{m'}}{f_{d,r}^{m'}}}{\sum_{d,m'} \frac{a_{d,r}^{m'}}{f_{d,r}^{m'}}}$$

Equation 3-6 Distance band and mode choice

Legend:
$T_{d,r}^{m}$ .....Vacation trips with mode m in distance band d originating in region r (trips/a)
P_r^{car}.....Potential vacation trips originating in region r households with access to a car (trips/a)
$P_r^{no\ car}$.....Potential vacation trips originating in region r households without access to a car (trips/a)
$a_{d,r}^{m}$.....Availability of mode m in distance band d originating in region r (-)
$f_{d,r}^{m}$ .....Friction factor for a vacation trip with mode m in distance band d originating in region r (h)
m'.....Subset of modes available in households without access to a car (coach, rail, air, maritime)

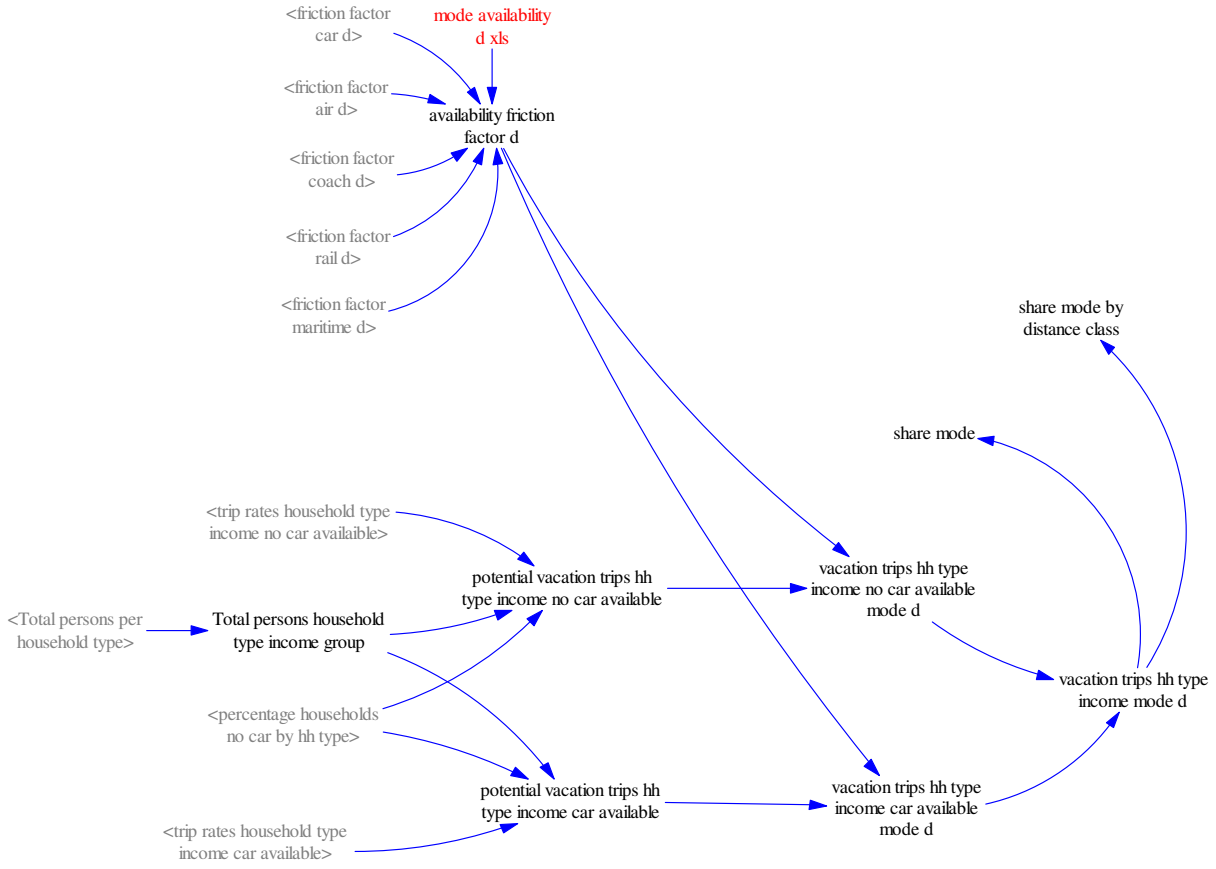


Figure 3-21 LUNA distance class and mode choice model in Vensim(r)

3.3.4 Sub-Module Calculation of Evaluation Indicators

To date only a limited number of output and evaluation indicators are calculated, namely modal share (see Figure 3-21), person kilometres, vehicle kilometres car, passengers by mode and average distance by trip and mode (see Figure 3-22). The wider set of evaluation indicators as defined in the ORIGAMI evaluation framework will be implemented later in WP7 Scenarios.

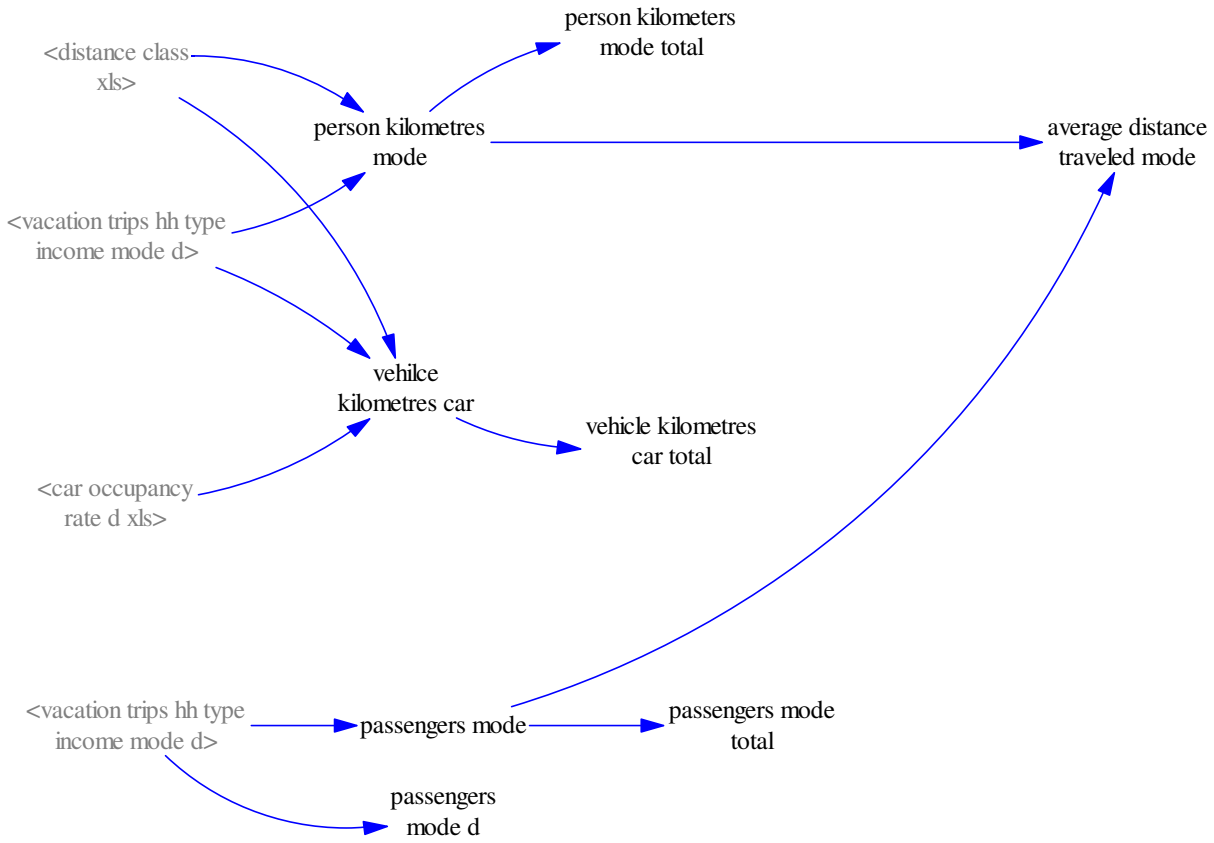


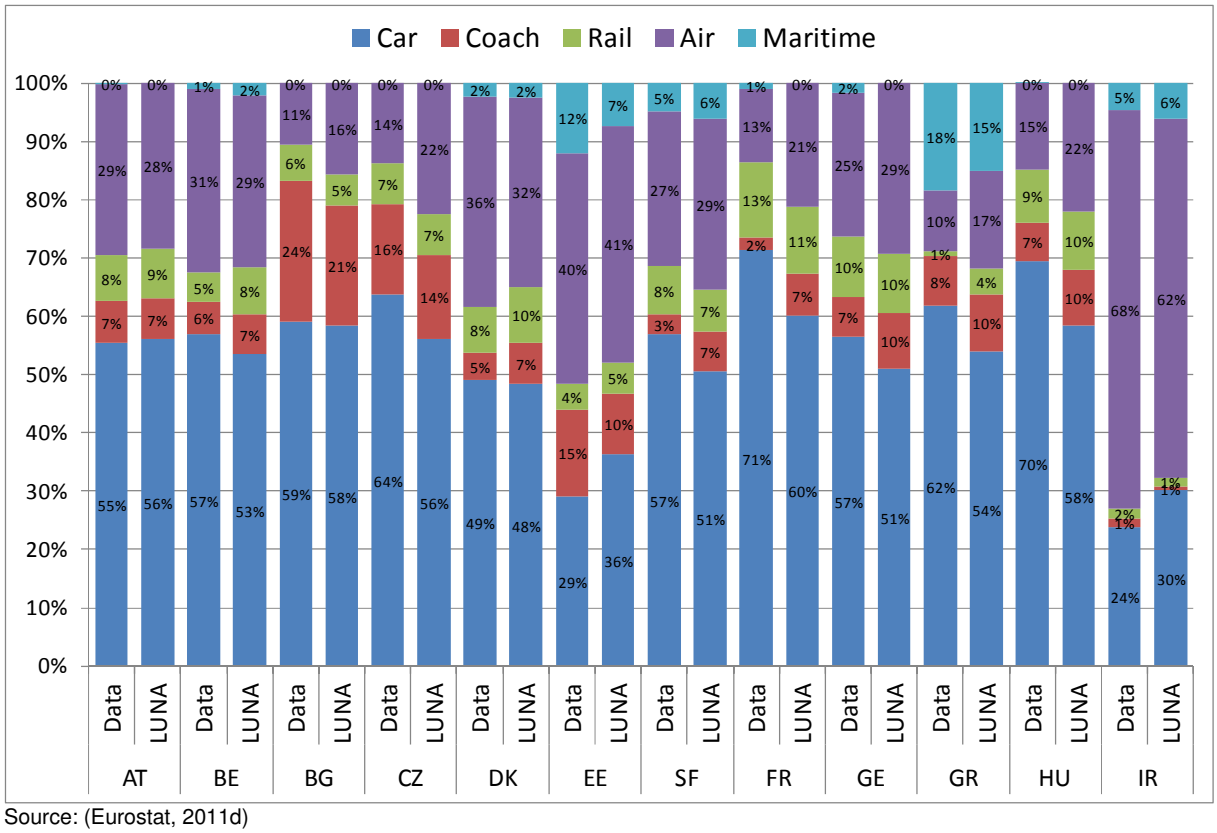
Figure 3-22 LUNA output and evaluation indicators in Vensim(r)

3.3.5 Model Testing

A comparison of different outcome indicators of the model LUNA with observed data from different sources was carried out in order to estimate model parameters and to test the quality of the model predictions.

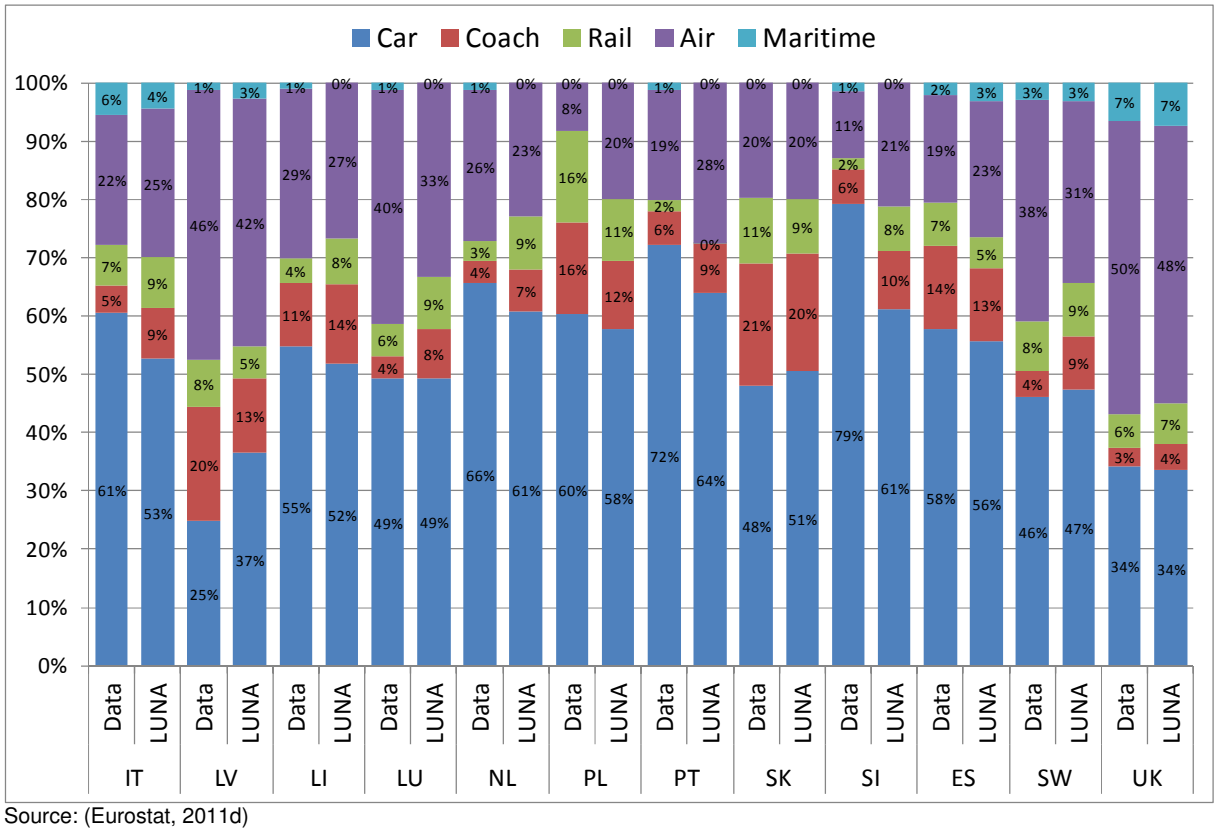
Comparison of modal split for holiday journeys four or more nights

At the current stage, LUNA models the demand for long-distance vacation trips. Other trip purposes will be implemented within the framework of WP7 Scenarios. Data about holiday journeys with overnight stays are available for nearly all EU member states from the Eurostat database. In the absence of other data it is assumed that holiday journeys with four or more nights represent long-distance vacation trips. Figure 3-23 and Figure 3-24 show a country by country comparison of the mode split data from Eurostat and the LUNA base year results. Generally the predictions fit the observed data well. Nevertheless there are some countries where the fit less satisfying. Some of these are countries with a very high share of car trips, like Slovenia or France. The model cannot reproduce these values because the share of car trips is higher than the share of households with access to a car. Other countries were the model fit is less good are those with a very low share of car trips, like Estonia, Latvia or Ireland.



Source: (Eurostat, 2011d)

Figure 3-23 Comparison mode split holiday travel 4 nights and longer Eurostat – LUNA



Source: (Eurostat, 2011d)

Figure 3-24 Comparison mode split holiday travel 4 nights and longer Eurostat – LUNA, continued

Figure 3-25 to Figure 3-29 show the country by country correlation between the modelled and the observed modal share. Generally the fit is acceptable. Nevertheless, since there seems to room for improvement concerning the rail mode, revisions to the input data concerning rail supply (e.g. access to railway stations, etc.) are planned within the scenario definition in WP7 Scenarios.

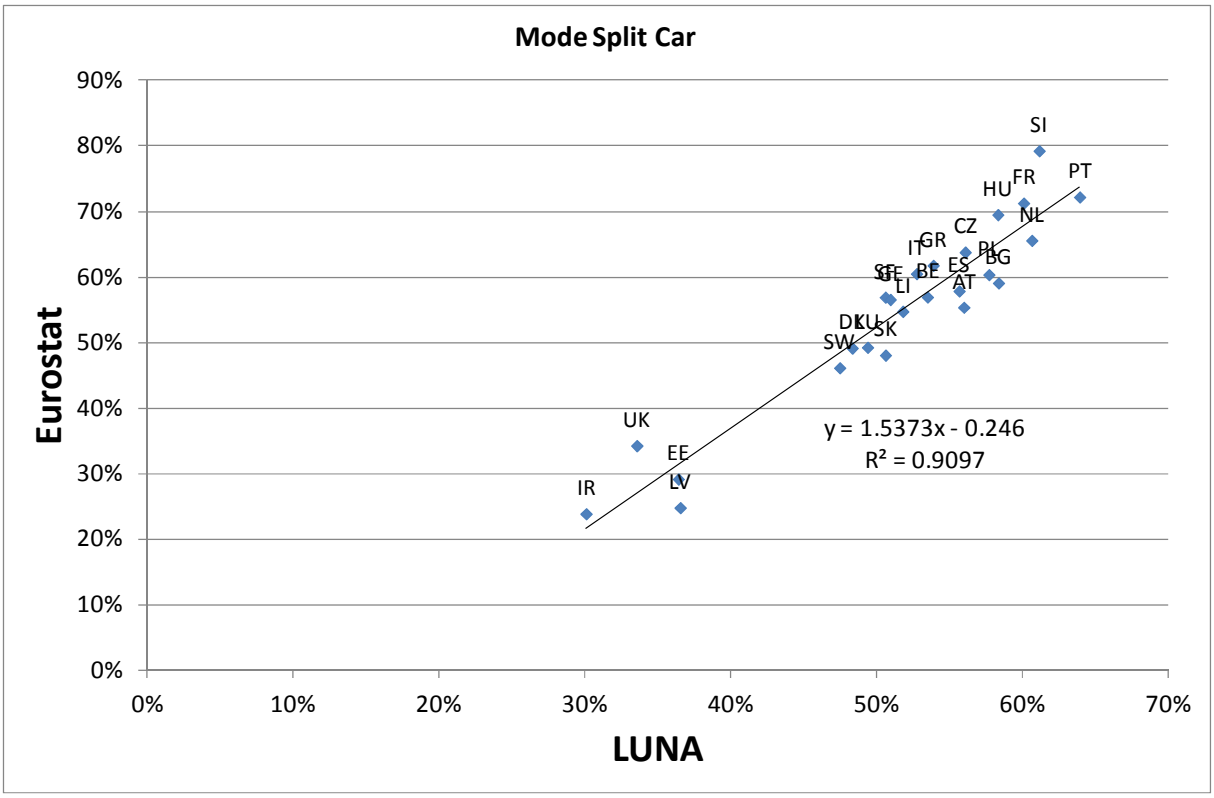


Figure 3-25 Correlation between mode split car Eurostat - LUNA

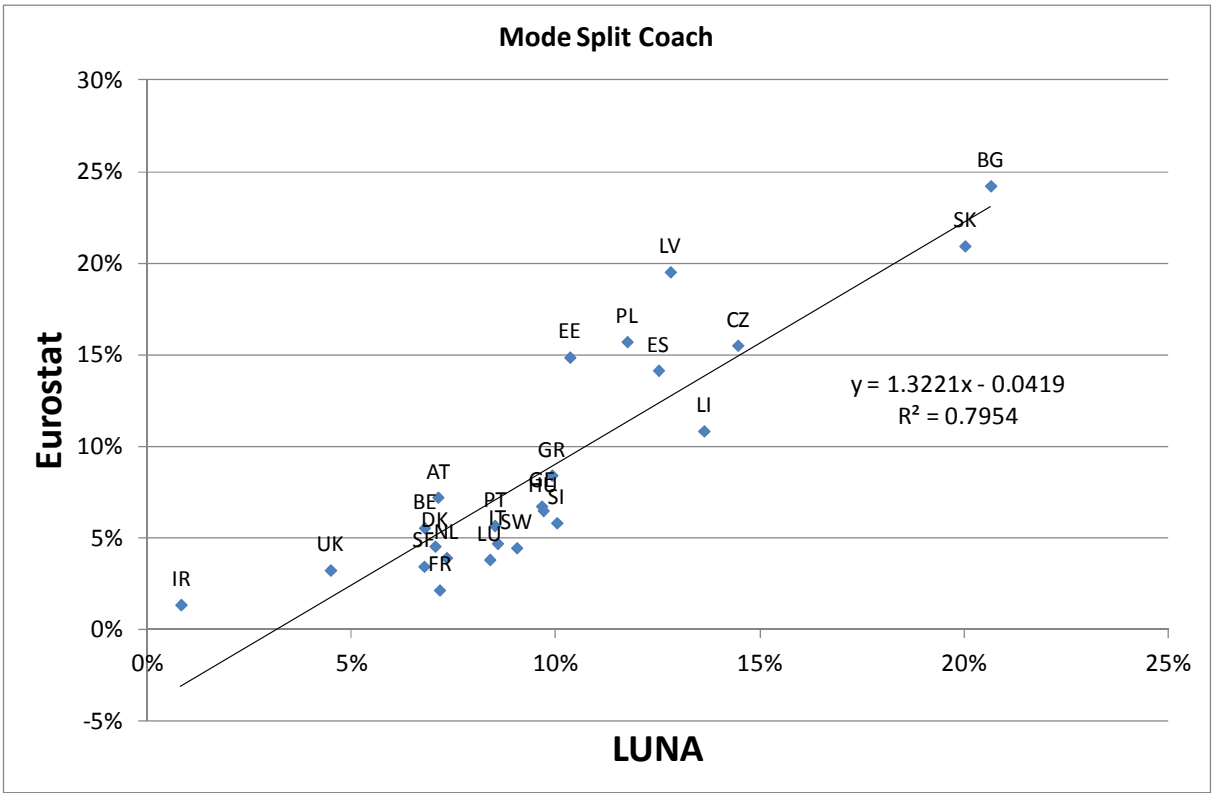


Figure 3-26 Correlation between mode split coach Eurostat - LUNA

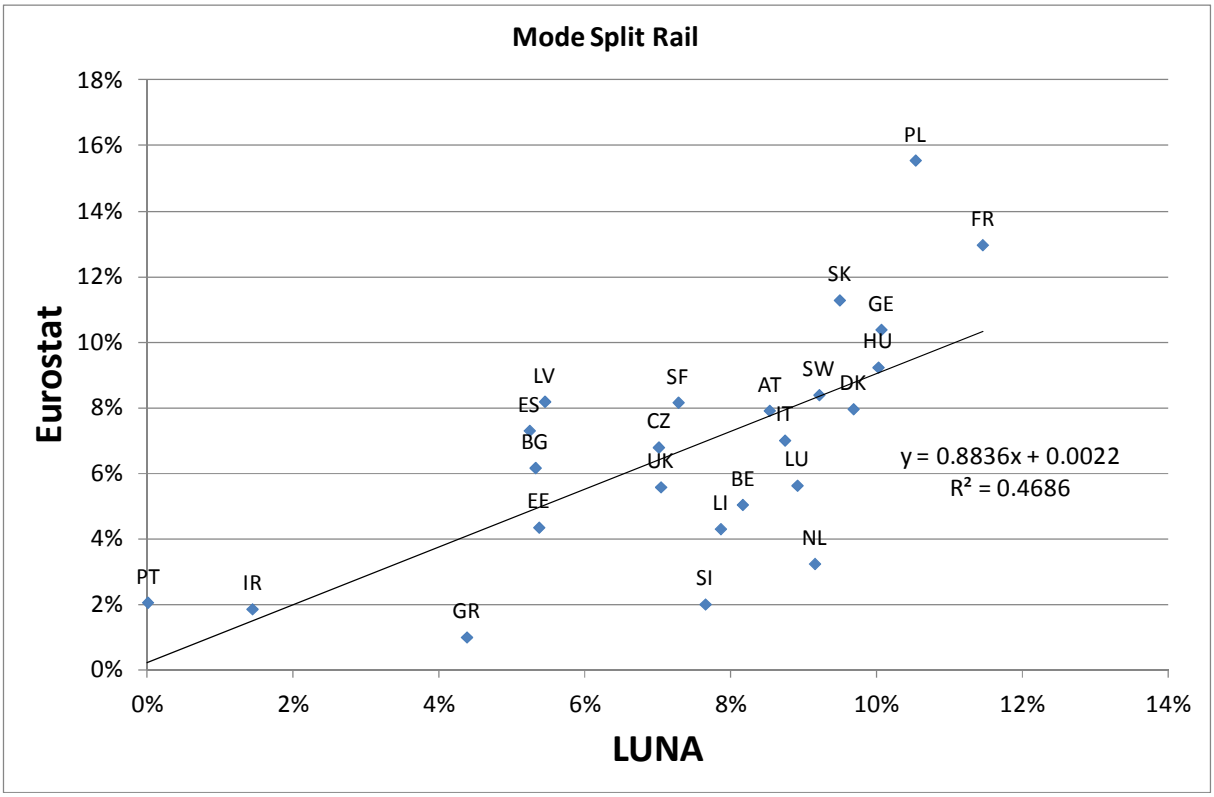


Figure 3-27 Correlation between mode split rail Eurostat - LUNA

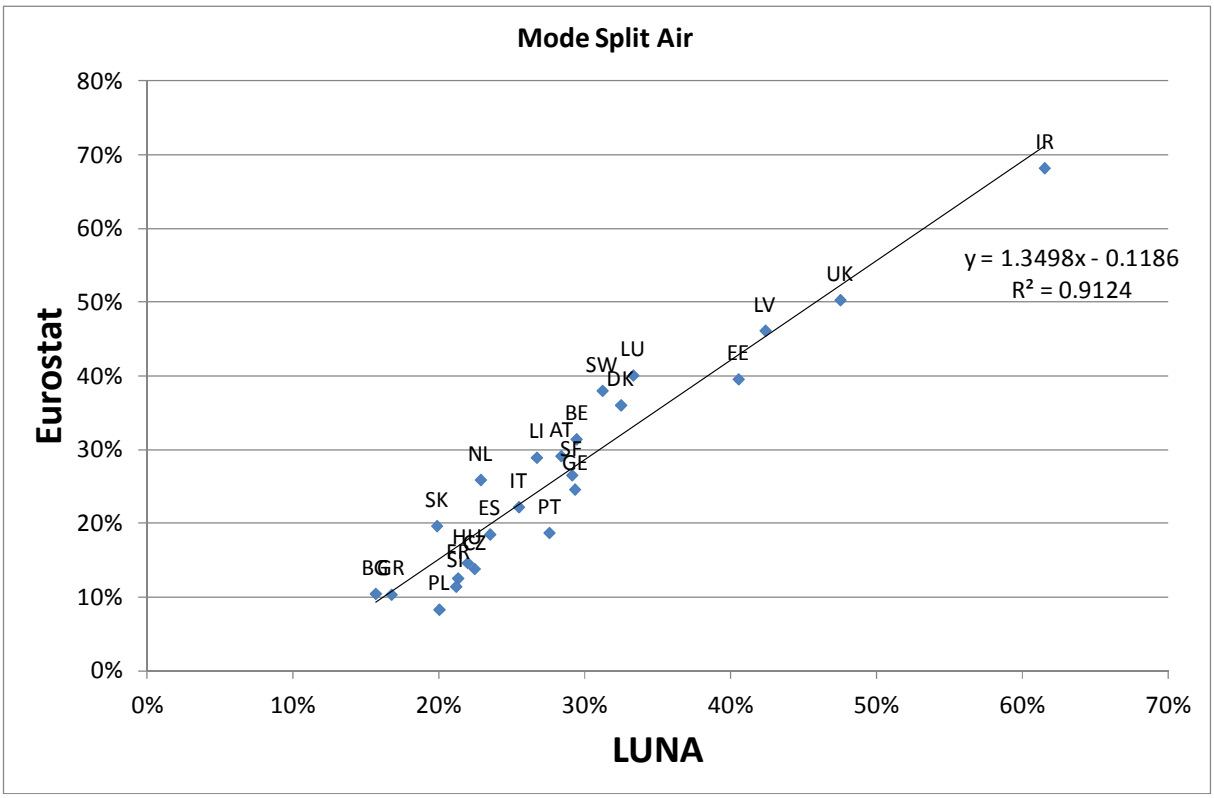


Figure 3-28 Correlation between mode split air Eurostat - LUNA

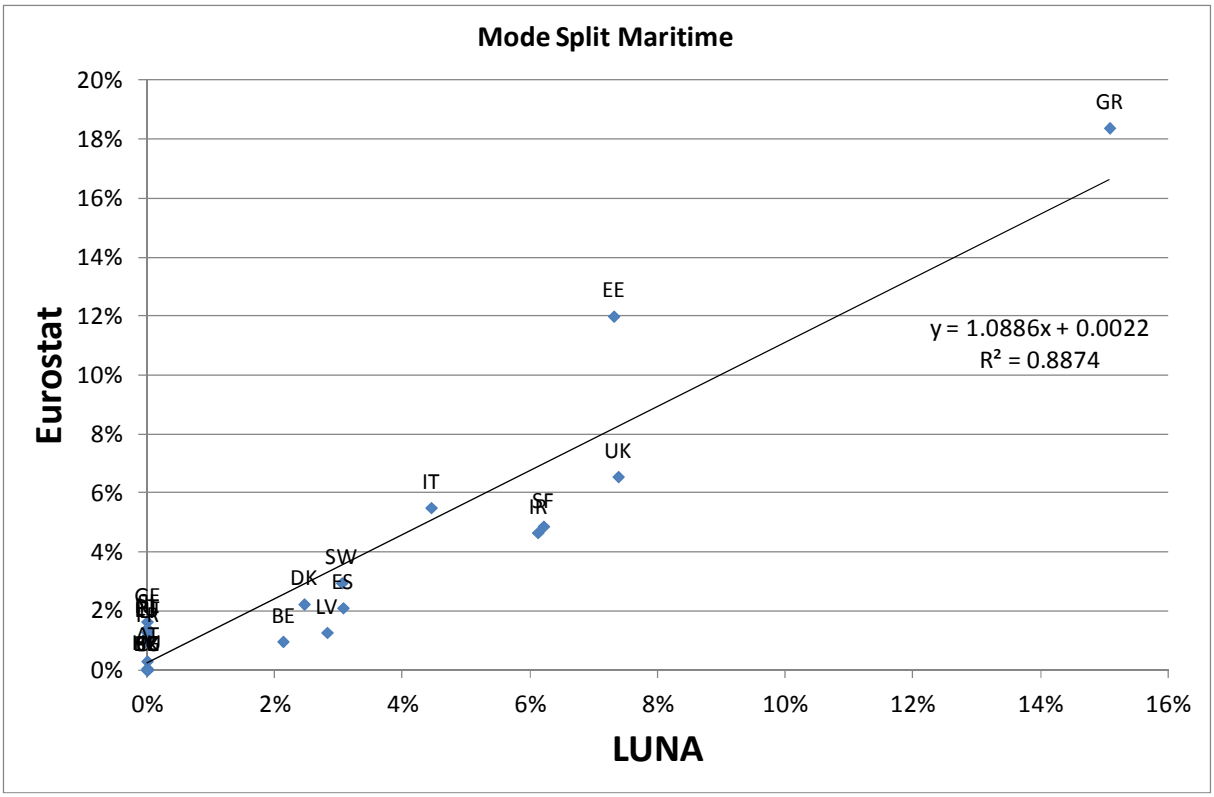


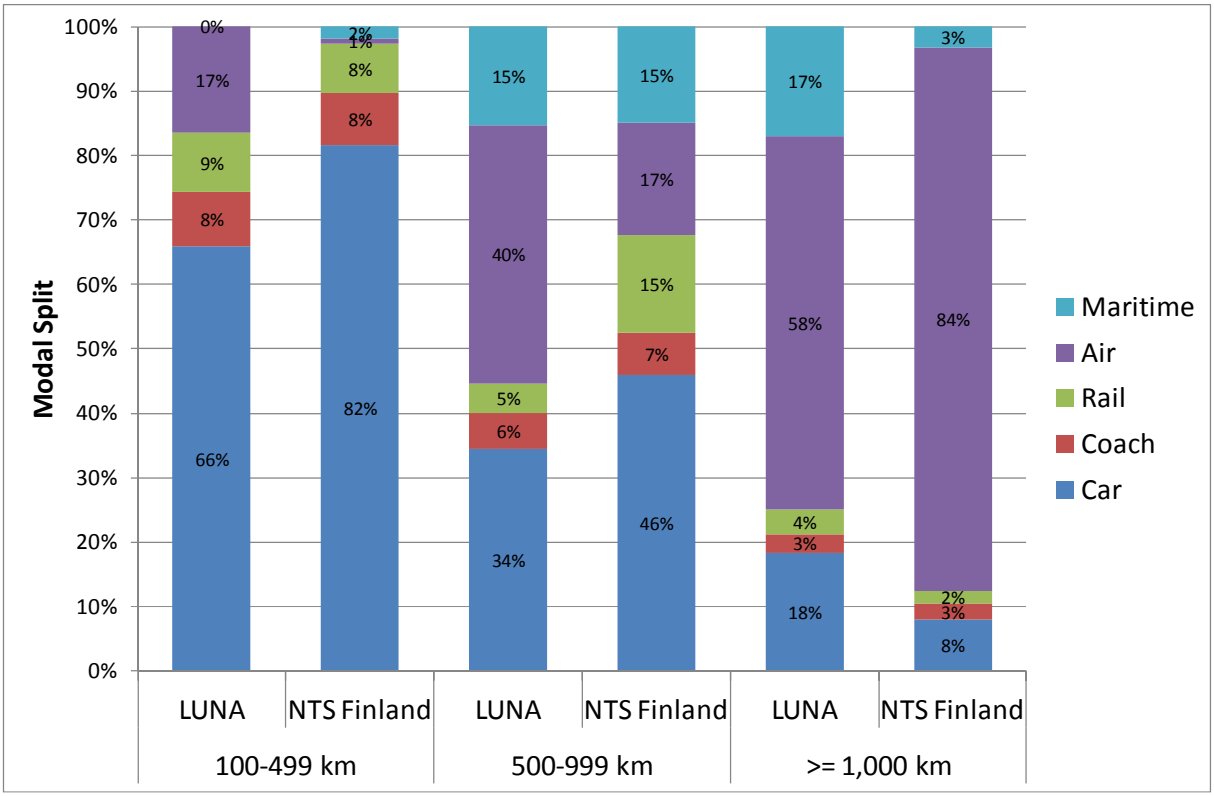
Figure 3-29 Correlation between mode split maritime Eurostat - LUNA

Comparison of modal split by distance band

For some European countries, namely Finland, France, Germany, Spain, Sweden and the United Kingdom, more detailed data about long-distance travel are available from national travel surveys (Ministry of Transport and Communications Finland et al., 2006, Ministère de l'Ecologie du Développement durable des Transports et du Logement, 2010, infas Institut für angewandte Sozialwissenschaft GmbH, 2010, Ministerio de Fomento, 2007, Swedish Institute for Transport and Communications Analysis (SIKA), 2007, Department for Transport, 2011).This enables us to compare model predictions with observed data for specified distance bands.

Finland

Figure 3-30 shows a comparison of mode split data by distance band from the Finish National Travel Survey with the corresponding data from the model LUNA. The data from the National Travel Survey (Ministry of Transport and Communications Finland et al., 2006) seem to be approximately in line with the data from Eurostat for holiday journeys with four or more nights (Eurostat, 2011d). In the lower two distance bands LUNA underestimates car travel and overestimates air travel while in the highest distance band car travel is overestimated and air travel is underestimated.

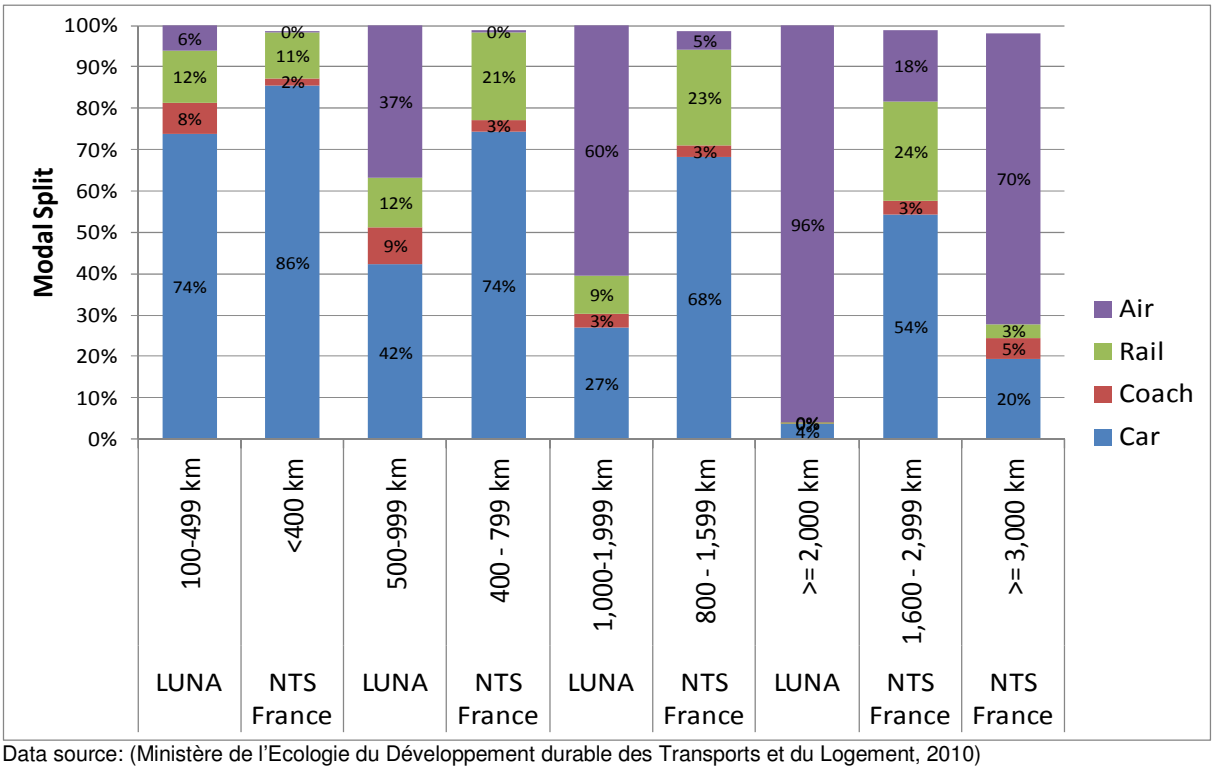


Data source: (Ministry of Transport and Communications Finland et al., 2006)

Figure 3-30 Comparison of mode split by distance band LUNA base year results – National Travel Survey Finland

France

Figure 3-31 shows a comparison of mode split data by distance band from the French National Travel Survey with the corresponding data from the model LUNA. The data from the National Travel Survey (Ministère de l'Ecologie du Développement durable des Transports et du Logement, 2010) seem to be approximately in line with the data from Eurostat for holiday journeys with four or more nights (Eurostat, 2011d). Unfortunately the two distance band definitions do not fit exactly. Noticeable is the very high share of car trips in the longest distance bands of the National Travel Survey. In comparison with the National Travel Survey LUNA underestimates car and rail travel and overestimates air and coach travel. In LUNA the base year share of households with access to a car is about 75 %. Even if all trips by these households in the lowest distance band were made by car it is not possible to replicate the share of 86 % from the National Travel Survey.

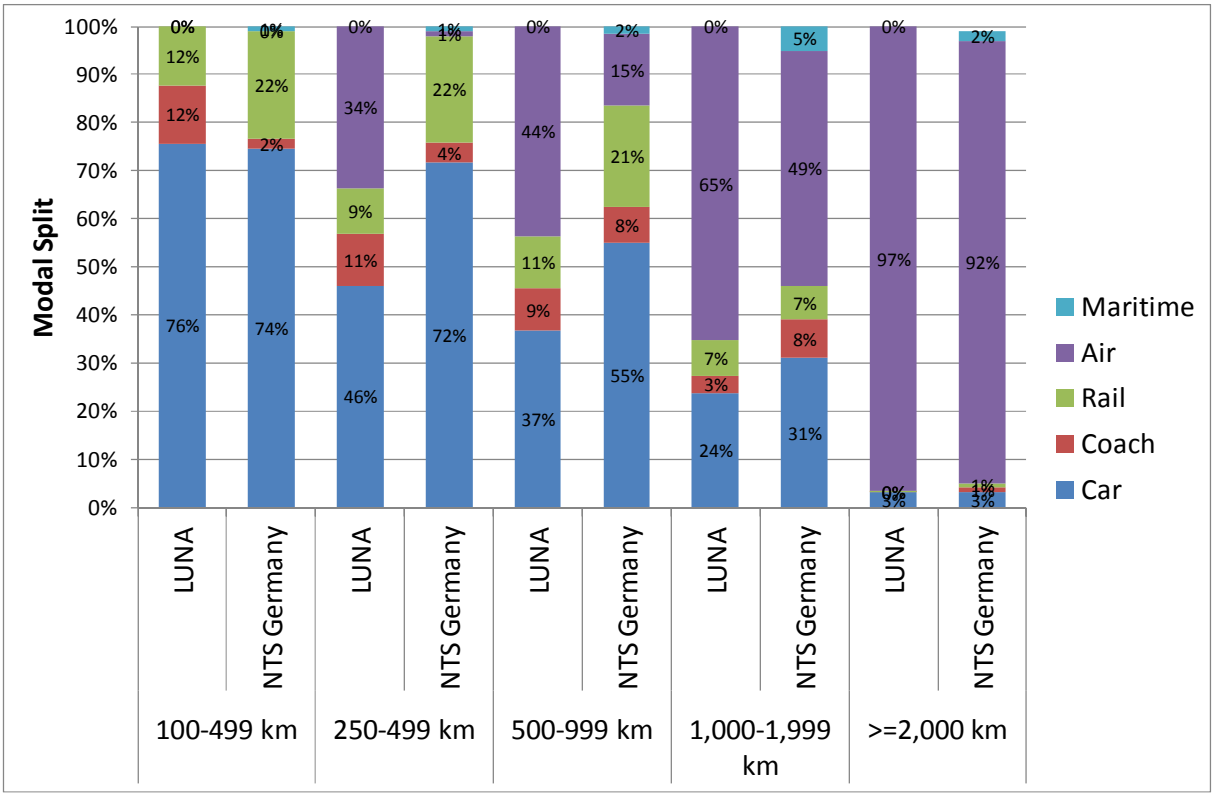


Data source: (Ministère de l'Ecologie du Développement durable des Transports et du Logement, 2010)

Figure 3-31 Comparison of mode split by distance band LUNA base year results – National Travel Survey France

Germany

Figure 3-32 shows a comparison of mode split data by distance band from the German National Travel Survey with the corresponding data from the model LUNA. The data from the National Travel Survey (infas Institut für angewandte Sozialwissenschaft GmbH, 2010) seem to be approximately in line with the data from Eurostat for holiday journeys with four or more nights (Eurostat, 2011d). The general fit between the two sets of data is good. Although in the middle distance bands LUNA has the tendency to underestimate car and rail trips and to overestimate air trips.

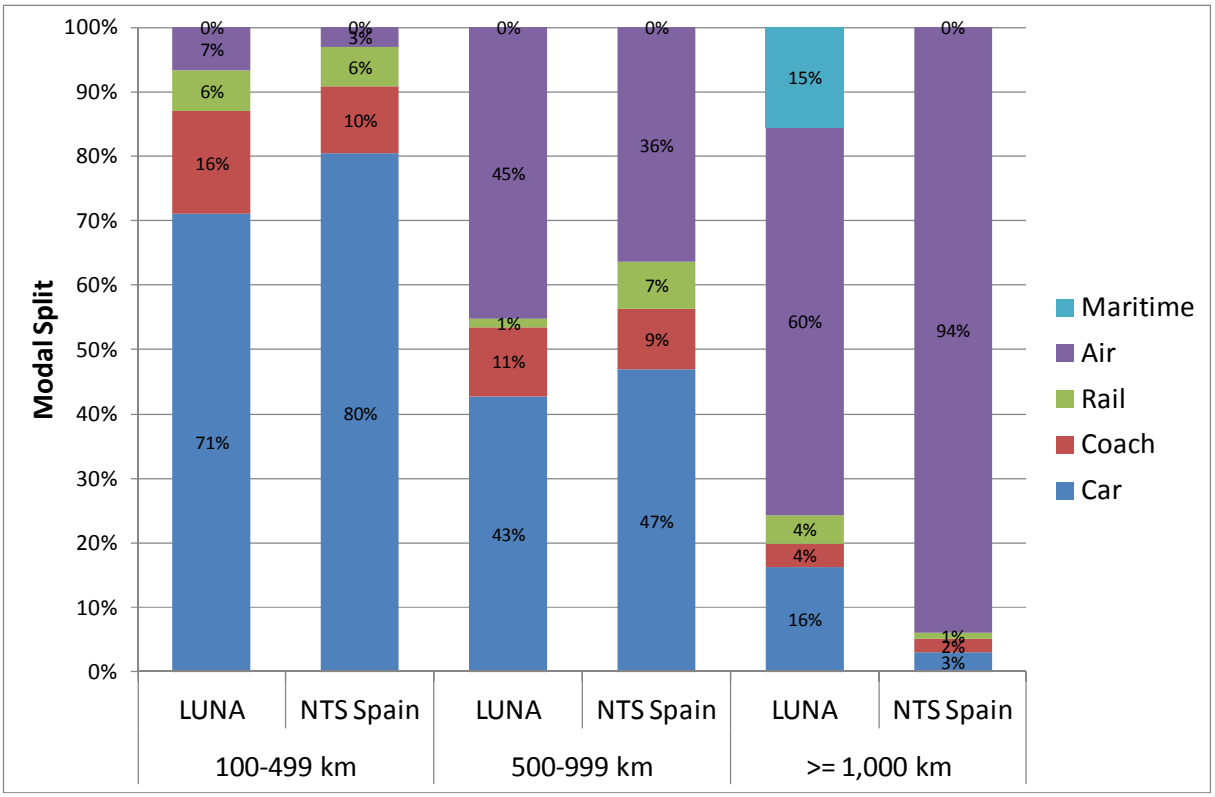


Data source: (infas Institut für angewandte Sozialwissenschaft GmbH, 2010)

Figure 3-32 Comparison of mode split by distance band LUNA base year results – National Travel Survey Germany

Spain

Figure 3-33 shows a comparison of mode split data by distance band from the Spanish National Travel Survey with the corresponding data from the model LUNA. The data from the National Travel Survey (Ministerio de Fomento, 2007) seem to be approximately in line with the data from Eurostat for holiday journeys with four or more nights (Eurostat, 2011d). The fit between the two sets of data is relatively good. Data about seaborne transport are missing in the National Travel Survey. LUNA has a slight tendency to underestimate car travel and to overestimate air travel in the lower distance bands and to do the opposite in the highest distance band.

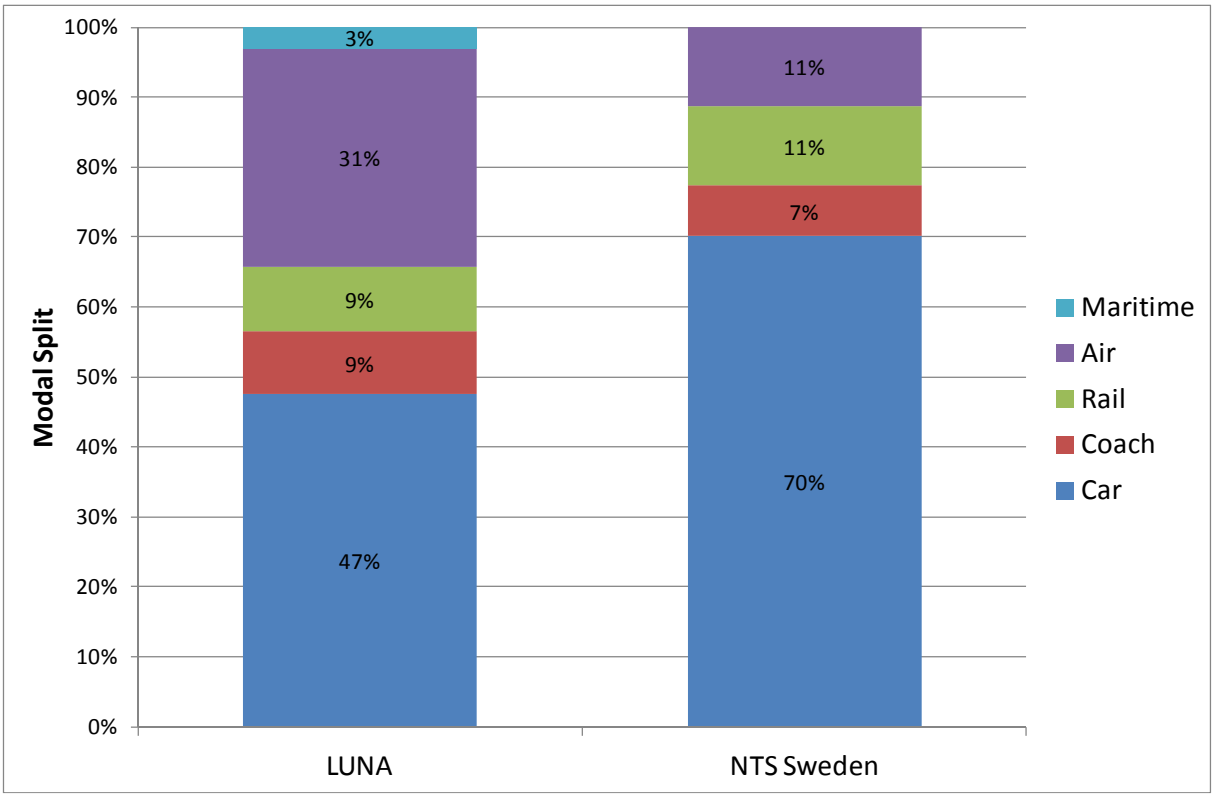


Data source: (Ministerio de Fomento, 2007)

Figure 3-33 Comparison of mode split by distance band LUNA base year results – National Travel Survey Spain

Sweden

The Swedish National Travel Survey (Swedish Institute for Transport and Communications Analysis (SIKA), 2007) does not provide mode split data about long-distance travel by distance band but only for trips longer than 100 kilometres. Figure 3-34 shows a comparison of these mode split data from the Swedish National Travel Survey with the corresponding data from the model LUNA. The data from the National Travel Survey are not in line with the data from Eurostat for holiday journeys with four or more nights (Eurostat, 2011d). As the parameters of the model LUNA were estimated based on the Eurostat data it comes as no surprise that the fit between the two data sets is not good.

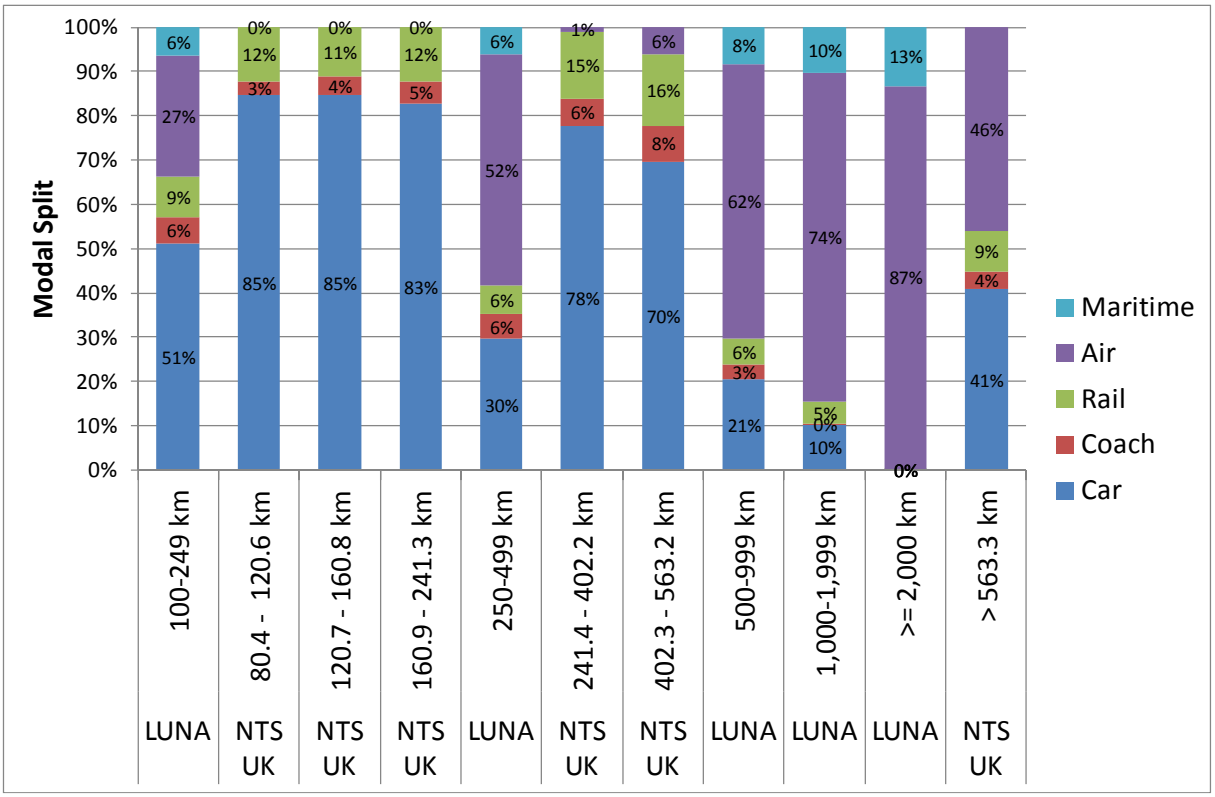


Data source: (Swedish Institute for Transport and Communications Analysis (SIKA), 2007)

Figure 3-34 Comparison of mode split by distance band LUNA base year results – National Travel Survey Sweden

United Kingdom

Figure 3-35 shows a comparison of the mode split data by distance band from the UK National Travel Survey (Department for Transport, 2011) with the corresponding data from the model LUNA. The distance band definition does not fit exactly. The data from the National Travel Survey are not in line with the data from Eurostat for holiday journeys with four or more nights (Eurostat, 2011d). E.g. the share of car travel in the highest distance band is even higher than the total car share in the Eurostat data. As the parameters of the model LUNA were estimated based on the Eurostat data it comes as no surprise that the fit between the two data sets is not very well.



Data source: (Department for Transport, 2011)

Figure 3-35 Comparison of mode split by distance band LUNA base year results – National Travel Survey United Kingdom

3.4 BASELINE SCENARIO DESCRIPTION

The baseline scenario for the identification of future trends utilising the LUNA model follows broadly the base case definition of the work described in (ITC, 2010, Dargay, 2010). Nevertheless it has to be mentioned that the baseline scenario will be revised within the work in WP7 Scenarios. Hence the scenario described here is not the final one.

The main assumptions for the baseline scenario are as follows:

- Relative to 2010, total GDP of the EU27 plus Norway and Switzerland grows by 52 % until 2030 and 104 % until 2050.
- Relative to 2010 income equity is improving in Denmark, Finland, Sweden, Norway and Switzerland, stable in Belgium, Germany, France, Cyprus, Luxembourg, Malta, the Netherlands, Austria and the UK and declining in Bulgaria, Czech Republic, Estonia, Ireland, Greece, Spain, Latvia, Lithuania, Hungary, Poland, Portugal, Slovenia and Slovakia.
- Relative to 2010, car fuel costs are increasing by 7 % up to 2030 and by 30 % up to 2050.
- Relative to 2010, rail and bus fares are increasing by 30 % up to 2030 and by 40 % up to 2050.
- Relative to 2010, air fares are declining by 12.5 % up to 2030 and then staying constant.
- Relative to 2010, fares for maritime transport are increasing by 30 % up to 2030 and by 40 % up to 2050.
- Due to increasing congestion, road speed relative to 2010 declines by about 6 % up to 2030 and then stays constant to 2050.

3.5 FORECASTS DRIVERS OF LONG-DISTANCE TRAVEL

3.5.1 Population

Eurostat population forecast 2060

The Eurostat database provides a population forecast by country up to the year 2060 (Eurostat, 2011a). Table 3-12 shows the data for the EU27 countries plus Norway and Switzerland for 2010-50. The total population of these countries is predicted to grow between 2010 and 2050 by about 5 %. The population is predicted to grow in 18 countries[13] and to decline in 11[14]. The highest relative growth is predicted for Luxembourg (+40%) and the highest decline is predicted for Bulgaria (- 22 %).

[13] Belgium, Czech Republic, Denmark, Ireland, Greece, Spain, France, Italy, Cyprus, Luxembourg, Netherlands, Austria, Slovenia, Finland, Sweden, United Kingdom, Norway and Switzerland

[14] Bulgaria, Germany, Estonia, Latvia, Lithuania, Hungary, Malta, Poland, Portugal, Romania and Slovakia

Table 3-12 Eurostat population forecast 2010-2050

Country	2010	2020	2030	2040	2050
Belgium	10,839,905	11,592,534	12,204,065	12,717,855	13,125,523
Bulgaria	7,563,710	7,121,205	6,611,320	6,235,049	5,898,876
Czech Republic	10,506,813	10,816,080	10,839,979	10,740,155	10,667,723
Denmark	5,534,738	5,720,332	5,892,997	5,991,954	6,037,836
Germany	81,742,884	80,098,347	77,871,675	74,814,316	70,807,016
Estonia	1,340,141	1,323,909	1,279,865	1,243,008	1,213,261
Ireland	4,467,854	4,814,602	5,276,163	5,757,624	6,207,343
Greece	11,305,118	11,526,085	11,577,875	11,630,098	11,575,793
Spain	45,989,016	47,961,070	49,961,157	51,713,930	52,687,786
France	64,714,074	67,820,253	70,302,983	72,186,344	73,183,970
Italy	60,340,328	62,876,781	64,491,289	65,694,307	65,915,103
Cyprus	803,147	885,452	973,354	1,036,127	1,090,050
Latvia	2,248,374	2,141,315	2,021,890	1,908,552	1,796,968
Lithuania	3,329,039	3,179,986	3,043,919	2,921,836	2,811,782
Luxembourg	502,066	573,066	625,941	669,947	703,696
Hungary	10,014,324	9,900,511	9,704,415	9,442,636	9,176,536
Malta	412,970	415,271	416,886	407,555	397,089
Netherlands	16,574,989	17,218,675	17,577,605	17,619,916	17,357,798
Austria	8,375,290	8,591,180	8,849,533	8,977,982	8,968,861
Poland	38,167,329	38,395,403	37,564,978	36,112,044	34,542,704
Portugal	10,637,713	10,727,813	10,779,647	10,767,057	10,598,409
Romania	21,462,186	21,006,219	20,250,626	19,437,293	18,483,288
Slovenia	2,046,976	2,142,217	2,154,609	2,141,070	2,114,985
Slovakia	5,424,925	5,576,326	5,579,504	5,467,229	5,326,176
Finland	5,351,427	5,577,269	5,704,485	5,727,038	5,726,934
Sweden	9,340,682	10,071,521	10,577,959	10,898,366	11,231,198
United Kingdom	62,008,048	66,292,265	70,207,694	73,443,152	76,405,986
Norway	4,858,199	5,379,920	5,787,755	6,101,189	6,365,895
Switzerland	7,785,806	8,505,701	8,943,807	9,189,879	9,312,795

Data source: (Eurostat, 2011a)

LUNA base line scenario

Table 3-13 shows the LUNA baseline population prediction for the EU27 countries plus Norway and Switzerland for the period 2010-2050.

Table 3-13 LUNA population forecast 2010-2050

Country	2010	2020	2030	2040	2050
Belgium	10,839,905	11,331,102	11,780,504	12,216,000	12,624,998
Bulgaria	7,563,710	7,092,424	6,475,370	5,802,995	5,118,631
Czech Republic	10,506,813	11,173,930	11,488,353	11,549,216	11,481,118
Denmark	5,534,738	5,772,058	6,015,108	6,175,721	6,236,080
Germany	81,742,888	80,421,696	78,512,792	76,196,048	74,281,520
Estonia	1,340,141	1,325,577	1,294,857	1,260,467	1,234,403
Ireland	4,467,854	4,650,619	4,788,462	5,005,435	5,426,106
Greece	11,305,118	11,548,462	11,488,166	11,243,978	10,812,145
Spain	45,989,016	48,281,492	49,632,352	50,460,268	50,949,320
France	64,714,076	66,258,568	67,570,224	69,271,176	71,811,456
Italy	60,340,328	63,139,308	64,958,256	66,183,032	66,900,256
Cyprus	803,147	863,702	922,038	994,846	1,088,838
Latvia	2,248,374	2,084,565	1,865,557	1,627,609	1,385,845
Lithuania	3,329,039	3,069,102	2,811,239	2,613,451	2,542,878
Luxembourg	502,066	599,210	691,660	738,374	714,125
Hungary	10,014,324	9,750,880	9,286,857	8,707,788	8,068,688
Malta	412,970	415,447	407,907	397,850	385,557
Netherlands	16,574,989	17,451,686	18,143,360	18,536,044	18,589,598
Austria	8,375,290	8,583,358	8,823,296	9,105,084	9,505,515
Poland	38,167,328	37,659,136	36,077,540	33,754,624	31,095,958
Portugal	10,637,713	10,083,360	9,361,389	8,577,518	7,759,790
Romania	21,462,186	20,943,840	20,191,048	19,314,248	18,438,296
Slovenia	2,046,976	2,214,917	2,413,466	2,584,912	2,716,106
Slovakia	5,424,925	5,516,447	5,458,273	5,295,681	5,098,212
Finland	5,351,427	5,592,756	5,794,056	5,987,178	6,236,454
Sweden	9,340,682	10,315,493	11,398,670	12,418,220	13,327,494
United Kingdom	62,008,048	66,252,432	70,187,272	73,810,584	77,114,160
Norway	4,858,199	5,469,705	6,087,250	6,590,683	6,830,237
Switzerland	7,785,806	8,740,066	9,598,867	10,015,008	9,834,354

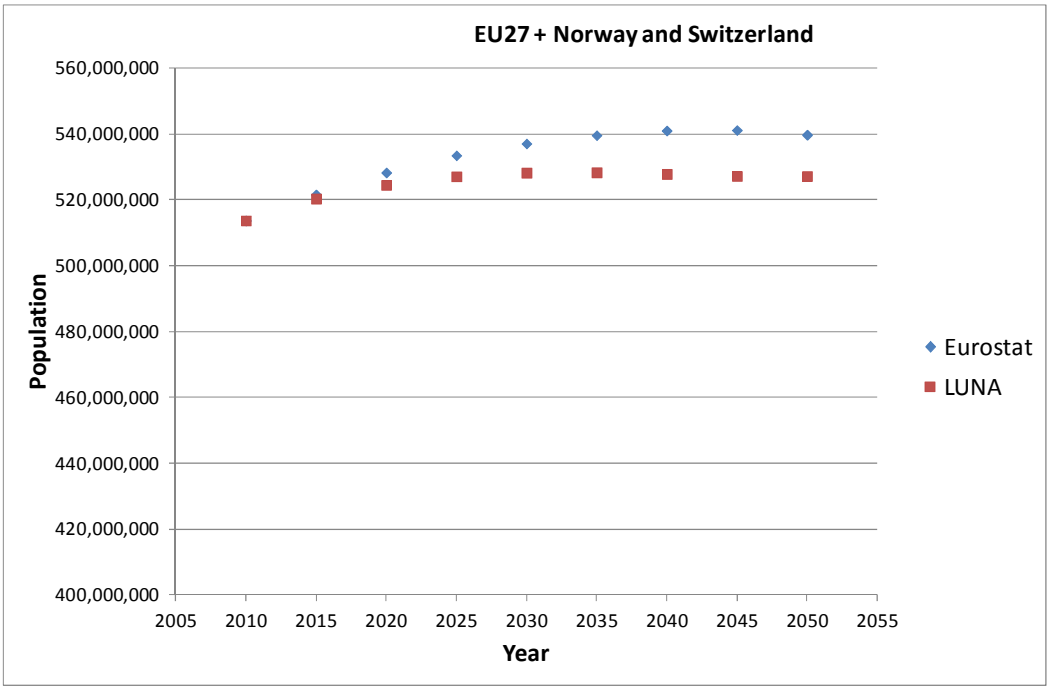
The total population of the EU27 countries plus Norway and Switzerland is predicted to grow between 2010 and 2050 by about 3 %. The population is predicted to grow in 18 countries[15] and to decline in 11 countries[16]. The highest relative growth is predicted for Norway with about plus 36 %. The highest decline is predicted for Bulgaria with about minus 23 %.

Comparison Eurostat – LUNA

Figure 3-36 shows a comparison of the development of the total population of the EU27 countries plus Norway and Switzerland as predicted by Eurostat and the LUNA baseline scenario. While the growth up to 2050 as predicted by Eurostat is about +5 %, the population stagnates at 3% in the LUNA predictions from about 2030. A detailed country by country comparison of the Eurostat and LUNA forecasts is given in Appendix 2.

[15] Belgium, Czech Republic, Denmark, Ireland, Greece, Spain, France, Italy, Cyprus, Luxembourg, Netherlands, Austria, Slovenia, Finland, Sweden, United Kingdom, Norway and Switzerland

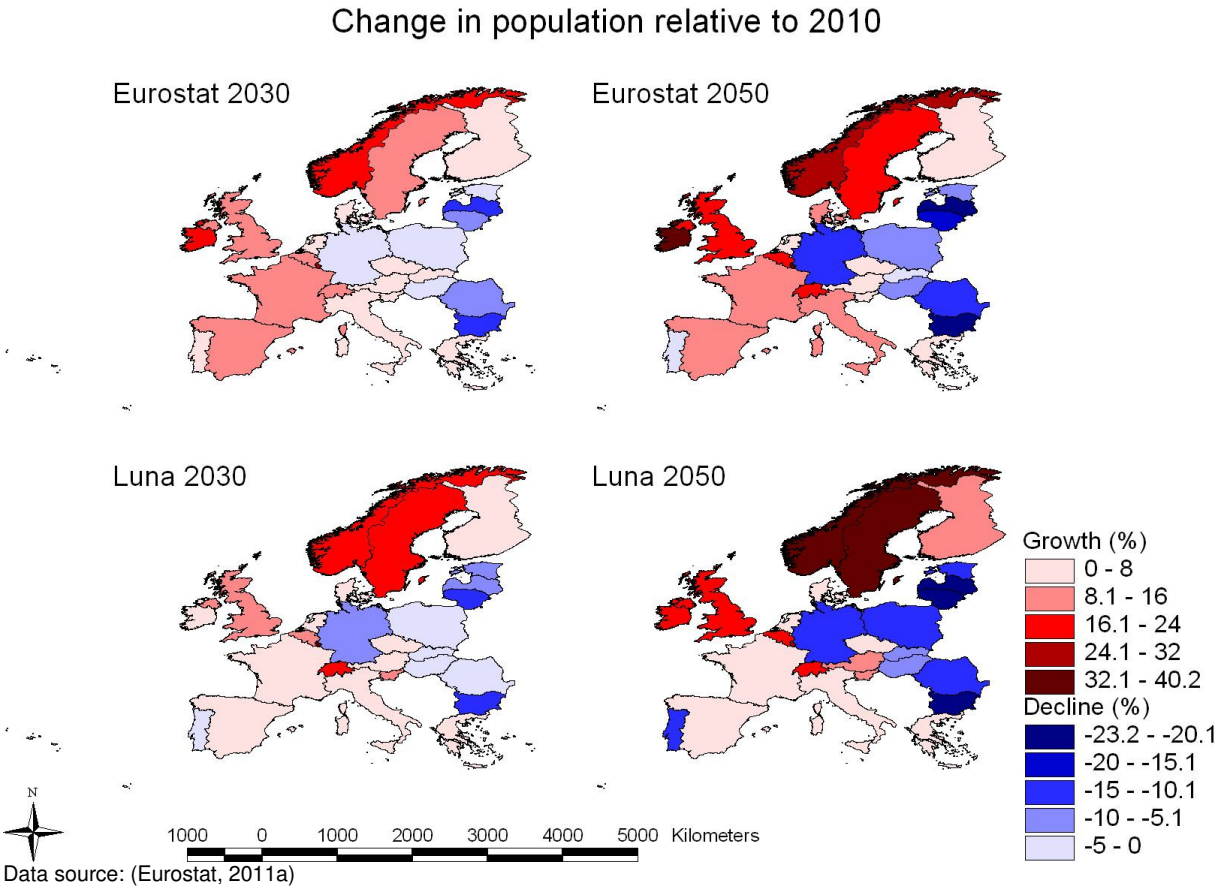
[16] Bulgaria, Germany, Estonia, Latvia, Lithuania, Hungary, Malta, Poland, Portugal, Romania and Slovakia



Data source: (Eurostat, 2011a)

Figure 3-36 Comparison population prediction 2010-2050 Eurostat – LUNA results

Figure 3-37 shows a country by country comparison of the percentage growth up to 2030 and 2050 as forecasted by Eurostat and LUNA. The predictions concerning countries growing and declining coincide.



Data source: (Eurostat, 2011a)

Figure 3-37 Comparison of the population growth by country Eurostat and LUNA results

3.5.2 Age Groups

Eurostat population forecast 2060

Table 3-13 to Table 3-16 show the Eurostat predictions for the share of population younger than 20 years, 20 to 59 years and 60 years and older respectively. The shares of population younger than 20 years and 20 to 59 years are predicted to decline. The share of population 60 years and older is predicted to increase.

Table 3-14 Percentage share population of age <20 years – Eurostat

Country	2010	2015	2020	2025	2030	2035	2040	2045	2050
Belgium	22.9	22.7	22.8	22.9	22.7	22.3	22.0	21.9	21.9
Bulgaria	19.1	18.9	19.5	19.5	18.7	17.8	17.5	17.8	18.1
Czech Republic	20.1	19.6	20.2	20.4	19.5	18.5	18.1	18.2	18.6
Denmark	24.4	23.6	22.8	22.6	22.4	22.4	22.4	22.1	21.8
Germany	18.8	17.8	17.2	17.0	16.9	16.8	16.6	16.4	16.5
Estonia	21.2	20.9	22.0	22.3	21.3	20.0	19.2	19.3	19.7
Ireland	27.5	28.9	29.0	27.9	26.2	24.8	24.6	25.1	25.5
Greece	19.4	19.5	19.6	19.4	18.7	18.0	17.8	18.0	18.3
Spain	19.8	20.1	20.0	19.2	18.0	17.2	17.1	17.3	17.6
France	24.7	24.4	24.1	23.8	23.3	22.8	22.5	22.4	22.3
Italy	19.0	18.7	18.3	17.9	17.3	16.9	16.9	16.9	17.0
Cyprus	24.0	22.6	22.2	22.4	22.2	21.3	20.3	19.8	19.6
Latvia	20.1	18.9	19.5	19.5	18.3	17.2	16.4	16.3	16.4
Lithuania	22.2	20.7	20.8	21.4	21.0	19.7	18.6	18.2	18.5
Luxembourg	23.7	22.9	22.2	21.8	21.5	21.1	20.7	20.4	20.2
Hungary	20.8	19.7	19.4	19.0	18.4	17.7	17.2	17.0	16.9
Malta	22.3	20.7	19.9	19.7	19.3	18.6	17.9	17.5	17.5
Netherlands	23.7	22.8	22.1	21.5	21.4	21.4	21.2	21.0	20.8
Austria	20.8	19.6	18.9	18.7	18.6	18.4	18.2	18.0	18.0
Poland	21.8	20.5	20.2	20.1	19.3	17.8	16.8	16.5	16.6
Portugal	20.5	19.8	19.0	18.0	17.2	16.8	16.7	16.7	16.6
Romania	21.0	20.3	19.9	19.3	18.3	17.3	16.6	16.3	16.2
Slovenia	19.2	19.2	19.6	19.7	19.0	18.0	17.6	17.8	18.3
Slovakia	22.1	20.6	20.3	20.2	19.4	18.1	17.2	16.8	16.9
Finland	22.9	22.2	22.2	22.4	22.2	21.9	21.6	21.4	21.4
Sweden	23.4	22.5	23.2	23.7	23.5	23.1	22.5	22.2	22.2
United Kingdom	23.8	23.4	23.5	24.0	23.8	23.4	23.1	22.9	22.9
Norway	25.5	24.8	24.4	24.5	24.3	23.9	23.4	23.0	22.9
Switzerland	21.0	20.1	19.7	19.7	19.5	19.0	18.5	18.1	18.1
EU27 + NO, CH	21.4	20.9	20.7	20.5	20.0	19.5	19.2	19.2	19.2

Data source: (Eurostat, 2011a)

Table 3-15 Percentage share population of age 20-59 years – Eurostat

Country	2010	2015	2020	2025	2030	2035	2040	2045	2050
Belgium	54.1	53.3	51.7	49.9	48.8	48.3	48.1	47.8	47.5
Bulgaria	56.7	55.2	52.9	51.2	50.3	49.1	47.2	45.3	43.5
Czech Republic	57.8	56.1	54.1	52.8	52.6	51.3	49.0	47.6	46.0
Denmark	52.5	52.0	51.3	50.0	48.6	47.7	47.3	47.8	48.0
Germany	55.4	54.4	52.6	49.6	46.9	46.1	45.9	45.3	44.5
Estonia	56.2	55.2	52.5	50.6	50.5	50.2	49.6	47.6	44.9
Ireland	56.4	53.2	51.3	50.6	50.7	50.5	49.2	47.2	47.1
Greece	55.8	54.6	53.1	51.8	50.2	48.5	46.5	44.7	44.2
Spain	58.1	56.5	54.9	53.4	52.0	50.0	47.4	45.7	45.1
France	52.7	51.1	49.7	48.4	47.4	46.6	46.6	46.3	45.9
Italy	54.7	54.0	53.1	51.5	49.6	47.7	46.4	45.8	45.5
Cyprus	57.7	57.0	55.4	53.6	52.9	52.8	52.5	51.0	49.4
Latvia	57.2	57.4	54.8	52.7	52.1	51.2	50.0	47.5	44.0
Lithuania	56.8	57.2	55.1	51.9	50.2	49.8	49.9	48.7	46.2
Luxembourg	57.4	57.2	56.3	54.5	52.6	51.3	50.4	49.4	48.7
Hungary	56.7	55.7	54.5	54.3	53.7	52.4	49.8	48.4	46.9
Malta	55.7	54.6	52.9	51.4	51.4	51.3	50.5	49.4	47.8
Netherlands	54.5	53.3	51.7	49.7	47.6	46.4	46.4	46.6	46.6
Austria	56.1	56.1	54.8	52.3	49.8	48.7	48.5	48.0	47.6
Poland	59.1	57.5	54.8	53.1	52.8	52.3	50.7	47.8	45.2
Portugal	55.9	55.0	54.1	53.1	51.9	50.0	47.8	46.3	45.8
Romania	58.9	57.8	56.3	56.1	54.2	52.5	49.9	47.7	44.5
Slovenia	58.8	56.4	53.8	51.4	50.0	49.2	47.6	45.8	44.3
Slovakia	60.4	59.3	57.0	55.0	54.1	53.0	50.6	48.2	45.8
Finland	52.7	51.0	49.3	47.7	46.8	47.2	47.2	47.0	46.7
Sweden	51.8	52.0	50.6	49.1	48.0	47.7	48.0	48.1	47.3
United Kingdom	53.8	53.3	52.1	50.1	48.8	48.4	48.8	48.6	47.9
Norway	53.6	53.3	52.3	50.9	49.3	48.3	48.2	48.1	47.7
Switzerland	56.3	56.1	54.7	52.1	49.9	48.8	48.2	47.3	46.4
EU27 + NO, CH	55.5	54.4	52.9	51.1	49.6	48.5	47.6	46.8	45.9

Data source: (Eurostat, 2011a)

Table 3-16 Percentage share population of age 60 years and older – Eurostat

Country	2010	2015	2020	2025	2030	2035	2040	2045	2050
Belgium	23.0	24.1	25.5	27.2	28.5	29.5	29.9	30.3	30.6
Bulgaria	24.3	25.9	27.5	29.3	31.0	33.1	35.3	36.9	38.4
Czech Republi	22.1	24.3	25.7	26.8	28.0	30.2	32.9	34.2	35.4
Denmark	23.0	24.5	25.8	27.5	29.0	29.9	30.3	30.1	30.2
Germany	25.9	27.8	30.1	33.4	36.2	37.2	37.6	38.3	39.0
Estonia	22.6	23.9	25.5	27.1	28.3	29.8	31.2	33.1	35.4
Ireland	16.1	17.9	19.6	21.5	23.1	24.7	26.2	27.7	27.4
Greece	24.8	25.9	27.3	28.8	31.1	33.5	35.7	37.3	37.5
Spain	22.1	23.4	25.1	27.4	30.0	32.8	35.5	37.0	37.3
France	22.6	24.6	26.2	27.8	29.3	30.5	30.9	31.3	31.7
Italy	26.3	27.3	28.6	30.7	33.1	35.3	36.7	37.3	37.5
Cyprus	18.3	20.4	22.4	24.0	24.9	25.9	27.2	29.3	31.0
Latvia	22.6	23.8	25.7	27.9	29.6	31.6	33.5	36.3	39.6
Lithuania	20.9	22.1	24.1	26.7	28.7	30.5	31.5	33.1	35.3
Luxembourg	18.9	19.9	21.5	23.7	25.9	27.6	28.9	30.2	31.1
Hungary	22.5	24.6	26.2	26.7	27.9	29.9	32.9	34.6	36.2
Malta	22.0	24.7	27.2	28.9	29.4	30.2	31.6	33.1	34.8
Netherlands	21.8	23.9	26.2	28.8	31.0	32.2	32.3	32.4	32.6
Austria	23.0	24.3	26.3	29.0	31.6	32.9	33.3	34.0	34.5
Poland	19.1	22.0	25.0	26.7	28.0	29.9	32.6	35.7	38.2
Portugal	23.6	25.2	26.9	29.0	30.9	33.2	35.5	37.0	37.6
Romania	20.1	21.9	23.8	24.6	27.5	30.3	33.5	36.1	39.3
Slovenia	22.0	24.4	26.7	28.9	31.0	32.8	34.8	36.4	37.4
Slovakia	17.5	20.1	22.6	24.8	26.5	28.9	32.2	35.0	37.4
Finland	24.4	26.8	28.5	30.0	30.9	30.9	31.2	31.6	31.8
Sweden	24.8	25.5	26.2	27.2	28.4	29.2	29.5	29.7	30.5
United Kingdo	22.4	23.3	24.3	25.9	27.4	28.1	28.1	28.5	29.2
Norway	20.9	21.9	23.2	24.7	26.4	27.8	28.4	28.9	29.4
Switzerland	22.7	23.8	25.6	28.2	30.6	32.2	33.4	34.6	35.5
EU27 + NO, CH	23.1	24.7	26.5	28.4	30.4	32.0	33.1	34.1	34.8

Data source: (Eurostat, 2011a)

LUNA base line scenario

Table 3-17 to Table 3-19 show the LUNA baseline predictions for the share of population younger than 20 years, 20 to 59 years and 60 years and older respectively. The share of population younger than 20 years is first decreasing and then slightly increasing. The share of population 20 to 59 years is predicted to decline. The share of population 60 years and older is predicted to increase. The assumptions concerning the changes in fertility rates by fertile age cohort will be subject to revisions within the work in WP7 Scenarios.

Table 3-17 percentage share population of age <20 years – LUNA results

Country	2010	2015	2020	2025	2030	2035	2040	2045	2050
Belgium	22.9	22.6	22.5	22.4	22.3	22.2	22.1	22.0	21.9
Bulgaria	19.1	19.2	19.5	19.6	19.4	19.2	19.1	19.2	19.4
Czech Republic	20.1	19.8	20.0	20.2	20.2	20.2	20.3	20.7	21.3
Denmark	24.4	23.9	23.8	24.1	24.8	25.8	26.8	27.8	28.9
Germany	18.8	18.2	18.2	18.6	19.4	20.3	21.4	22.8	24.4
Estonia	21.2	21.5	22.1	22.4	22.6	22.7	23.0	23.6	24.6
Ireland	27.5	28.6	29.2	29.1	28.8	28.6	29.0	30.0	31.3
Greece	19.4	19.3	18.9	18.2	17.3	16.4	15.5	14.8	14.1
Spain	19.8	20.3	20.3	19.9	19.3	18.9	18.7	18.8	19.2
France	24.7	24.6	24.6	24.6	24.8	25.1	25.6	26.3	27.1
Italy	19.0	18.8	18.5	18.1	17.8	17.7	17.7	17.9	18.2
Cyprus	24.0	23.0	22.7	22.8	23.0	23.3	23.9	24.7	26.0
Latvia	20.1	19.7	19.6	19.2	18.4	17.3	16.2	15.2	14.3
Lithuania	22.2	21.3	21.6	22.3	23.0	23.9	25.0	26.6	28.6
Luxembourg	23.7	23.0	22.8	23.0	23.5	24.1	24.6	25.0	25.4
Hungary	20.8	20.1	19.7	19.4	19.0	18.7	18.5	18.4	18.4
Malta	22.3	20.7	19.7	19.0	18.4	17.7	17.1	16.5	16.0
Netherlands	23.7	22.8	22.2	21.9	22.0	22.2	22.5	22.8	23.1
Austria	20.8	20.0	19.9	20.4	21.3	22.5	24.1	25.9	28.0
Poland	21.8	20.9	20.6	20.3	20.1	19.9	19.8	19.9	20.2
Portugal	20.5	20.0	19.4	18.7	18.0	17.5	17.1	16.9	16.8
Romania	21.0	20.4	19.9	19.3	18.5	17.7	17.0	16.3	15.8
Slovenia	19.2	19.5	20.6	21.8	22.9	23.9	24.7	25.5	26.3
Slovakia	22.1	20.9	20.3	20.0	19.7	19.5	19.5	19.8	20.4
Finland	22.9	22.4	22.5	22.9	23.4	24.1	24.8	25.6	26.5
Sweden	23.4	23.1	23.7	24.5	25.3	26.0	26.6	27.1	27.7
United Kingdom	23.8	23.5	23.6	23.6	23.6	23.5	23.5	23.4	23.5
Norway	25.5	24.6	23.9	23.3	22.8	22.3	21.7	21.2	20.7
Switzerland	21.0	20.2	19.9	20.0	20.1	20.3	20.5	20.7	20.8
EU27 + NO, CH	21.4	21.1	21.0	21.0	21.0	21.1	21.3	21.7	22.3

Table 3-18 Percentage share population of age 20-59 years – LUNA results

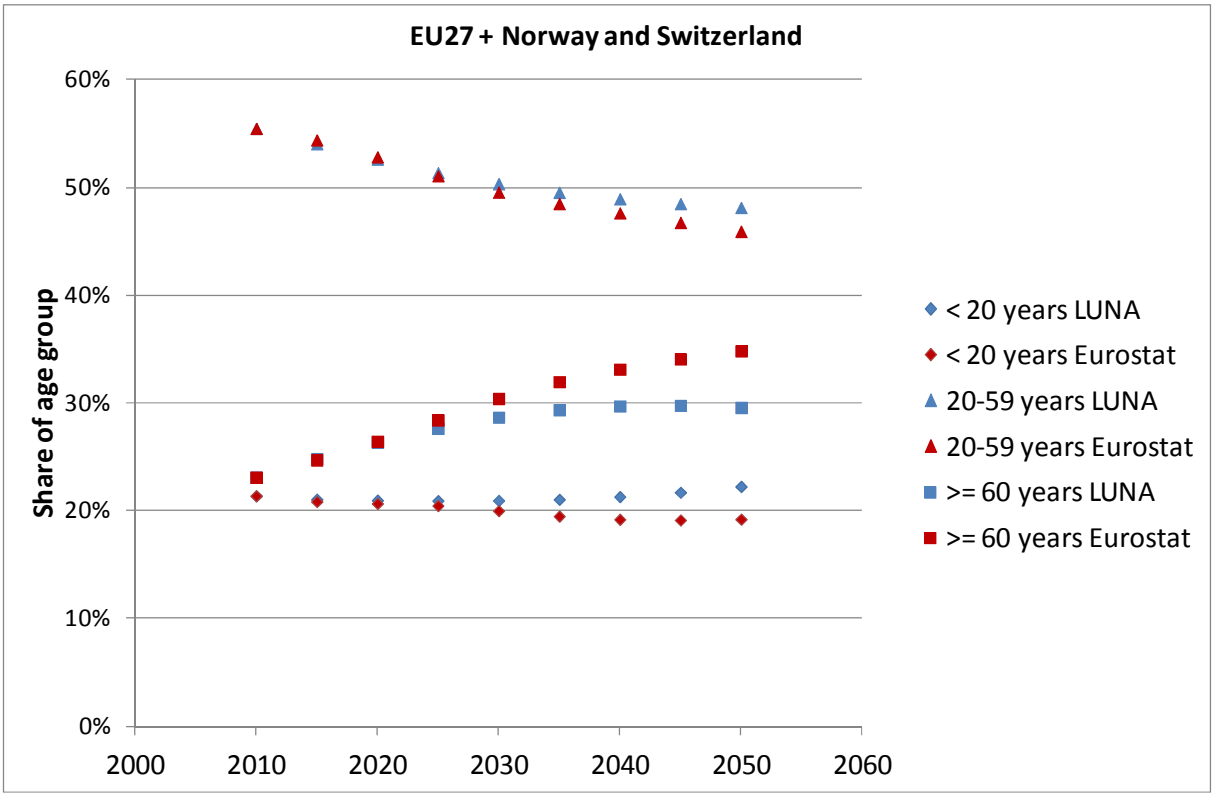
Country	2010	2015	2020	2025	2030	2035	2040	2045	2050
Belgium	54.1	53.1	52.2	51.6	51.5	51.7	51.9	52.1	52.3
Bulgaria	56.7	55.3	54.4	53.6	53.0	52.3	51.5	50.9	50.4
Czech Republic	57.8	56.5	55.4	54.5	53.6	52.5	51.4	50.2	49.2
Denmark	52.5	51.6	50.7	49.6	48.7	47.9	47.1	46.3	45.5
Germany	55.4	53.9	51.8	49.7	47.8	46.4	45.4	44.6	44.0
Estonia	56.2	54.6	52.9	51.7	50.9	50.1	49.4	48.5	47.8
Ireland	56.4	53.1	50.3	48.2	46.5	45.2	44.2	43.7	43.5
Greece	55.8	54.8	54.0	53.3	52.7	52.2	51.8	51.6	51.4
Spain	58.1	56.1	54.3	52.5	51.0	49.7	48.7	48.1	47.7
France	52.7	50.6	48.9	47.6	46.7	46.3	46.1	46.1	46.1
Italy	54.7	53.7	52.7	51.5	50.4	49.5	48.9	48.6	48.4
Cyprus	57.7	56.0	54.0	52.4	51.2	50.3	49.6	48.9	48.2
Latvia	57.2	56.4	55.2	54.3	53.8	53.4	52.9	52.4	51.9
Lithuania	56.8	56.1	54.2	52.1	50.3	48.8	47.6	46.6	45.8
Luxembourg	57.4	57.2	56.5	55.4	54.0	52.6	51.2	49.6	47.9
Hungary	56.7	55.4	55.0	54.9	54.6	54.2	53.7	53.1	52.6
Malta	55.7	54.4	53.3	52.6	52.5	52.5	52.5	52.3	51.8
Netherlands	54.5	53.3	52.0	50.8	50.0	49.5	49.2	48.9	48.6
Austria	56.1	55.3	53.4	51.2	49.2	47.6	46.3	45.2	44.3
Poland	59.1	56.9	55.0	53.9	53.1	52.2	51.3	50.3	49.5
Portugal	55.9	54.7	53.7	52.7	51.7	50.7	49.9	49.4	49.0
Romania	58.9	57.7	57.1	56.6	55.9	55.0	54.1	53.1	52.4
Slovenia	58.8	56.2	53.8	51.7	49.9	48.4	47.2	46.1	45.1
Slovakia	60.4	59.0	57.5	56.2	54.9	53.5	52.1	50.7	49.5
Finland	52.7	50.9	49.4	48.5	47.9	47.7	47.5	47.3	47.0
Sweden	51.8	51.6	50.9	50.2	49.6	49.2	48.8	48.4	47.9
United Kingdom	53.8	53.0	52.0	51.2	50.7	50.5	50.6	50.6	50.7
Norway	53.6	53.5	53.3	53.2	53.2	53.3	53.3	53.1	52.7
Switzerland	56.3	55.9	55.0	54.0	52.9	51.9	50.8	49.6	48.3
EU27 + NO, CH	55.5	54.1	52.7	51.4	50.3	49.6	49.0	48.5	48.1

Table 3-19 percentage share population of age 60 years and older – LUNA results

Country	2010	2015	2020	2025	2030	2035	2040	2045	2050
Belgium	23.0	24.3	25.3	26.0	26.2	26.1	26.0	25.8	25.8
Bulgaria	24.3	25.4	26.1	26.8	27.6	28.5	29.4	29.9	30.2
Czech Republic	22.1	23.7	24.6	25.3	26.2	27.3	28.3	29.1	29.5
Denmark	23.0	24.5	25.6	26.2	26.5	26.4	26.1	25.8	25.6
Germany	25.9	28.0	30.0	31.7	32.8	33.3	33.2	32.6	31.6
Estonia	22.6	24.0	25.0	25.8	26.5	27.2	27.7	27.8	27.6
Ireland	16.1	18.3	20.5	22.8	24.8	26.2	26.8	26.4	25.2
Greece	24.8	25.9	27.1	28.5	30.0	31.4	32.6	33.6	34.5
Spain	22.1	23.6	25.4	27.6	29.7	31.5	32.6	33.1	33.1
France	22.6	24.9	26.6	27.8	28.5	28.6	28.3	27.6	26.8
Italy	26.3	27.5	28.9	30.4	31.8	32.8	33.4	33.5	33.4
Cyprus	18.3	21.0	23.2	24.8	25.8	26.4	26.5	26.3	25.9
Latvia	22.6	24.0	25.2	26.5	27.8	29.3	30.8	32.3	33.7
Lithuania	20.9	22.6	24.2	25.7	26.7	27.3	27.4	26.8	25.7
Luxembourg	18.9	19.9	20.7	21.6	22.5	23.3	24.3	25.4	26.7
Hungary	22.5	24.5	25.2	25.7	26.4	27.1	27.9	28.5	29.1
Malta	22.0	24.9	27.0	28.3	29.2	29.8	30.5	31.3	32.1
Netherlands	21.8	24.0	25.8	27.2	28.0	28.3	28.3	28.3	28.3
Austria	23.0	24.7	26.7	28.4	29.5	29.9	29.7	28.9	27.7
Poland	19.1	22.2	24.4	25.7	26.8	27.9	28.9	29.7	30.2
Portugal	23.6	25.3	26.9	28.6	30.3	31.8	33.0	33.7	34.2
Romania	20.1	21.9	22.9	24.1	25.6	27.3	29.0	30.5	31.8
Slovenia	22.0	24.3	25.7	26.5	27.1	27.7	28.1	28.4	28.6
Slovakia	17.5	20.1	22.2	23.9	25.5	27.0	28.4	29.5	30.1
Finland	24.4	26.7	28.0	28.6	28.6	28.3	27.8	27.1	26.5
Sweden	24.8	25.3	25.4	25.3	25.1	24.9	24.6	24.5	24.5
United Kingdom	22.4	23.4	24.4	25.2	25.7	25.9	26.0	25.9	25.9
Norway	20.9	21.9	22.8	23.5	24.0	24.4	24.9	25.6	26.6
Switzerland	22.7	23.8	25.0	26.1	26.9	27.8	28.7	29.7	30.9
EU27 + NO, CH	23.1	24.8	26.4	27.7	28.7	29.4	29.7	29.8	29.6

Comparison Eurostat – LUNA

Figure 3-38 shows a comparison of the development of the shares of population younger than 20 years, 20 to 59 years and 60 years and older. While the Eurostat forecasts predicts a steady decline of the share of population younger than 20 years, the LUNA baselines scenario predicts a decline up to 2030 followed by an increase up to 2050. As mentioned above, the assumptions concerning the changes in fertility rates by fertile age cohort will be subject to revisions within the work in WP7 Scenarios.



Data source: (Eurostat, 2011a)

Figure 3-38 Comparison share of age groups 2010-2050 Eurostat – LUNA results

3.5.3 Household Income

In the base year the average household income in the EU27 countries plus Norway and Switzerland is about 13,700 Euro per year. Luxembourg has the highest household income with about 80,000 Euro per year. Bulgaria has the lowest household income with about 4,800 Euro per year. The LUNA baseline scenario predicts for the EU27 countries plus Norway and Switzerland a growth of the average household income by about 36 % up to 2030 and by about 78 % up to 2050. Figure 3-39 shows the base year average household income per person per hour and the percentage growth up to 2030 and 2050.

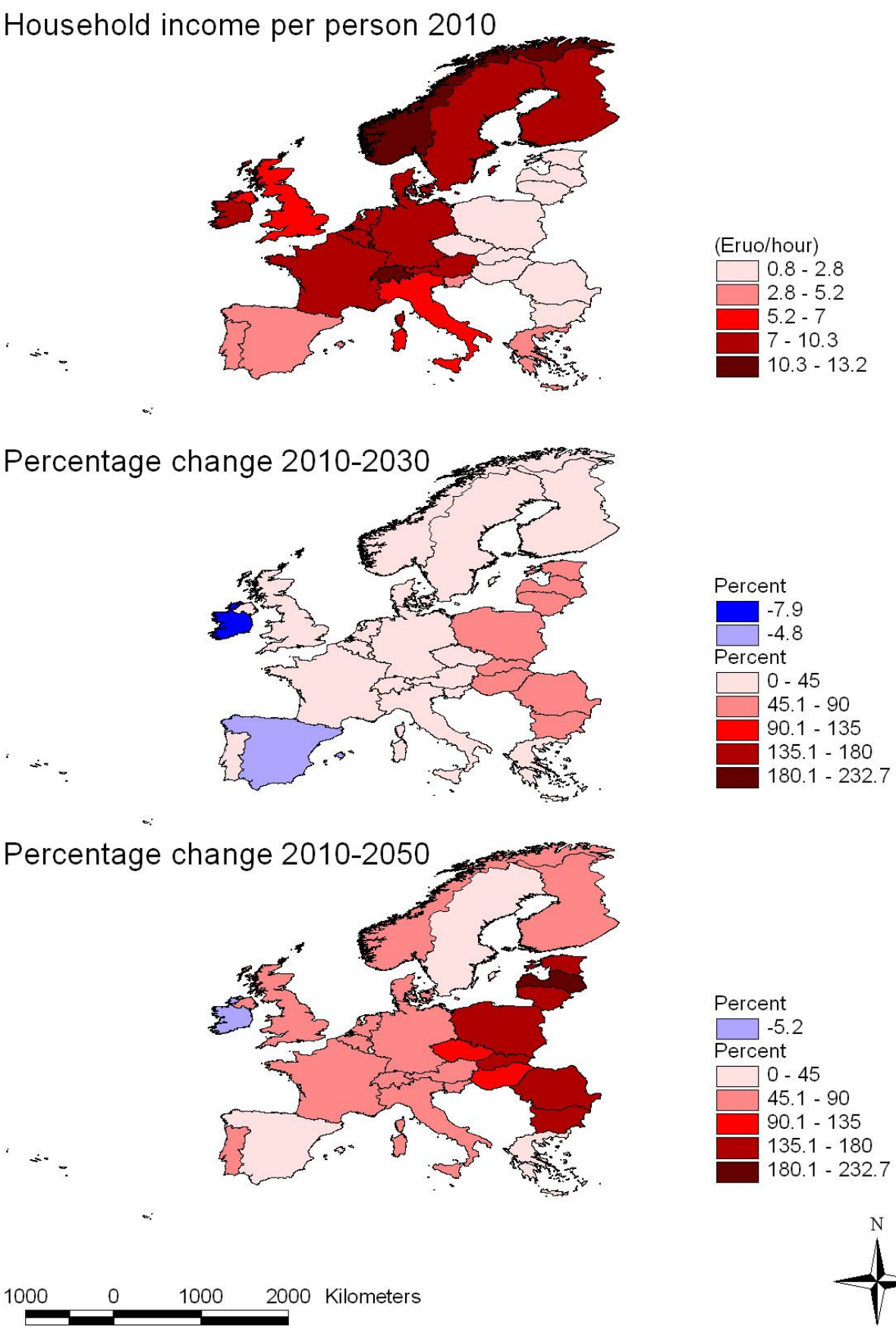


Figure 3-39 Household income by person and country - LUNA baseline scenario

3.5.4 Household Types

The analysis of available data (Dargay et al., 2008) has shown that car ownership in single households is significantly lower than in multiple person households. Hence the development of the shares of household types is an important driver concerning long-distance travel. Figure 3-40 shows the share of single households by country for the base year and the percentage change 2010 to 2050 in the baseline scenario.

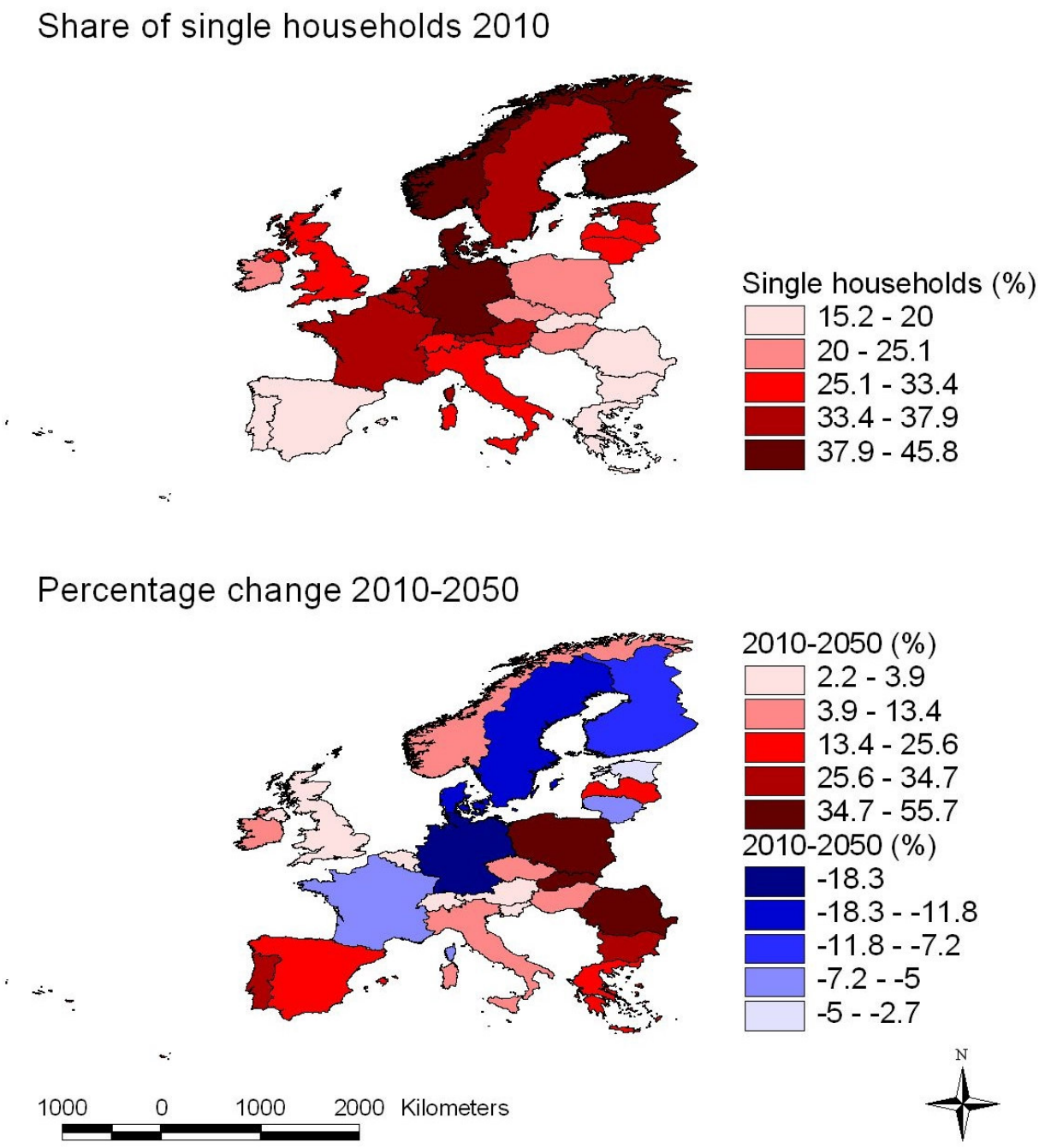


Figure 3-40 Share of single households by country – LUNA baseline scenario

3.5.5 Car Availability

Car availability is influencing both mode choice and long-distance trip rates. Hence the development of car availability is an important driver concerning long-distance travel demand. Figure 3-41 shows the share of households without access to a car for the base year and the respective percentage change 2010 to 2050 in the baseline scenario.

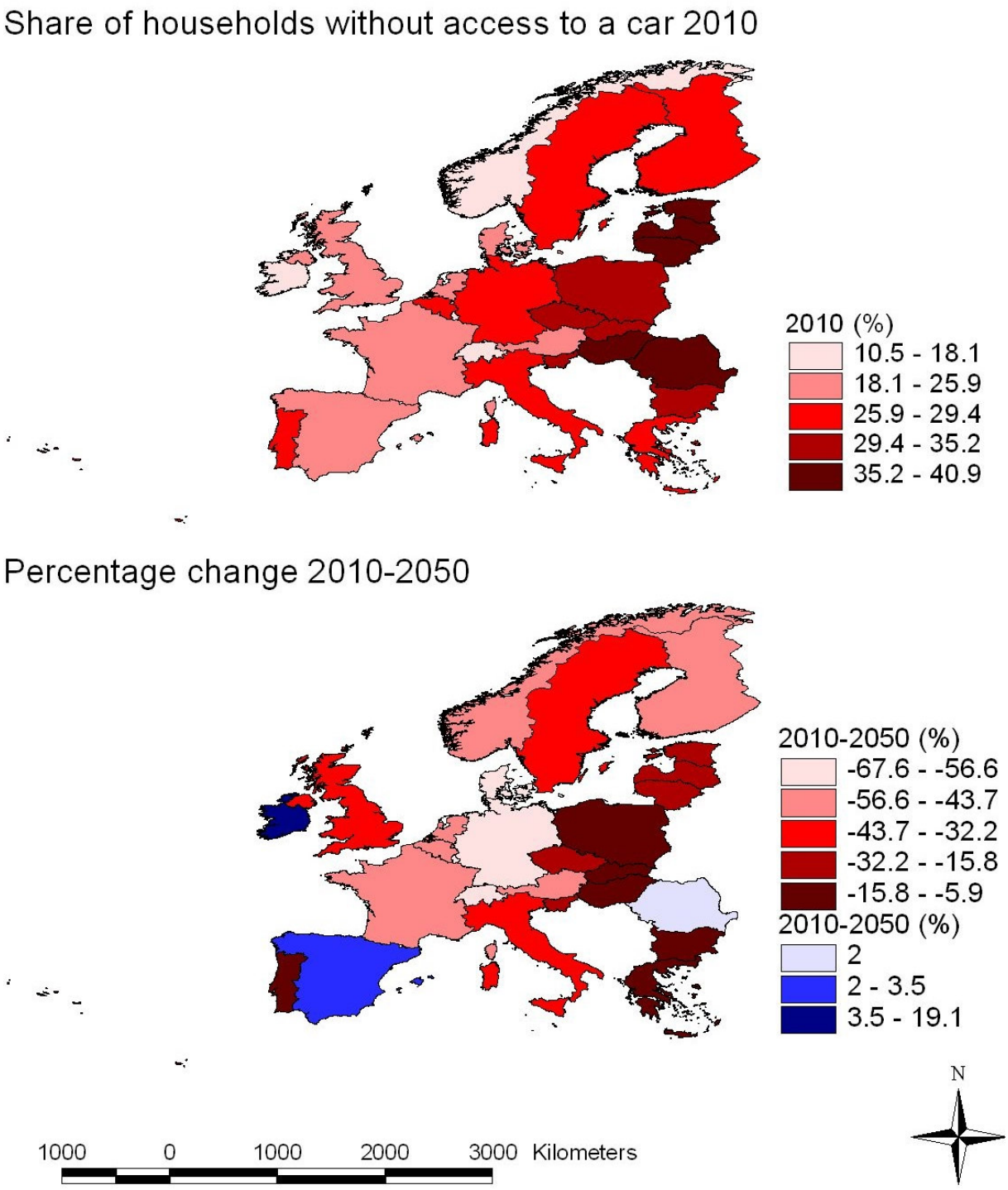


Figure 3-41 Share of households without access to a car – LUNA baseline scenario

3.6 LONG-DISTANCE TRANSPORT DEMAND

The following sections present the baseline forecasts made by LUNA for long-distance holiday transport demand in passengers transported and in person kilometres travelled.

3.6.1 Passengers

Total

Figure 3-42 shows the development of passenger numbers transported by each mode of transport in all distance bands. The highest share of passengers in the base year use car (52 %) followed by air (29 %). The absolute number of long-distance car passengers increases from about 314 million per year in 2010 to about 378 million per year. In the same period the number of air passengers increases from about 174 million per year to about 219 million per year. Bus/coach and rail trips are slightly decreasing while maritime trips are increasing albeit remaining on a comparatively very low absolute level.

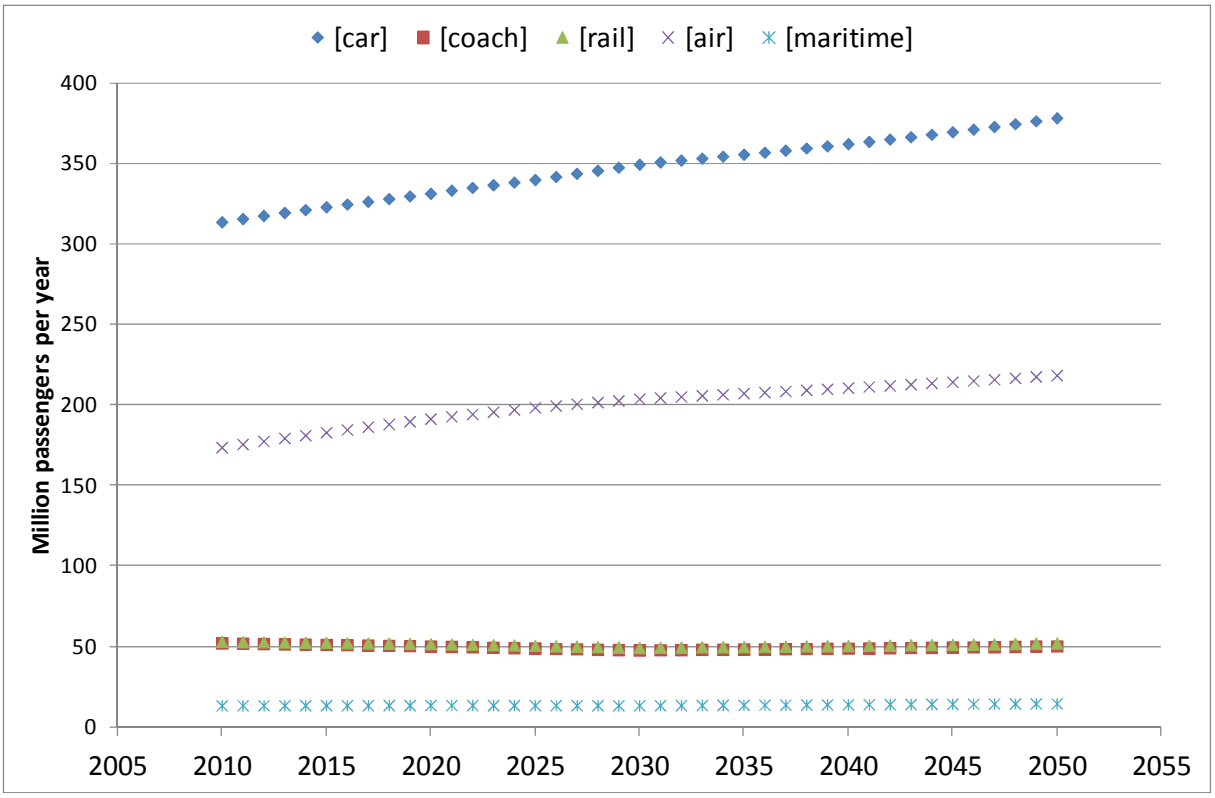


Figure 3-42 LUNA forecast - number of travellers per year and mode 2010-2050 EU27 + Norway and Switzerland

Table 3-21 and Figure 3-43 show the changes in the number of passengers transported by each mode of transport in all distance bands relative to 2010. Air transport grows at the highest rate followed by car transport. The relative change in the number of car passengers by country between 2010 and 2050 ranges from -8 % in Portugal to +50 % in Sweden. The changes in air transport range from +1 % in Germany to +71 % in Sweden. The main drivers are economic and population development.

Table 3-20 LUNA forecast - change in number of travellers by mode 2050 relative to 2010

Mode	Median	Minimum		Maximum	
	(2010=100)	Country	(2010=100)	Country	(2010=100)
Car	120	Portugal	92	Sweden	150
Coach	99	Portugal	76	Norway	130
Rail	98	Portugal	67	Norway	130
Air	128	Germany	101	Cyprus	171
Maritime	100	Spain	91	Sweden	121

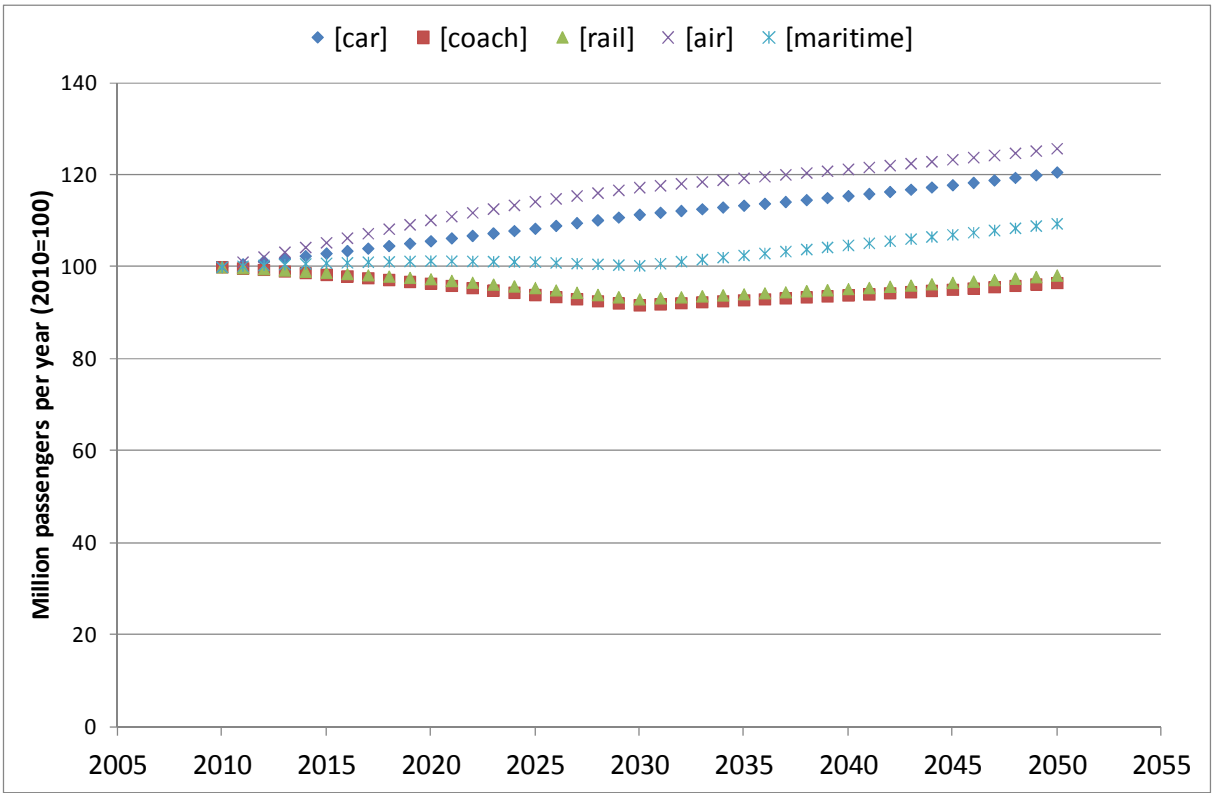


Figure 3-43 LUNA forecast - number of travellers per year and mode 2010-2050 EU27 + Norway and Switzerland (2010 = 100)

100-249 kilometres

Figure 3-44 shows the development of passenger numbers transported by each mode of transport in the distance band 100-249 kilometres. In the shortest distance band the highest share of passengers in the base year use car (53 %) followed by bus/coach and rail (about 10 % each). The absolute number of car passengers in this distance band increases from about 171 million per year in 2010 to about 208 million per year in 2050. In the same period the number of air passengers increases from about 11 million per year to about 16 million per year. Bus/coach and rail trips are slightly decreasing in the first and later increasing again. Maritime trips are increasing albeit remaining on a comparatively very low absolute level.

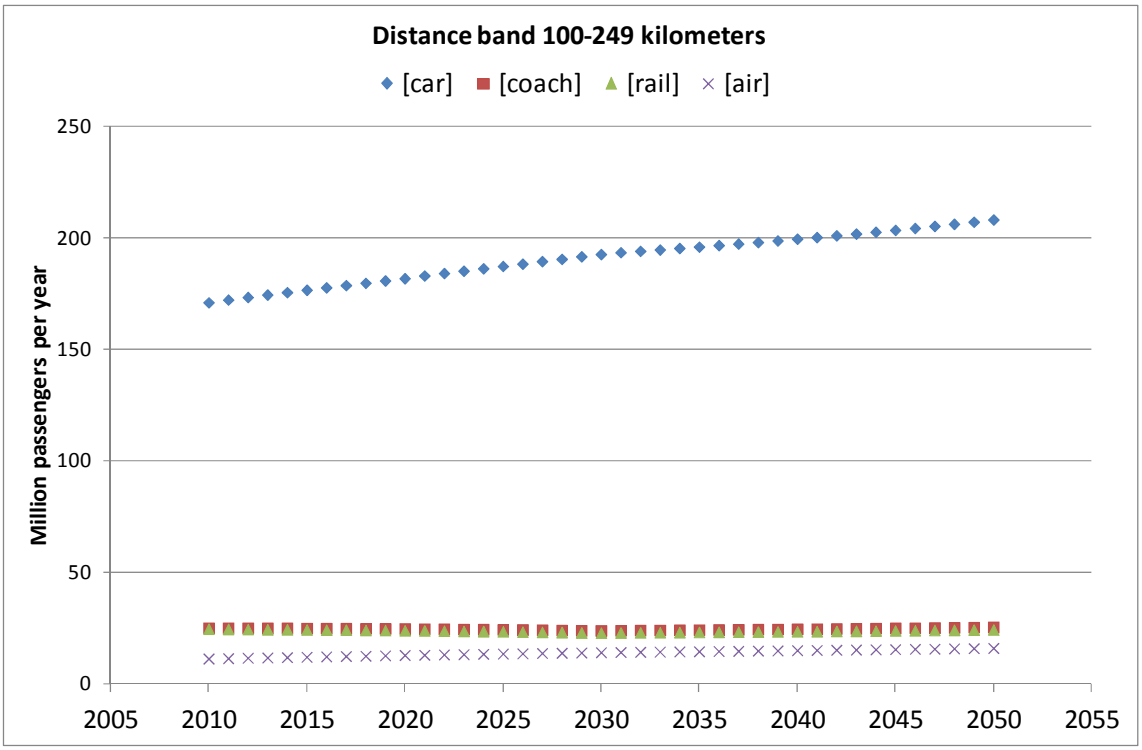


Figure 3-44 LUNA forecast - number of travellers per year and mode in the distance band 100-249 kilometres 2010-2050 EU27 + Norway and Switzerland

Figure 3-45 and Table 3-22 show the changes in the number of passengers transported by each mode of transport in the distance band 100-249 kilometres relative to 2010. Air transport grows at the highest rate followed by car transport. Relative changes in the number of car passengers by country between 2010 and 2050 range from -6 % in Portugal to +52 % in Sweden. The changes in air transport range from +0 % in Belgium to +44 % in the United Kingdom. The main drivers are again economic and population development.

Table 3-21 LUNA forecast - change in number of travellers by mode distance class 100-249 kilometres 2050 relative to 2010

Mode	Median	Minimum		Maximum	
	(2010=100)	Country	(2010=100)	Country	(2010=100)
Car	122	Portugal	94	Sweden	152
Coach	104	Portugal	81	Norway	137
Rail	100	Portugal	67	Ireland	132
Air	100	Belgium	100	United Kingdom	144
Maritime	100	Greece	93	United Kingdom	126

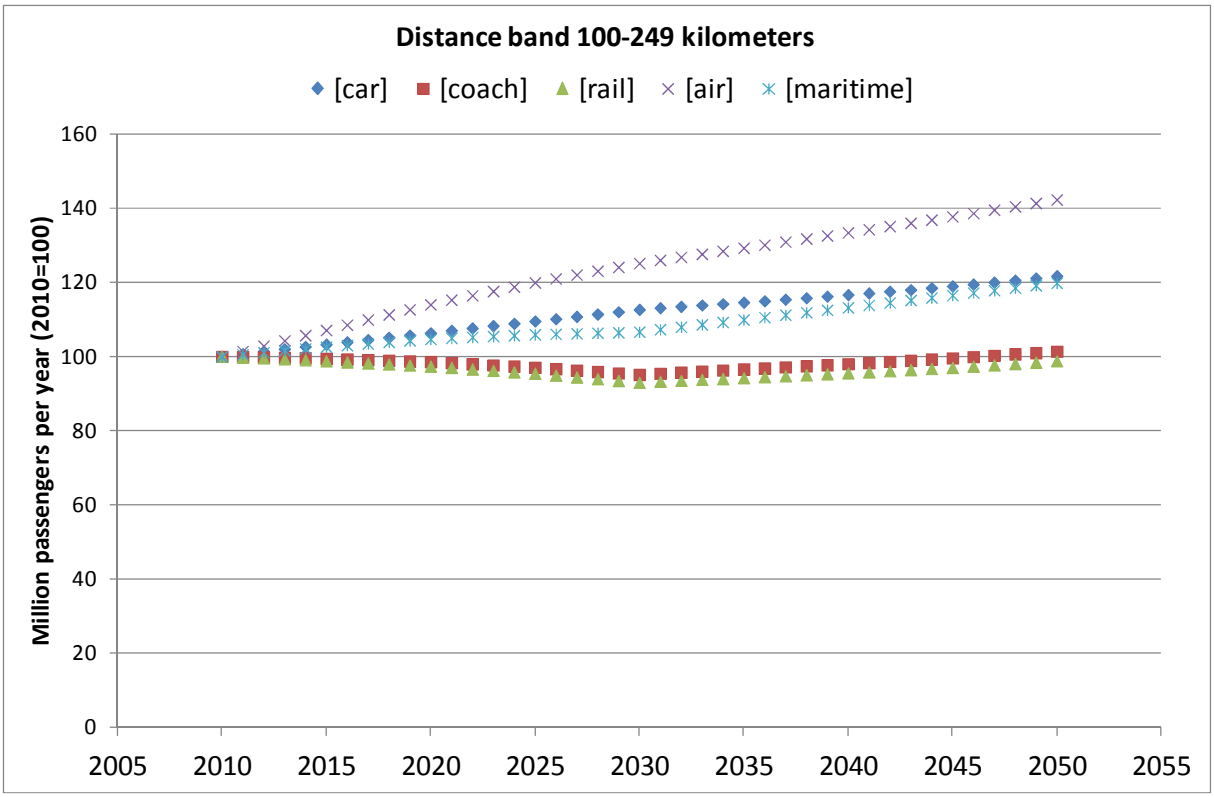


Figure 3-45 LUNA forecast - number of travellers per year and mode in the distance band 100-249 kilometres 2010-2050 EU27 + Norway and Switzerland (2010 = 100)

250-499 kilometres

Figure 3-46 shows the development of passenger numbers transported by each mode of transport in the distance band 250-499 kilometres. In this distance band the highest share of passengers in the base year use car (51 %) followed by air (about 30 %). The absolute number of car passengers in this distance band increases from about 87 million per year in 2010 to about 106 million per year in 2050. In the same period the number of air passengers increases from about 50 million per year to about 61 million per year. Bus/coach and rail trips are slightly decreasing in the first and later increasing again. Maritime trips are increasing albeit remaining on a comparatively very low absolute level.

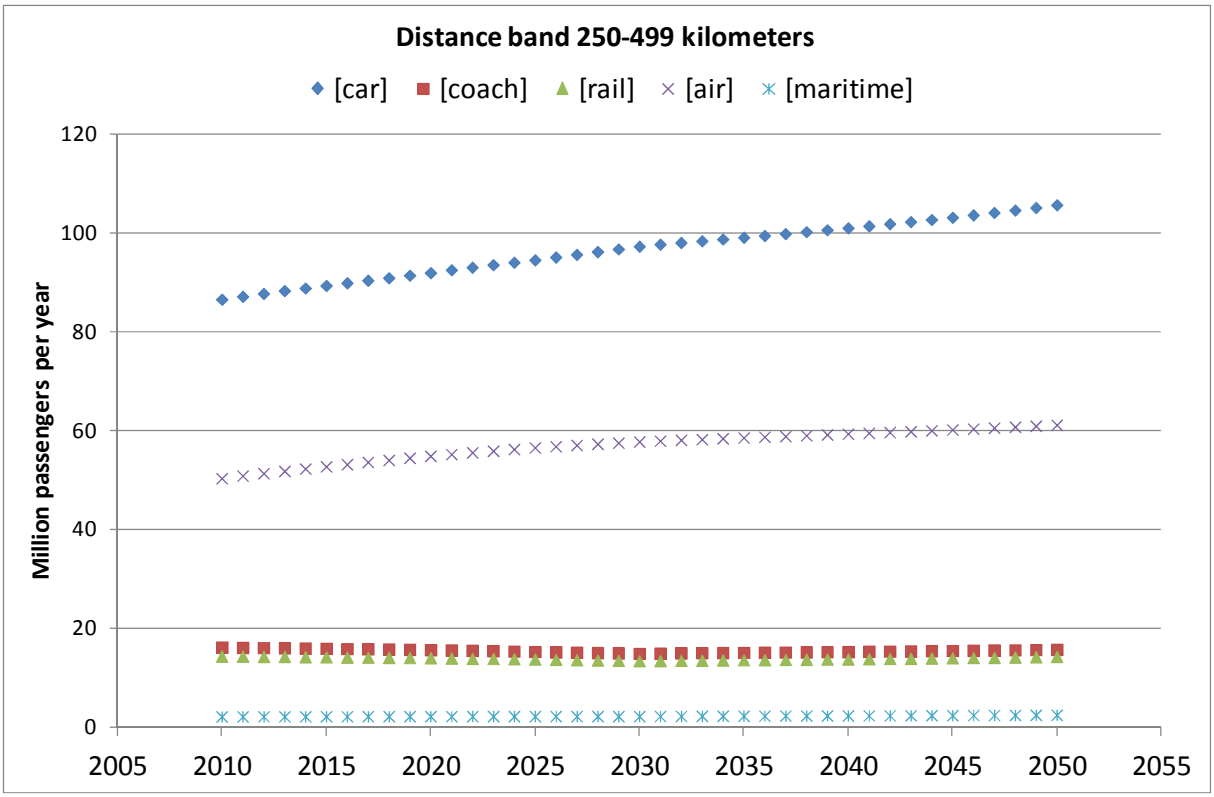


Figure 3-46 LUNA forecast - number of travellers per year and mode in the distance band 250-499 kilometres 2010-2050 EU27 + Norway and Switzerland

Figure 3-47 and Table 3-23 show the changes in the number of passengers transported by each mode of transport in the distance band 250-499 kilometres relative to 2010. Air and car transport grow more or less at the same rate. Relative changes in the number of car passengers by country between 2010 and 2050 range from -8 % in Portugal to +49 % in Sweden. The changes in air transport range from -1 % in Germany to +56 % in Norway. The main drivers are again economic and population development.

Table 3-22 LUNA forecast - change in number of travellers by mode distance class 250-499 kilometres 2050 relative to 2010

Mode	Median	Minimum		Maximum	
	(2010=100)	Country	(2010=100)	Country	(2010=100)
Car	120	Portugal	92	Sweden	149
Coach	97	Portugal	78	Norway	127
Rail	100	Portugal	67	Norway	129
Air	125	Germany	99	Norway	156
Maritime	100	Greece	90	United Kingdom	121

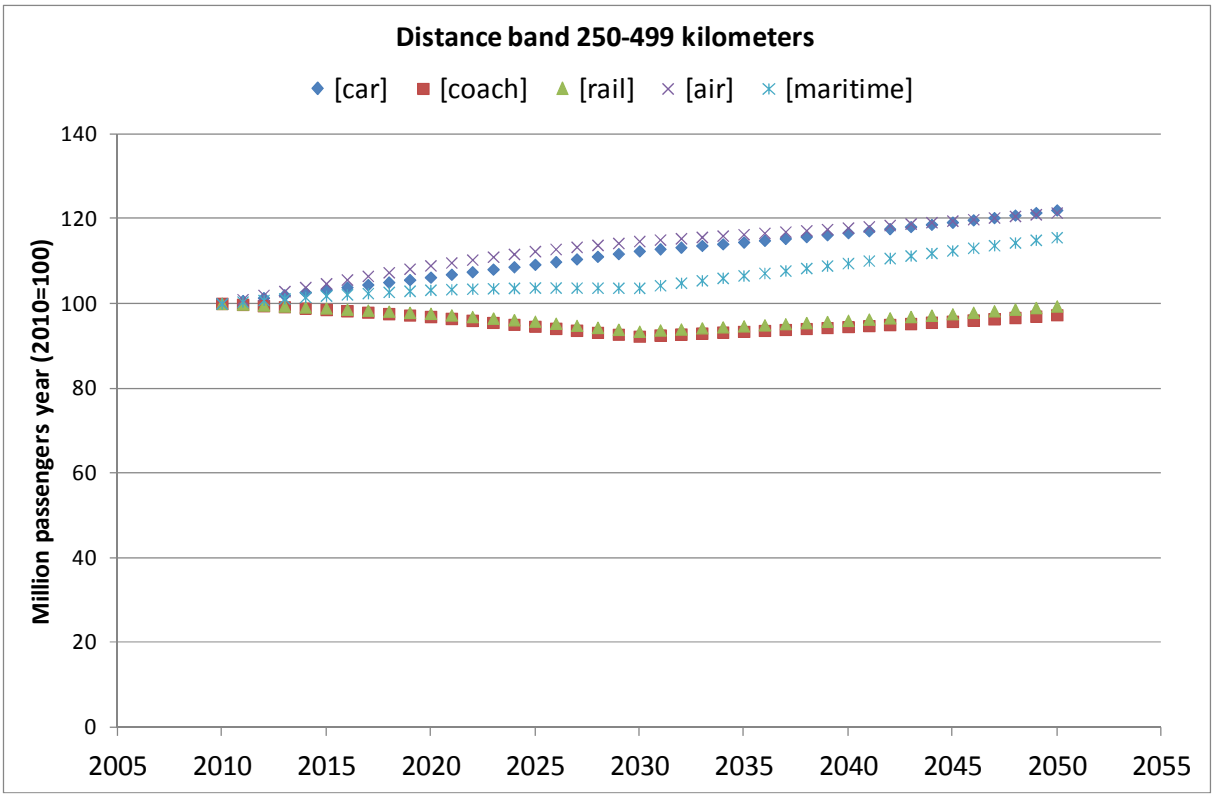


Figure 3-47 LUNA forecast - number of travellers per year and mode in the distance band 250-499 kilometres 2010-2050 EU27 + Norway and Switzerland (2010 = 100)

500-999 kilometres

Figure 3-48 shows the development of passenger numbers transported by each mode of transport in the distance band 500-999 kilometres. In this distance band air transport overtakes car transport (43 % to 37 % respectively). The absolute number of car passengers in this distance band increases from about 41 million per year in 2010 to about 49 million per year in 2050. In the same period the number of air passengers increases from about 47 million per year to about 58 million per year. Bus/coach and rail trips are slightly decreasing in the first and later increasing or at least stabilizing again. Maritime trips are increasing albeit remaining on a comparatively very low absolute level.

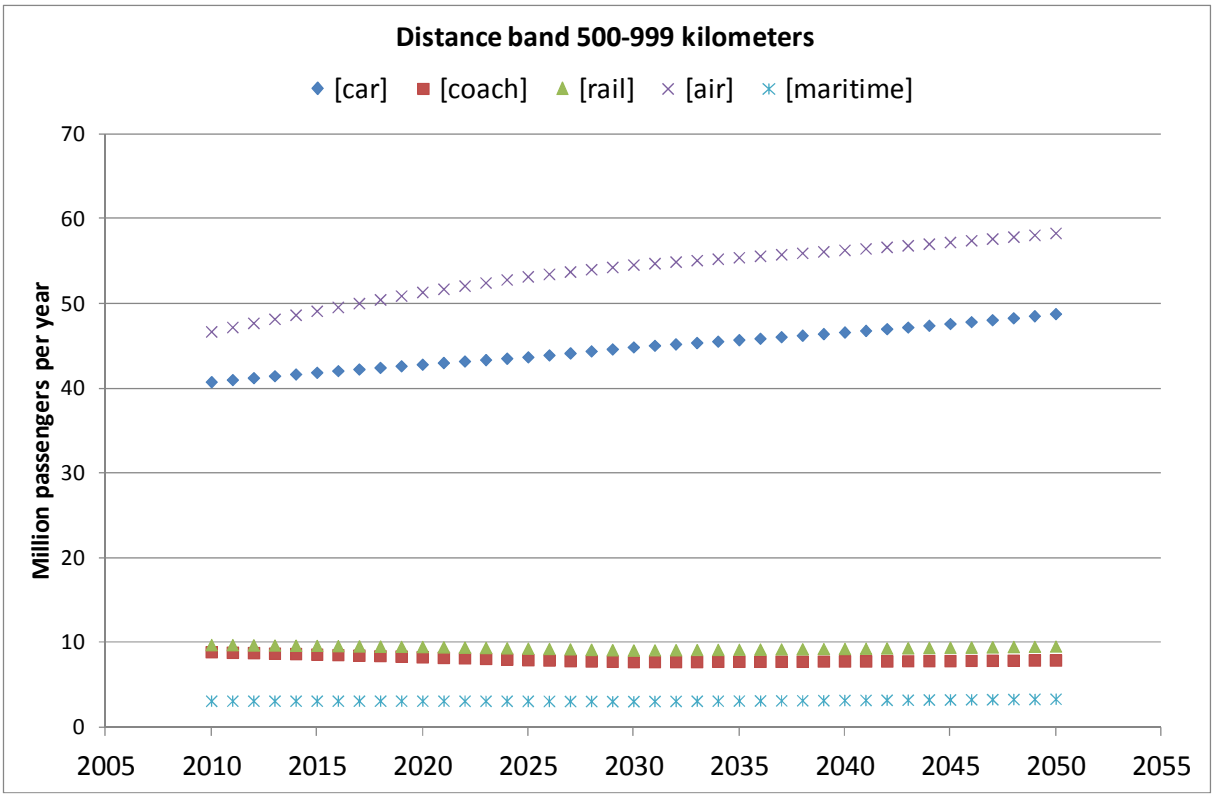


Figure 3-48 LUNA forecast - number of travellers per year and mode in the distance band 500-999 kilometres 2010-2050 EU27 + Norway and Switzerland

Figure 3-49 and Table 3-24 show the change in the number of passengers transported by each mode of transport in the distance band 500-999 kilometres relative to 2010. Air transport grows at the highest rate followed by car transport. Relative changes in the number of car passengers by country between 2010 and 2050 range from -12 % in Portugal to +53 % in Sweden. The changes in air transport range from +0 % in Germany to +62 % in Norway. The main drivers are again economic and population development.

Table 3-23 LUNA forecast - change in number of travellers by mode distance class 500-999 kilometres 2050 relative to 2010

Mode	Median	Minimum		Maximum	
	(2010=100)	Country	(2010=100)	Country	(2010=100)
Car	114	Portugal	88	Sweden	153
Coach	87	Estonia	49	Luxembourg	118
Rail	99	Estonia	61	Norway	129
Air	128	Germany	100	Norway	162
Maritime	100	Greece	89	United Kingdom	118

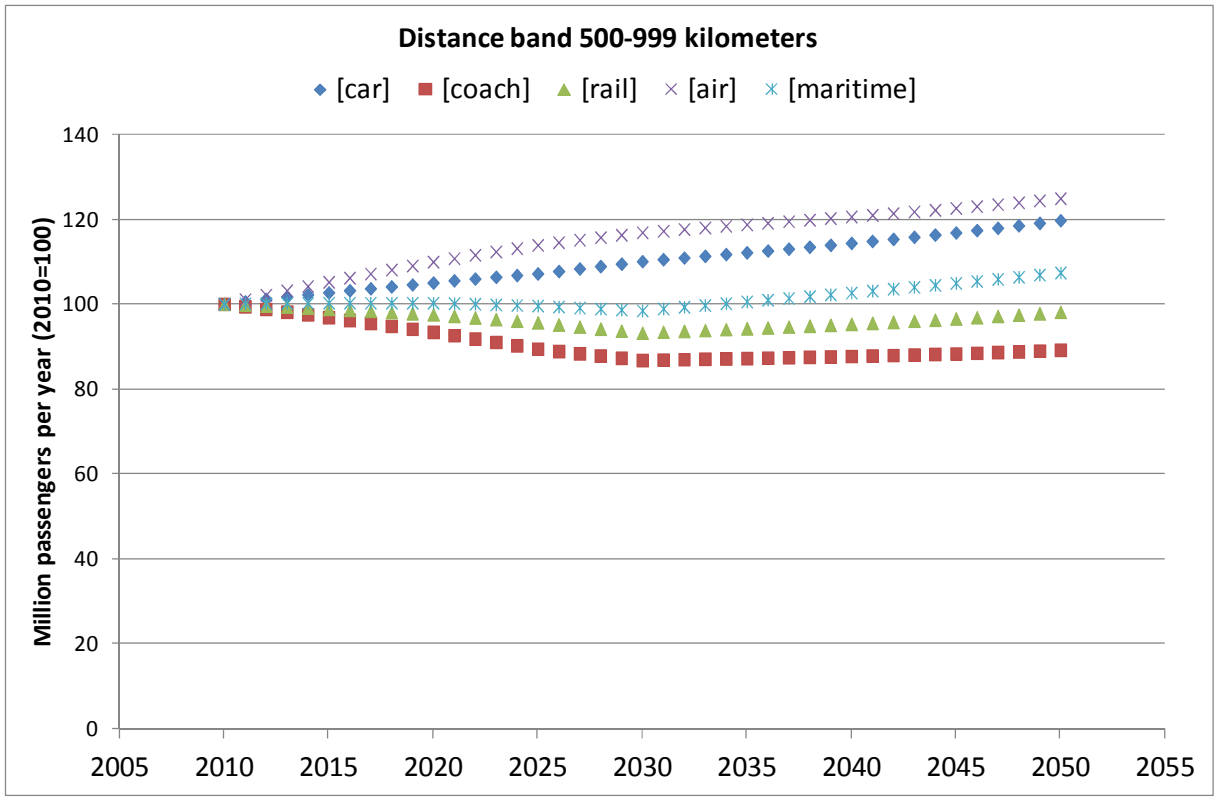


Figure 3-49 LUNA forecast - number of travellers per year and mode in the distance band 500-999 kilometres 2010-2050 EU27 + Norway and Switzerland (2010 = 100)

1,000-1,999 kilometres

Figure 3-50 shows the development of passenger numbers transported by each mode of transport in the distance band 1,000-1,999 kilometres. In this distance band the highest share of passengers in the base year use air as mode of transport (61 %) followed by car (about 23 %). The absolute number of air passengers in this distance band increases from about 38 million per year in 2010 to about 48 million per year in 2050. In the same period the number of car passengers increases slightly from about 14 million per year to about 15 million per year. Rail and especially bus/coach trips are decreasing significantly. Maritime trips are increasing only slightly.

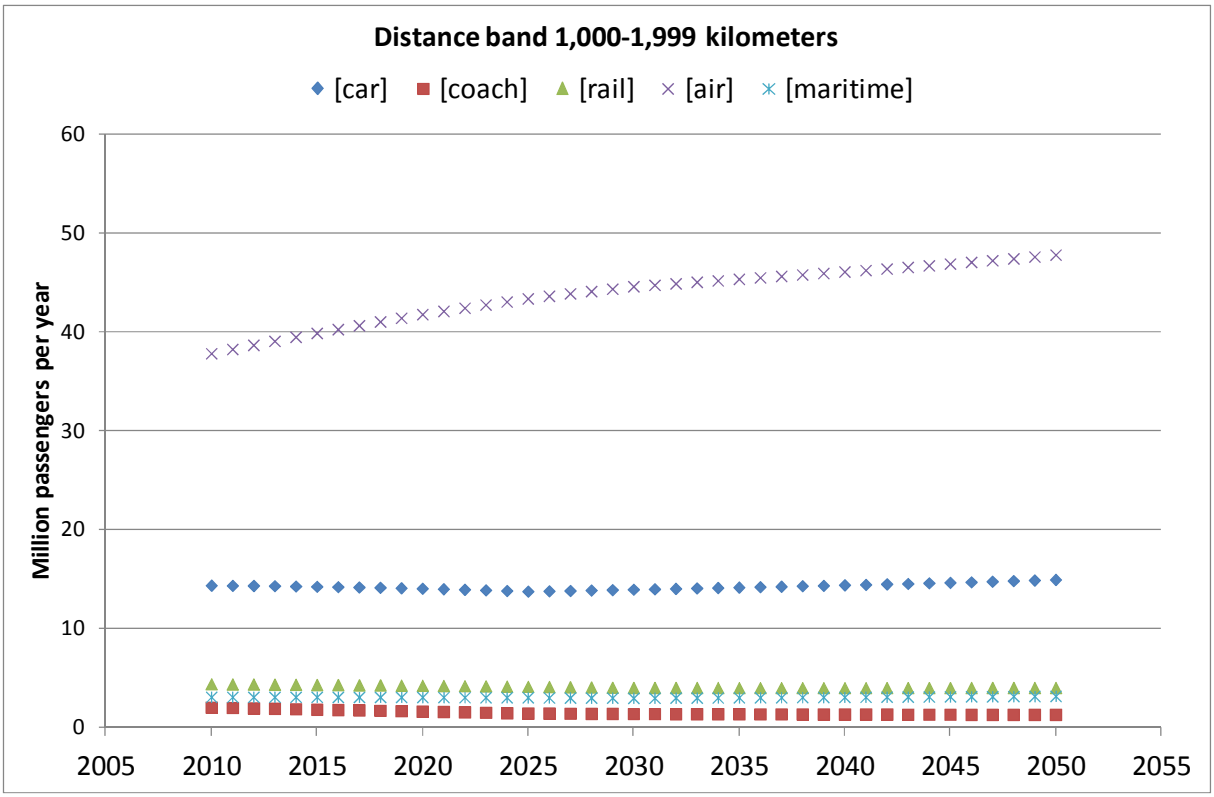


Figure 3-50 LUNA forecast - number of travellers per year and mode in the distance band 1,000-1,999 kilometres 2010-2050 EU27 + Norway and Switzerland

Figure 3-51 and Table 3-25 show the changes in the number of passengers transported by each mode of transport in the distance band 1,000-1,999 kilometres relative to 2010. In this distance band air is the only mode of transport which is increasing significantly. Relative changes in the number of car passengers by country between 2010 and 2050 range from -42 % in Latvia to +40 % in Sweden. The changes in air transport range from +3 % in Germany to +73 % in Cyprus. The main drivers are again economic and population development.

Table 3-24 LUNA forecast - change in number of travellers by mode distance class 1,000-1,999 kilometres 2050 relative to 2010

Mode	Median	Minimum		Maximum	
	(2010=100)	Country	(2010=100)	Country	(2010=100)
Car	100	Latvia	58	Sweden	140
Coach	58	Estonia	32	Sweden	92
Rail	92	Lithuania	66	Norway	128
Air	129	Germany	103	Cyprus	173
Maritime	100	Greece	89	Sweden	121

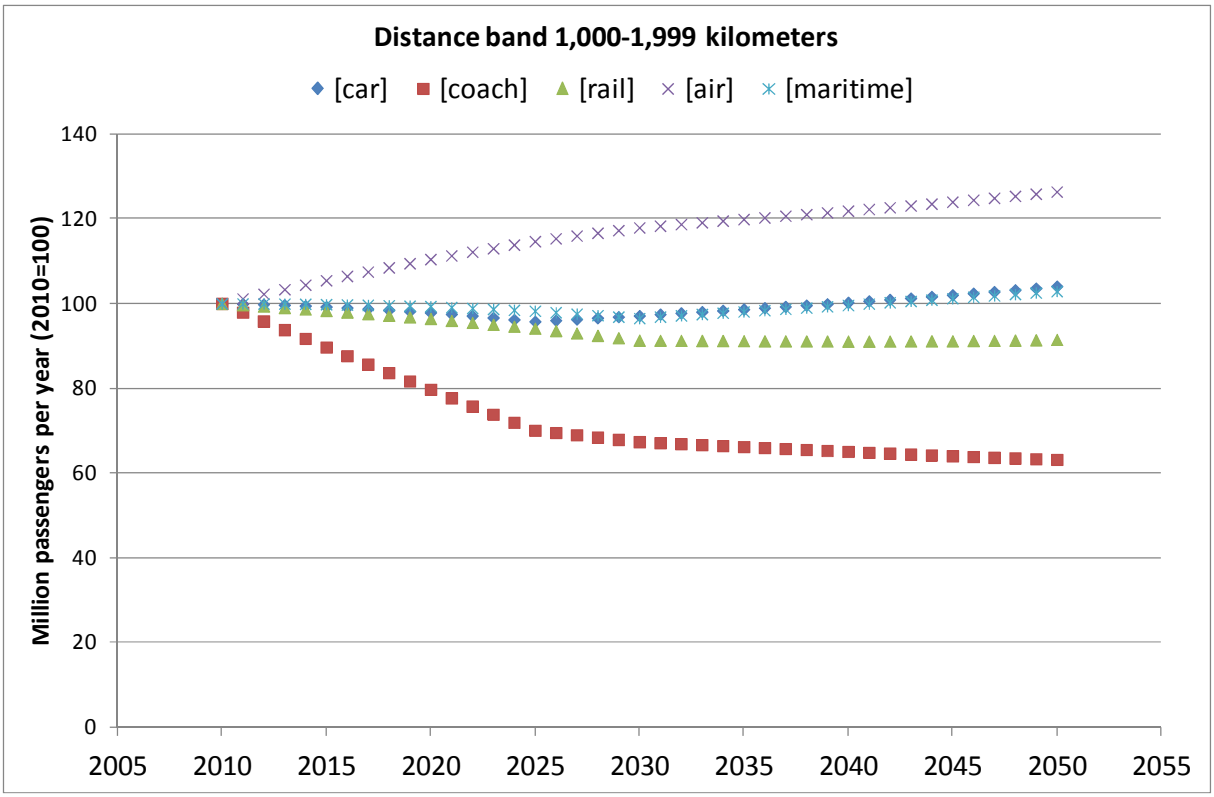


Figure 3-51 LUNA forecast - number of travellers per year and mode in the distance band 1,000-1,999 kilometres 2010-2050 EU27 + Norway and Switzerland (2010 = 100)

2,000 kilometres and more

Figure 3-52 shows the development of passenger numbers transported by each mode of transport in the distance band 2,000 kilometres and more. In this distance band by far the highest share of passengers in the base year use air as mode of transport (89 %) followed by maritime (about 7 %). The absolute number of air passengers in this distance band increases from about 28 million per year in 2010 to about 35 million per year in 2050. In the same period the number of maritime passengers is more or less stable while the use of the other modes is decreasing significantly.

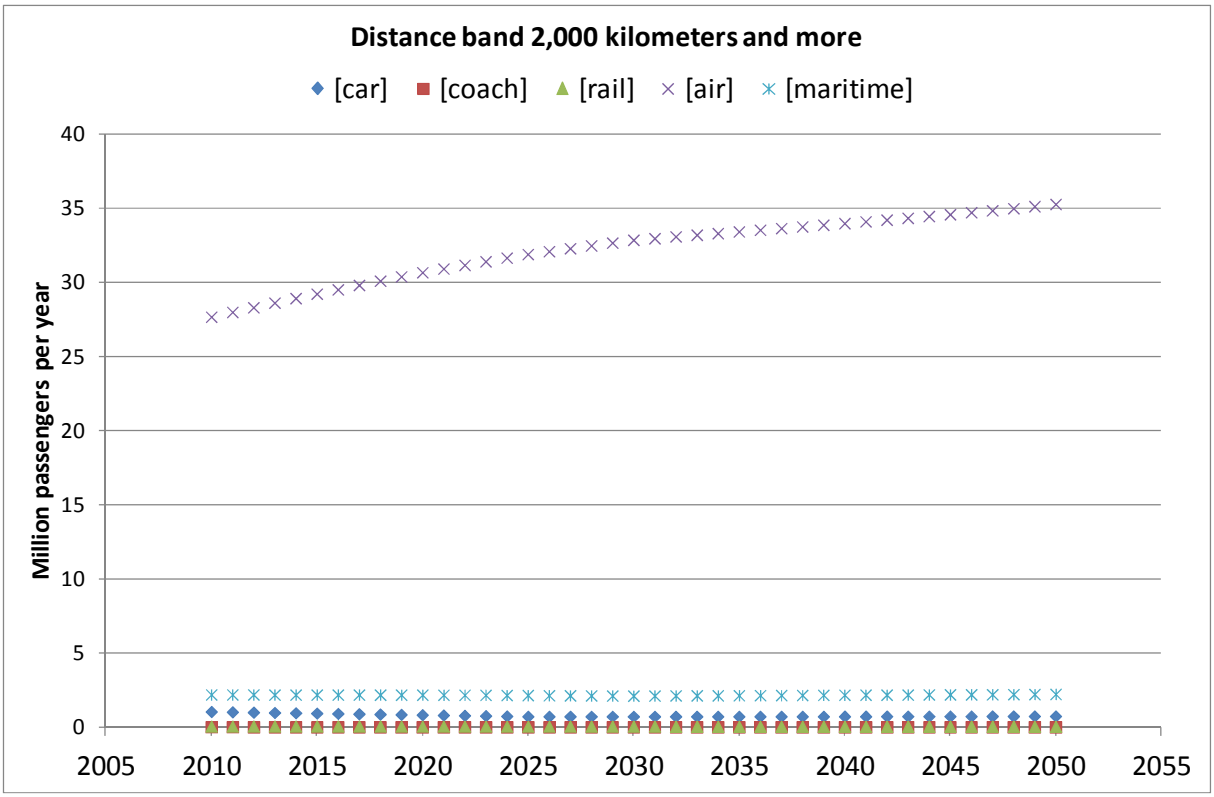


Figure 3-52 LUNA forecast - number of travellers per year and mode in the distance band 2,000 and more kilometres 2010-2050 EU27 + Norway and Switzerland

Figure 3-53 and Table 3-26 show the changes in the number of passengers transported by each mode of transport in the distance band 2,000 kilometres and more relative to 2010. In this distance band air is the only mode of transport which is increasing significantly. Relative changes in the number of car passengers by country between 2010 and 2050 range from -70 % in Latvia to -5 % in Sweden. The changes in air transport range from +4 % in Germany to +70 % in Cyprus. The main drivers are again economic and population development.

Table 3-25 LUNA forecast - change in number of travellers by mode distance class 2,000 kilometres and more 2050 relative to 2010

Mode	Median	Minimum		Maximum	
	(2010=100)	Country	(2010=100)	Country	(2010=100)
Car	70	Latvia	30	Sweden	95
Coach	33	Latvia	18	Luxembourg	60
Rail	84	Latvia	47	Ireland	132
Air	130	Germany	104	Cyprus	170
Maritime	100	Greece	89	Sweden	121

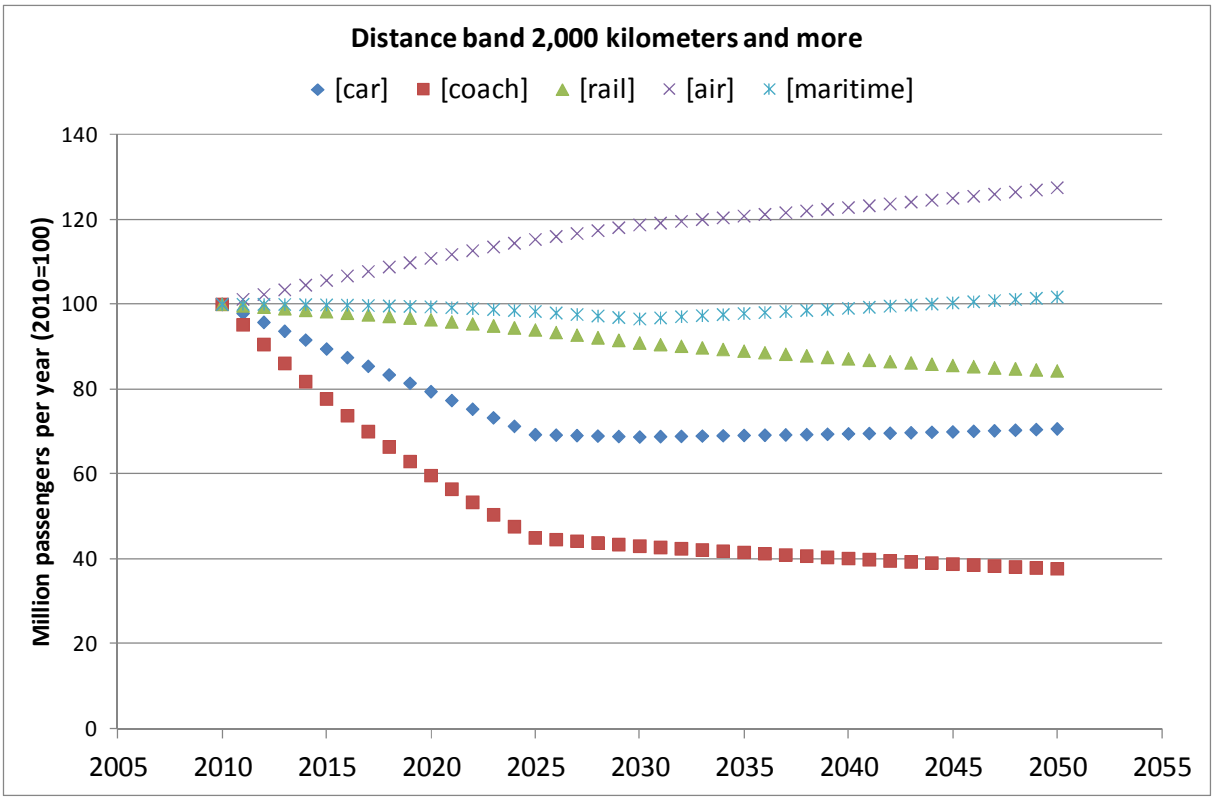


Figure 3-53 LUNA forecast - number of travellers per year and mode in the distance band 2,000 and more kilometres 2010-2050 EU27 + Norway and Switzerland (2010 = 100)

3.6.2 Person Kilometres

Total

Figure 3-54 shows the development of numbers of passenger kilometres travelled by each mode of transport in all distance bands. In the base year the highest share of passenger kilometres are travelled by air (53 %) followed by car (32 %). The absolute numbers of long-distance air passenger kilometres increases from about 196 billion per year in 2010 to about 247 billion per year. In the same period the numbers of car passenger kilometres increase from about 117 billion per year to about 137 billion per year. Bus/coach and rail person kilometres are slightly decreasing while maritime person kilometres are relatively stable.

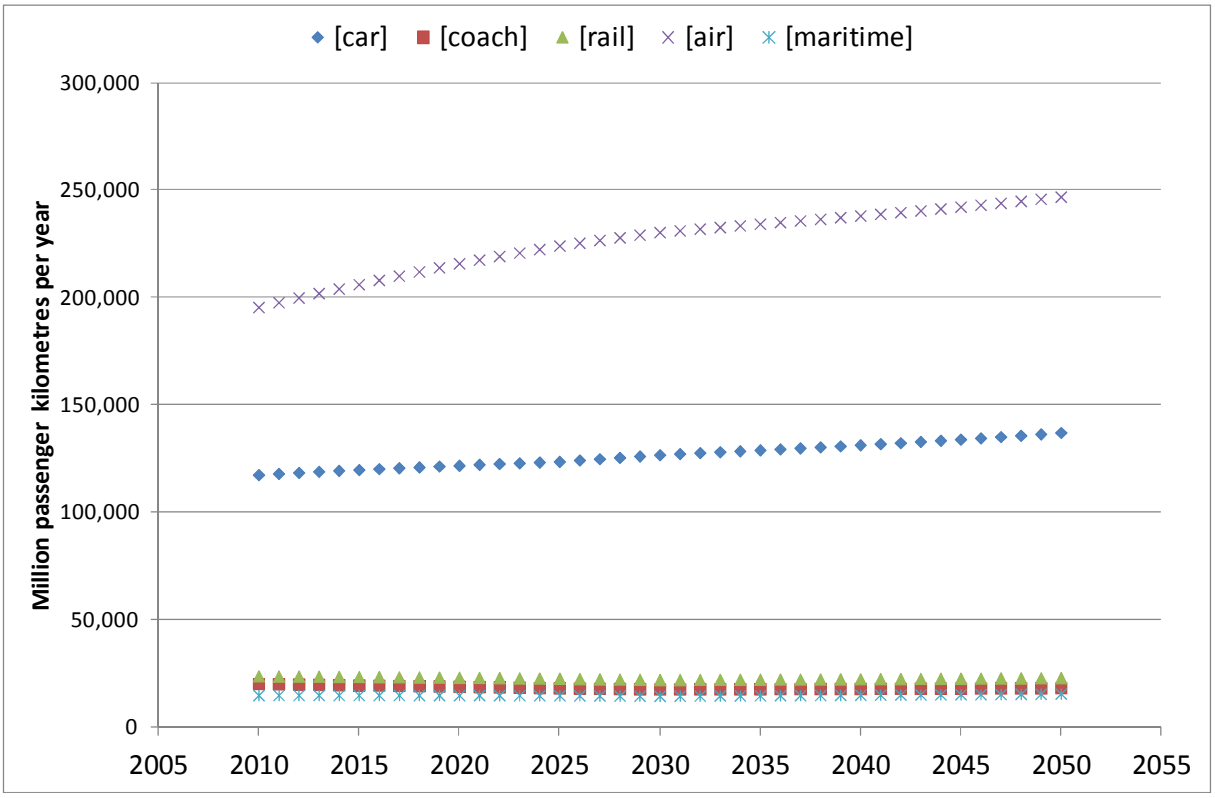


Figure 3-54 LUNA forecast - person kilometres travelled per year and mode 2010-2050 EU27 + Norway and Switzerland

Table 3-27 and Figure 3-55 show the change in the number of passenger kilometres travelled by each mode of transport in all distance bands relative to 2010. Air passenger kilometres grow at the highest rate followed by car. The relative change in numbers of car passenger kilometres by country between 2010 and 2050 ranges from -7 % in Bulgaria to +52 % in Sweden. The changes in air person kilometres range from -6 % in Germany to +53 % in Norway. The main drivers are economic and population development.

Table 3-26 LUNA forecast - change in person kilometres travelled by year and mode 2050 relative to 2010

Mode	Median	Minimum		Maximum	
	(2010=100)	Country	(2010=100)	Country	(2010=100)
Car	118	Bulgaria	93	Sweden	152
Coach	95	Portugal	77	Norway	125
Rail	100	Portugal	73	Norway	133
Air	116	Germany	94	Norway	153
Maritime	100	Bulgaria	100	Sweden	141

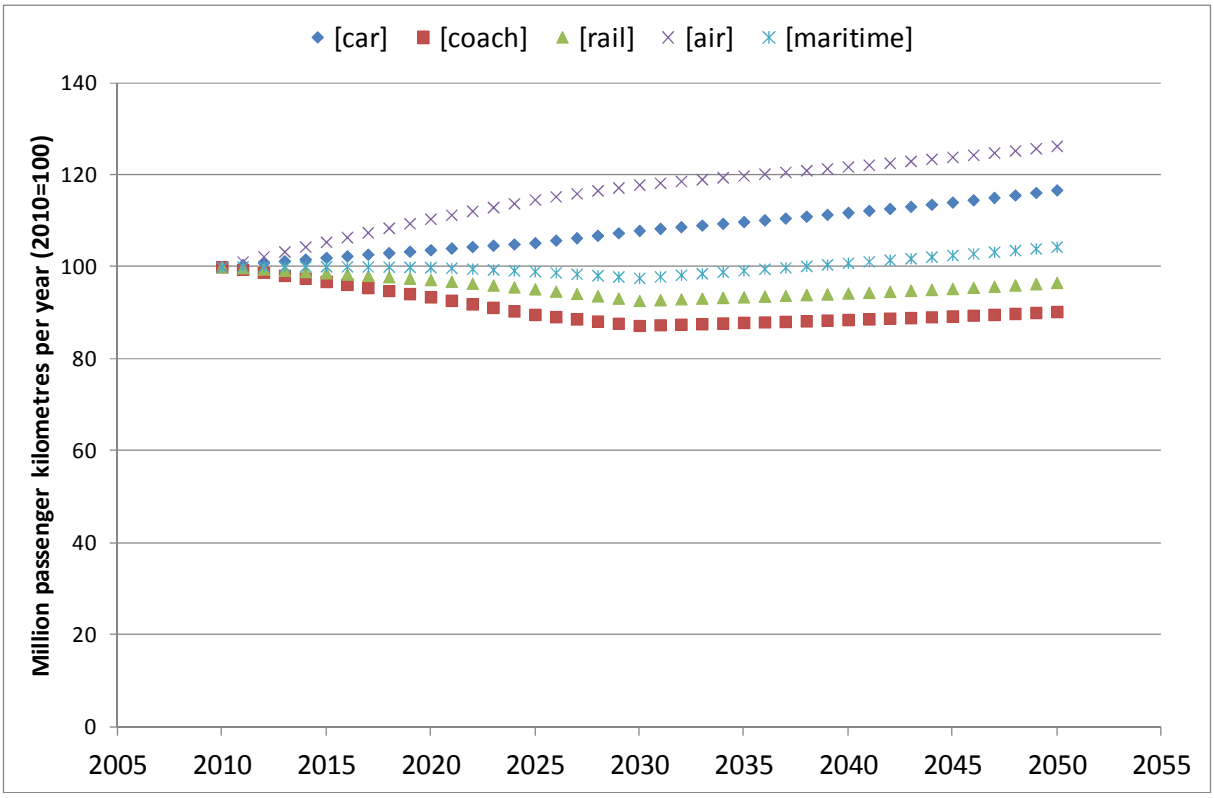


Figure 3-55 LUNA forecast - person kilometres travelled per year and mode 2010-2050 EU27 + Norway and Switzerland (2010 = 100)

100-249 kilometres

Figure 3-56 shows the development of numbers of passenger kilometres travelled by each mode of transport in the distance band 100-249 kilometres. In the base year the highest share of passenger kilometres in the shortest distance band are travelled by air (53 %) followed by car (32 %). The absolute numbers of long-distance car passenger kilometres increase from about 30 billion per year in 2010 to about 36 billion per year. In the same period the numbers of air passenger kilometres increases from about 2 billion per year to about 3 billion per year. Bus/coach and rail person kilometres are slightly decreasing and the increasing again. Maritime person kilometres are increasing albeit on a comparatively low absolute level.

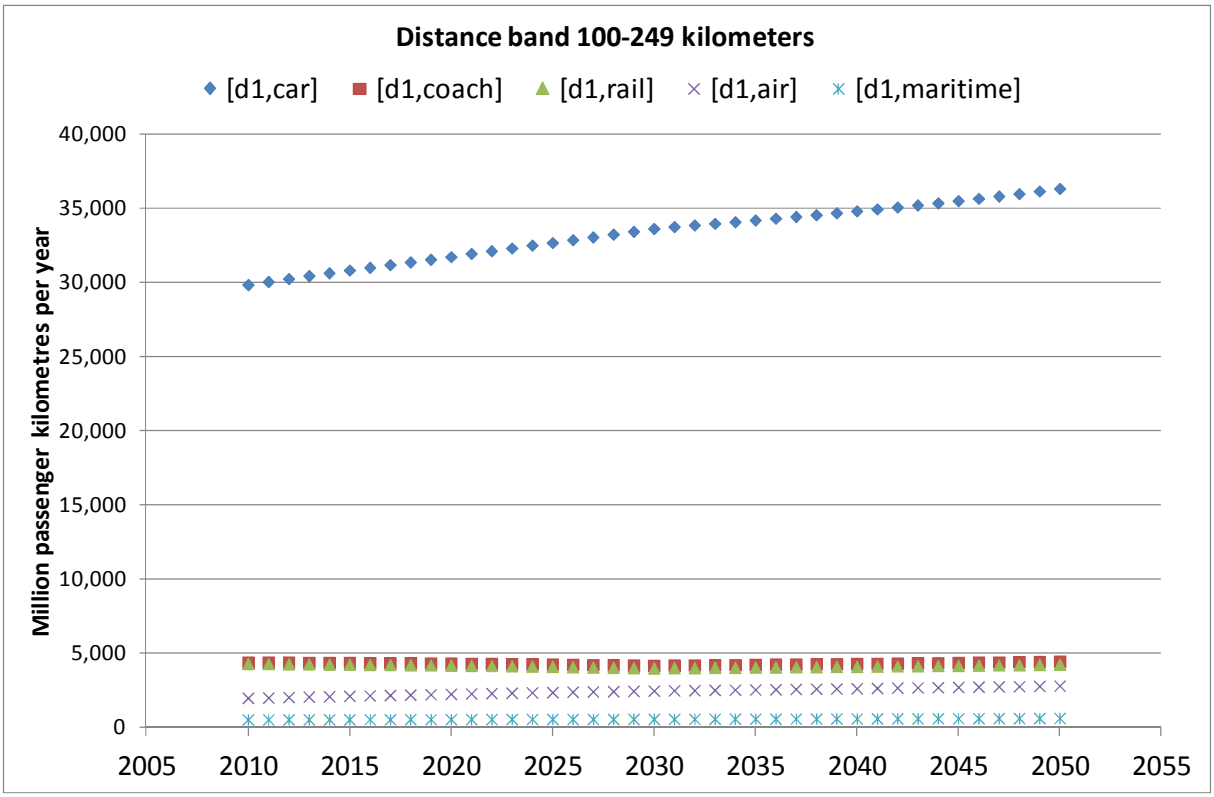


Figure 3-56 LUNA forecast - person kilometres travelled per year and mode in the distance band 100-249 kilometres 2010-2050 EU27 + Norway and Switzerland

Figure 3-57 and Table 3-28 show the changes in the number of passenger kilometres travelled by each mode of transport in the distance band 100-249 kilometres relative to 2010. Air passenger kilometres grow at the highest rate followed by car. The relative change in numbers of car passenger kilometres by country between 2010 and 2050 ranges from -7 % in Portugal to +52 % in Sweden. The changes in air person kilometres range from +0 % in Belgium to +44 % in the United Kingdom. The main drivers are again economic and population development.

Table 3-27 Change in person kilometres travelled by year and mode distance band 100-249 kilometres 2050 relative to 2010

Mode	Median	Minimum		Maximum	
	(2010=100)	Country	(2010=100)	Country	(2010=100)
Car	122	Portugal	94	Sweden	152
Coach	104	Portugal	81	Norway	137
Rail	100	Portugal	67	Ireland	132
Air	100	Belgium	100	United Kingdom	144
Maritime	100	Greece	93	United Kingdom	126

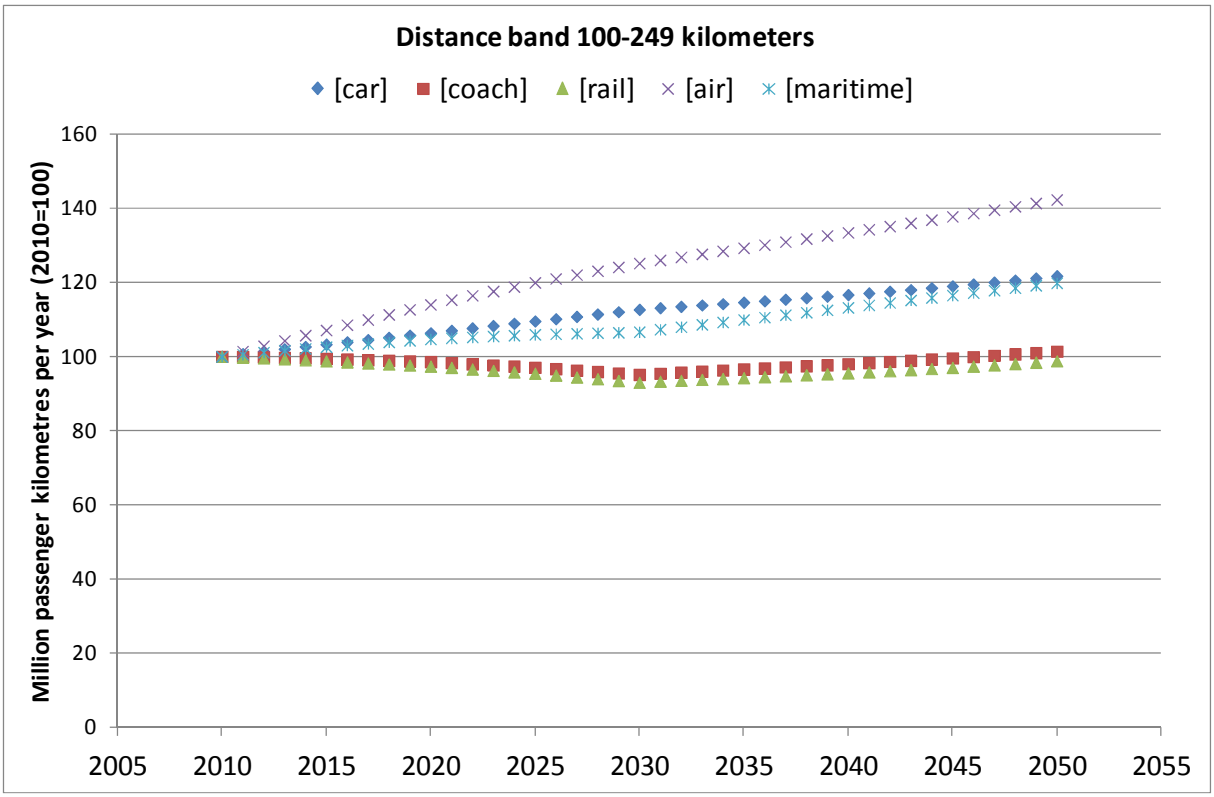


Figure 3-57 LUNA forecast - person kilometres travelled per year and mode in the distance band 100-249 kilometres 2010-2050 EU27 + Norway and Switzerland (2010 = 100)

250-499 kilometres

Figure 3-58 shows the development of the number of passenger kilometres travelled by each mode of transport in the distance band 250-499 kilometres. In this distance band the highest share of passenger kilometres in the base year are travelled by car (51 %) followed by air (about 30 %). The absolute number of car passenger kilometres in this distance band increases from about 32 billion per year in 2010 to about 40 billion per year in 2050. In the same period the numbers of air passenger kilometres travelled increase from about 19 billion per year to about 23 billion per year. Bus/coach and rail passenger kilometres are slightly decreasing in the first and later increasing again. Maritime trips are increasing albeit remaining on a comparatively very low absolute level.

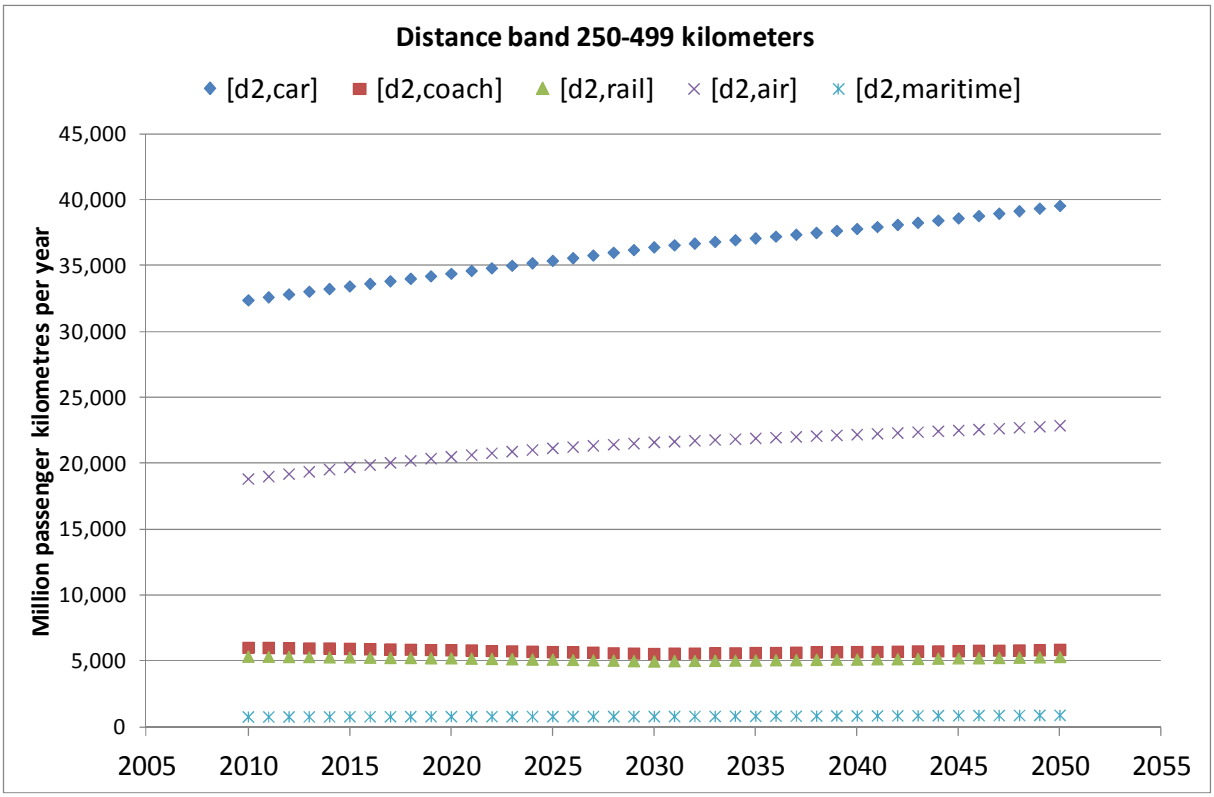


Figure 3-58 LUNA forecast - person kilometres travelled per year and mode in the distance band 250-499 kilometres 2010-2050 EU27 + Norway and Switzerland

Figure 3-59 and Table 3-29 show the change in the number of passenger kilometres travelled by each mode of transport in the distance band 250-499 kilometres relative to 2010. Air and car passenger kilometres travelled grow more or less at the same rate. Relative changes in the number of car passengers by country between 2010 and 2050 range from -8 % in Portugal to +49 % in Sweden. The changes in air transport range from -1 % in Germany to +56 % in Norway. The main drivers are again economic and population development.

Table 3-28 LUNA forecast - change in person kilometres travelled by year and mode distance band 250-499 kilometres 2050 relative to 2010

Mode	Median	Minimum		Maximum	
	(2010=100)	Country	(2010=100)	Country	(2010=100)
Car	120	Portugal	92	Sweden	149
Coach	97	Portugal	78	Norway	127
Rail	100	Portugal	67	Norway	129
Air	125	Germany	99	Norway	156
Maritime	100	Greece	90	United Kingdom	121

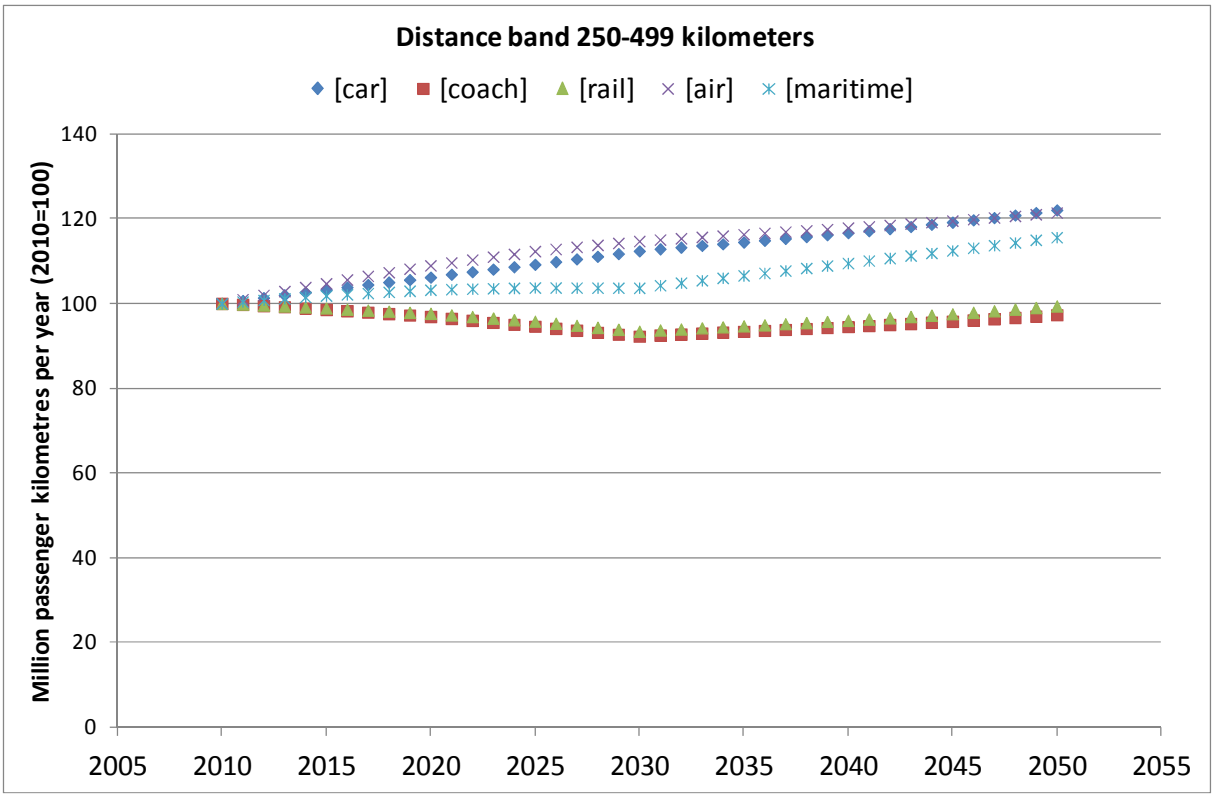


Figure 3-59 LUNA forecast - person kilometres travelled per year and mode in the distance band 250-499 kilometres 2010-2050 EU27 + Norway and Switzerland (2010 = 100)

500-999 kilometres

Figure 3-60 shows the development of numbers of passenger kilometres travelled by each mode of transport in the distance band 500-999 kilometres. In this distance band air passenger kilometres travelled overtake car passenger kilometres travelled (43 % to 37 % respectively). The absolute numbers of car passenger kilometres travelled in this distance band increase from about 31 billion per year in 2010 to about 37 billion per year in 2050. In the same period the numbers of air passenger kilometres travelled increase from about 35 billion per year to about 44 billion per year. Bus/coach and rail trips are slightly decreasing in the first and later increasing or at least stabilizing again. Maritime trips are increasing albeit remaining on a comparatively very low absolute level.

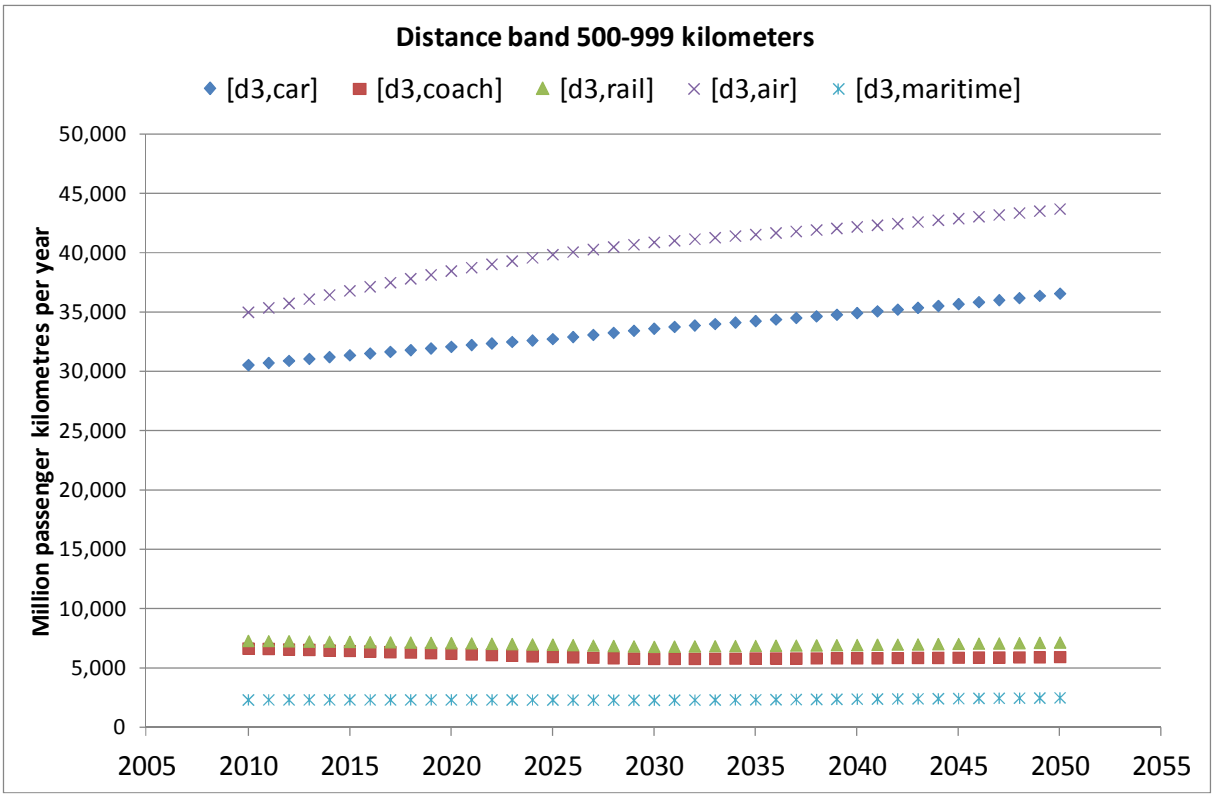


Figure 3-60 LUNA forecast - person kilometres travelled per year and mode in the distance band 500-999 kilometres 2010-2050 EU27 + Norway and Switzerland

Figure 3-61 and Table 3-30 show the changes in the number of passenger kilometres travelled by mode of transport in the distance band 500-999 kilometres relative to 2010. Air transport grows at the highest rate followed by car transport. Relative changes in the number of car passengers by country between 2010 and 2050 range from -12 % in Portugal to +53 % in Sweden. The changes in air transport range from +0 % in Germany to +62 % in Norway. The main drivers are again economic and population development.

Table 3-29 LUNA forecast - change in person kilometres travelled by year and mode distance band 500-999 kilometres 2050 relative to 2010

Mode	Median	Minimum		Maximum	
	(2010=100)	Country	(2010=100)	Country	(2010=100)
Car	114	Portugal	88	Sweden	153
Coach	87	Estonia	49	Luxembourg	118
Rail	99	Estonia	61	Norway	129
Air	128	Germany	100	Norway	162
Maritime	100	Greece	89	United Kingdom	118

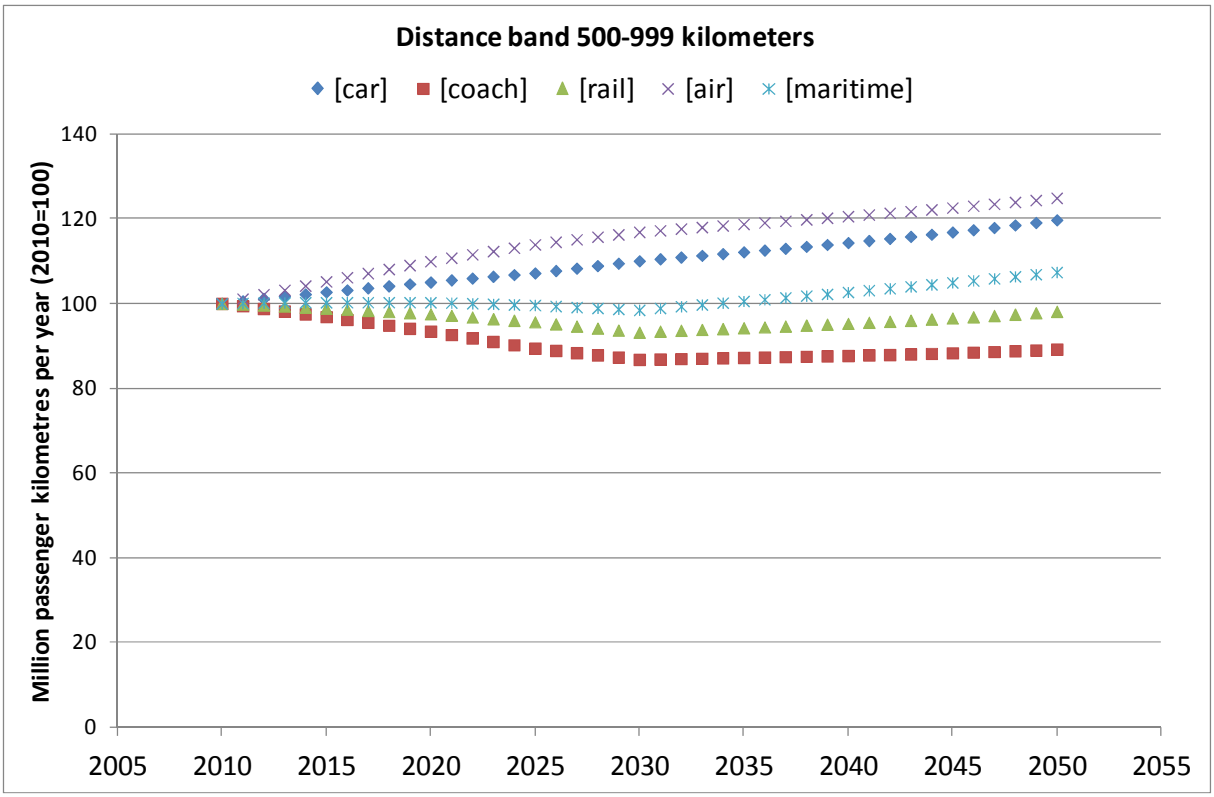


Figure 3-61 LUNA forecast - person kilometres travelled per year and mode in the distance band 500-999 kilometres 2010-2050 EU27 + Norway and Switzerland (2010 = 100)

1,000-1,999 kilometres

Figure 3-62 shows the development of numbers of passenger kilometres travelled by each mode of transport in the distance band 1,000-1,999 kilometres. In this distance band the highest share of passenger kilometres in the base year are travelled by air as mode of transport (61 %) followed by car (about 23 %). The absolute numbers of air passenger kilometres travelled in this distance band increase from about 57 billion per year in 2010 to about 72 billion per year in 2050. In the same period the numbers of car passenger kilometres travelled increase slightly from about 21 billion per year to about 22 billion per year. Rail and especially bus/coach trips are decreasing significantly. Maritime trips are increasing only slightly.

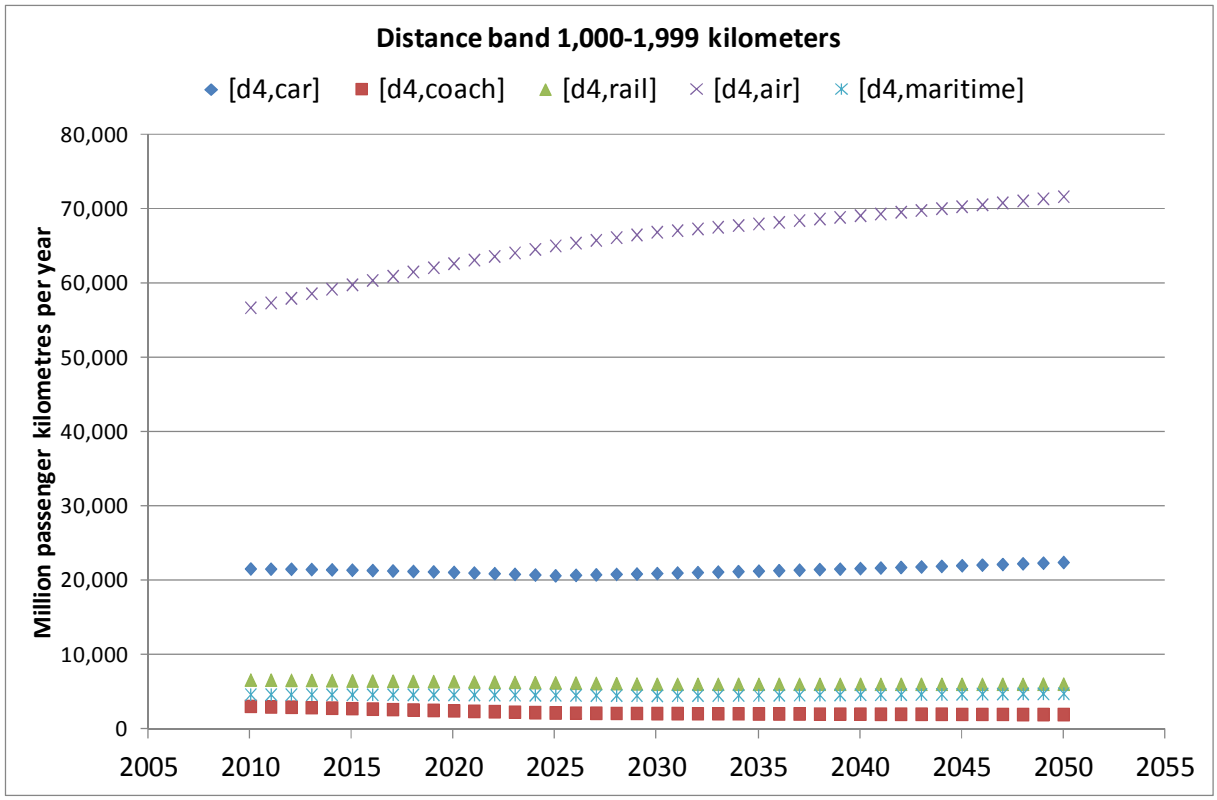


Figure 3-62 LUNA forecast - person kilometres travelled per year and mode in the distance band 1,000-1,999 kilometres 2010-2050 EU27 + Norway and Switzerland

Figure 3-63 and Table 3-31 show the changes in the number of passenger kilometres travelled by each mode of transport in the distance band 1,000-1,999 kilometres relative to 2010. In this distance band air is the only mode of transport which is increasing significantly. Relative changes in the numbers of car passenger kilometres by country between 2010 and 2050 range from -42 % in Latvia to +40 % in Sweden. The changes in air passenger kilometres travelled range from +3 % in Germany to +73 % in Cyprus. The main drivers are again economic and population development.

Table 3-30 LUNA forecast - change in person kilometres travelled by year and mode distance band 1,000-1,999 kilometres 2050 relative to 2010

Mode	Median	Minimum		Maximum	
	(2010=100)	Country	(2010=100)	Country	(2010=100)
Car	100	Latvia	58	Sweden	140
Coach	58	Estonia	32	Sweden	92
Rail	92	Lithuania	66	Norway	128
Air	129	Germany	103	Cyprus	173
Maritime	100	Greece	89	Sweden	121

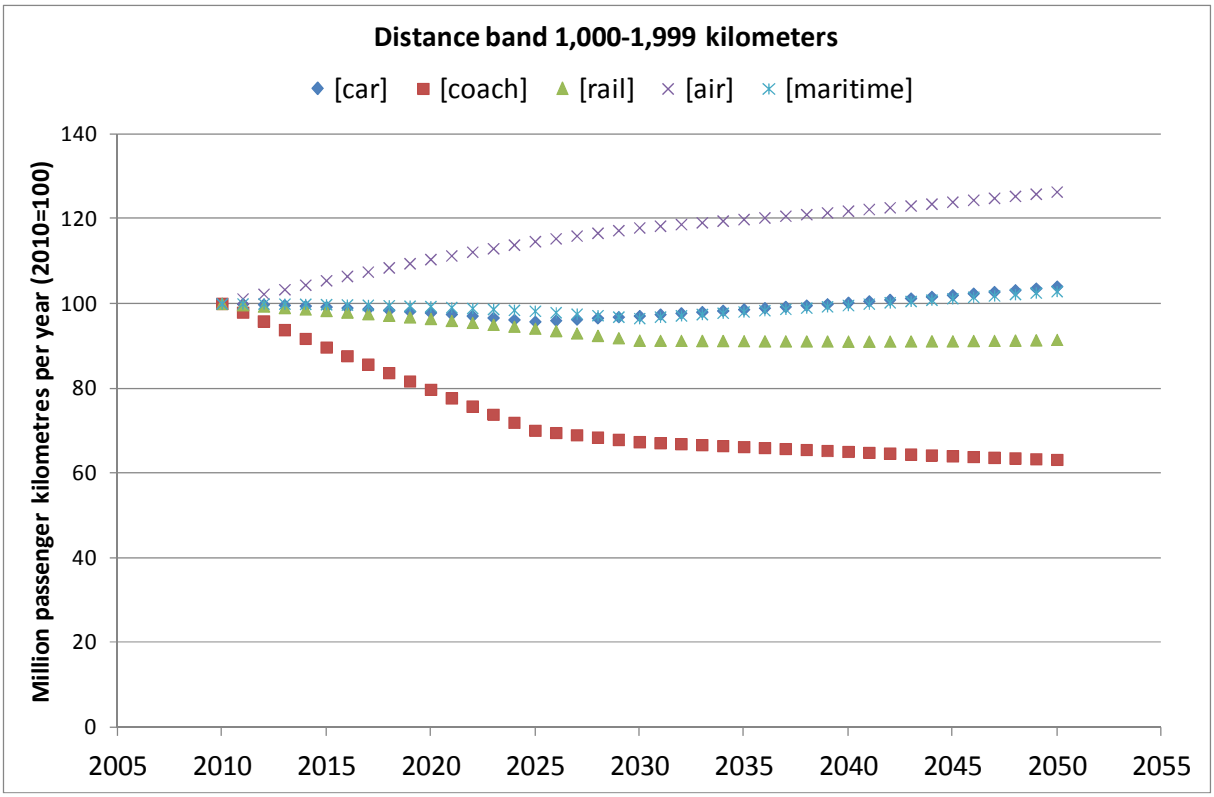


Figure 3-63 LUNA forecast - person kilometres travelled per year and mode in the distance band 1,000-1,999 kilometres 2010-2050 EU27 + Norway and Switzerland (2010 = 100)

2,000 kilometres and more

Figure 3-64 shows the development of numbers of passenger kilometres travelled by each mode of transport in the distance band 2,000 kilometres and more. In this distance band by far the highest share of passenger kilometres in the base year is travelled by air as mode of transport (89 %) followed by maritime (about 7 %). The absolute numbers of air passenger kilometres travelled in this distance band increase from about 83 billion per year in 2010 to about 106 billion per year in 2050. In the same period the number of maritime passengers is more or less stable while the use of the other modes is decreasing significantly.

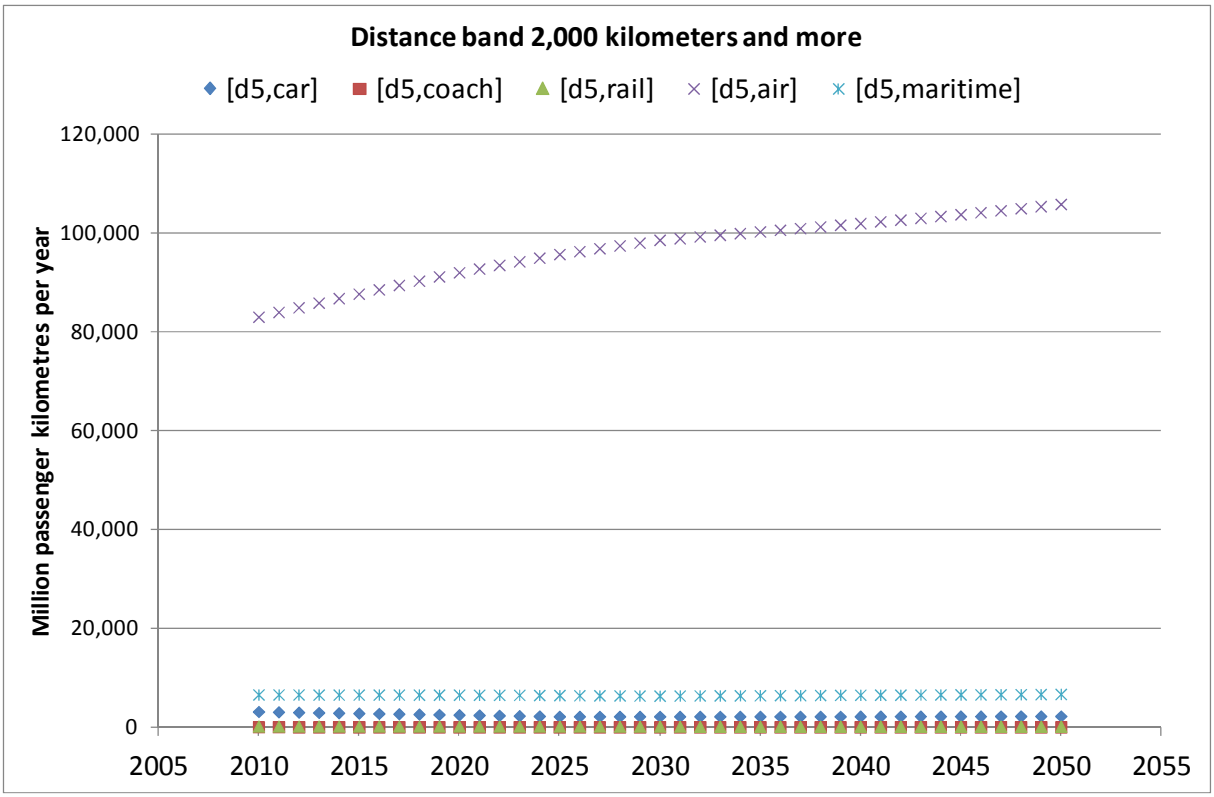


Figure 3-64 LUNA forecast - person kilometres travelled per year and mode in the distance band 2,000 and more kilometres 2010-2050 EU27 + Norway and Switzerland

Figure 3-65 and Table 3-32 show the change in the number of passenger kilometres travelled by each mode of transport in the distance band 2,000 kilometres and more relative to 2010. In this distance band air is the only mode of transport which is increasing significantly. Relative changes in the numbers of car passenger kilometres travelled by country between 2010 and 2050 range from -70 % in Latvia to -5 % in Sweden. The changes in air passenger kilometres travelled range from +4 % in Germany to +70 % in Cyprus. The main drivers are again economic and population development.

Table 3-31 LUNA forecast - change in person kilometres travelled by year and mode distance band 2,000 kilometres and more 2050 relative to 2010

Mode	Median	Minimum		Maximum	
	(2010=100)	Country	(2010=100)	Country	(2010=100)
Car	70	Latvia	30	Sweden	95
Coach	33	Latvia	18	Luxembourg	60
Rail	84	Latvia	47	Ireland	132
Air	130	Germany	104	Cyprus	170
Maritime	100	Greece	89	Sweden	121

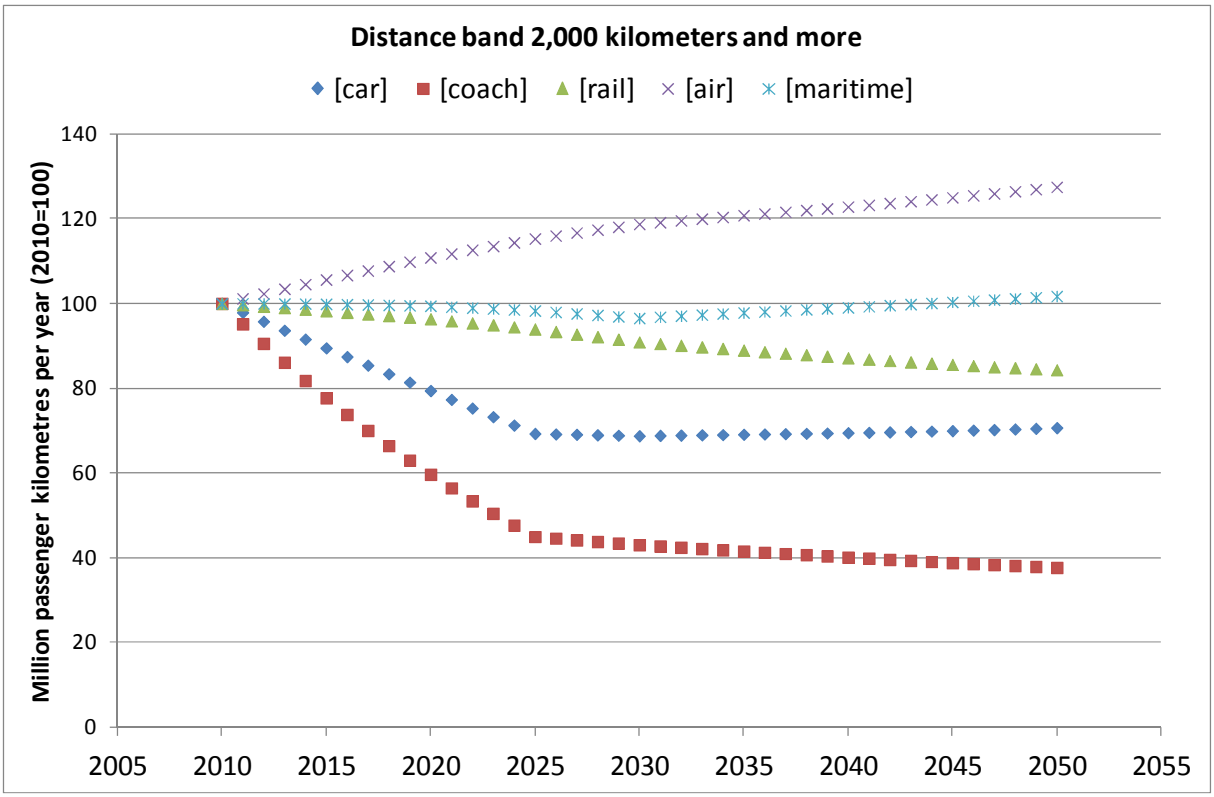


Figure 3-65 LUNA forecast - person kilometres travelled per year and mode in the distance band 2,000 and more kilometres 2010-2050 EU27 + Norway and Switzerland (2010 = 100)

3.6.3 Comparison with Forecasts from Literature

Passengers transported

(HS2, 2011) predicts changes in demand for long-distance passenger transport by 2043 (see section 3.2.2). Table 3-32 shows a comparison of these forecasts with results from the LUNA baseline scenario. While the predictions for total demand are more or less in line, LUNA predicts higher growth for car travel and lower growth for rail and air travel.

Table 3-32 Comparison of HS2 and LUNA forecasts for growth in demand in passengers transported in the UK

Mode	HS2 Ltd forecast (2008 – 2043)	LUNA forecast (2010-2050)
Car	+26%	+33%
Coach	n.a.	+12%
Rail	+61%	+14%
Air	+87%	+38%
Maritime	n.a.	+21%
Others	+68%	n.a.
Total	+36%	+32%

Source: (HS2, 2011), own calculations
n.a. = not available

Passenger kilometres travelled

(ITC, 2010) and (Dargay, 2010) report the forecasting results concerning growth in long-distance passenger mileage travelled for a total of nine different scenarios. Table 3-33 compares the results of

two of these scenarios with the corresponding LUNA baseline forecasts. The prediction of the change in total demand made by LUNA is pretty much in line with ITC forecasts. But LUNA predicts much lower growth rates for air, rail and coach.

Table 3-33 Comparison of ITC and LUNA forecasts for growth in passenger kilometres travelled in the UK

Mode	ITC base case (2005 – 2030)	ITC low GDP growth (2005-2030)	LUNA forecast (2010-2030)
Population	+14%[1)]	+14%[1)]	+11%
GDP	+58%[1)]	+30%[1)]	+34%
Passenger kilometres travelled			
Car	+30%	+18%	+17%
Coach	+25%	+26%	-2%
Rail	+35%	-1%	+2%
Air	+126%	+45%	+18%
Maritime	n.a.	n.a.	+17%
Total	+34%	+18%	+17%

Source: (ITC, 2010), own calculations
n.a. = not available
1) 2009-2030

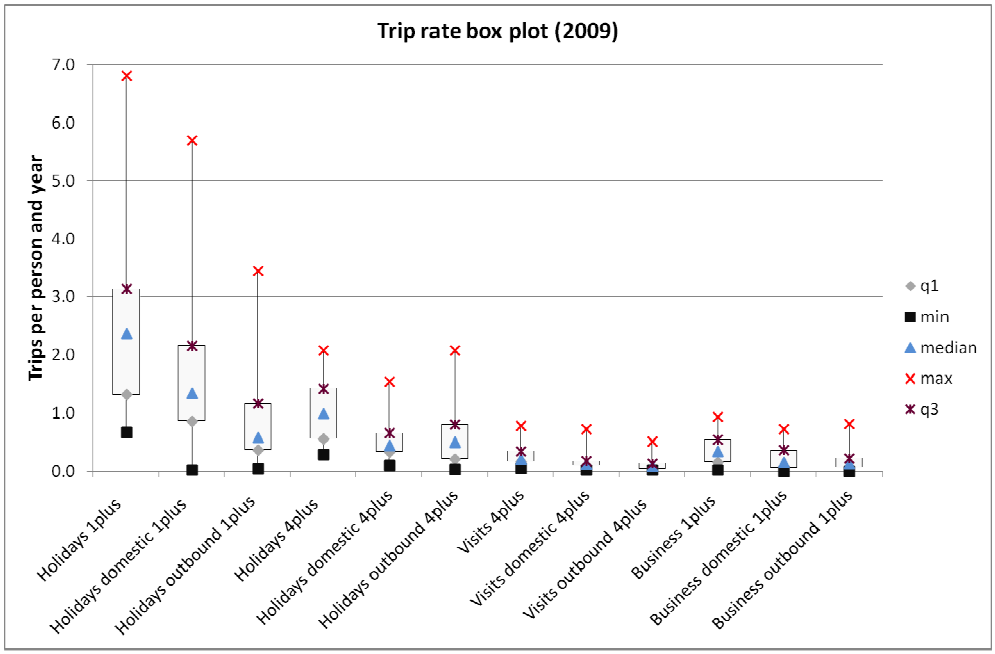
4 SUMMARY AND CONCLUSIONS

The first objective of the work presented in this deliverable was to review the available data sources in order to analyse the current travel behaviour concerning long-distance travel in Europe. To achieve this aim, the report specifies data sources and key statistics for long-distance travel:

- Eurostat tourism demand data are a consistent dataset of long-distance trips and are updated annually. Data are available at country level and long-distance trips are defined on the duration of stay (at least one overnight stay or at least four overnight stays) and not defined by trip length. All EU member states collect these statistics on residents aged 15 and over via household surveys.
- National Travel Surveys (NTS) are created by many countries in Western Europe and cover aspects of long-distance travel to some extent. On the other hand, collection of mobility data in National Travel Surveys is not common practice in Eastern Europe. As a result, there is a lack of data in these countries. Furthermore, different survey designs and settings are used in the different NTS. This has an adverse effect concerning their strict comparability.
- DATELINE was the first detailed supranational household and personal survey that focused on long-distance travel in 16 European countries. This dataset provides comprehensive and comparable information concerning travel purpose, travel date, destination, travel mode and focuses on limited scale intermodal trips.

Although the examined data sources are not fully comparable, the available data deliver clear results for aspects of long-distance travel. With reference to the analysis of Eurostat tourism demand data, German residents make the highest number of holiday trips (224.5 million trips) and business trips (58.8 million trips). France makes the highest number of trips for visiting friends and relatives (39.7 million trips). Scandinavian countries like Finland (6.8 trips), Sweden (5.2 trips) and Denmark (5.2 trips) have the highest per capita holiday trip rates. Air has its highest share of trips in Ireland (68%) whereas sea has its highest share in Greece (18%), rail has its highest share in Poland (15%) and private/shared vehicles have their highest share in Slovenia (79%).

The box plot (Figure 4-1) illustrates the distribution of Eurostat trip rates (trips per person per year) for different trip purposes. The bottom and top of the box represent the lower and upper quartiles and the triangle near the middle of the box is the median. The ends of the whiskers represent the minimum and the maximum trip rates.



Source: (Eurostat, 2011d), own calculation

Figure 4-1 Eurostat distribution of trip rates for various trip purposes (2009)

The second objective of the work presented in this deliverable section was to identify country specific trends influencing future long-distance mobility behaviour. These trends include economic growth, population growth, aging of population, changes in household structures, and increasing access to cars.

The first step of this work was to carry out a brief review of existing literature concerning future long-distance travel demand. Only three studies dealing explicitly with future long-distance travel have been identified. A study from Germany assumes that the travel intensity of the German population will be stable from 2010 to 2050 (Petermann et al., 2006) and hence that the most important driver will be the change in population. One study from the UK dealing with the topic of high speed railways forecasted the number of long-distance trips by mode of transport made by residents of the UK in 2043 (HS2, 2011). Trip rates are predicted to rise in 45 years between 26 % (car) and 87 % (air). In another study from the UK a model of long-distance travel was built to estimate future demand for a range of different scenarios (ITC, 2010, Dargay, 2010). In the base case scenario passenger kilometres travelled are expected to rise from 2005 to 2030 between 25 % (coach) and 126 % (air).

The second step was to create a set of national population cohort models and corresponding household composition models based on system dynamics. These models take into account the major drivers in order to quantify the impacts of likely future trends in long-distance transport demand. The model output includes information on the demand for long-distance trips disaggregated by age groups, household groups, and mode share trends for different distance classes. It does not include origin-destination information. A description of the resulting model (LUNA) was given.

The next step was to define an initial baseline scenario regarding economy, population and transport costs[17]. Forecasts of important drivers of future long-distance travel demand were made for this baseline scenario and, where possible, compared with other forecasts. Finally LUNA was used to forecast long-distance travel demand for the baseline scenario in the EU27 countries plus Norway and Switzerland. The results of LUNA are within a reasonable range of the predictions made in other studies (ITC, 2010, Dargay, 2010, HS2, 2011). Figure 4-2 shows the LUNA baseline results for the percentage change in passenger kilometres by mode and country.

LUNA forecasts the highest growth in demand for long-distance holiday travel for the mode air followed by the mode car. A significant decline in demand is predicted for the modes rail and coach for the longer distance bands (1,000 kilometres and more). A comparison of the demand forecasts by country shows significant differences as well between the different modes as between the different countries (Figure 4-2). Demand for air travel is increasing in all countries except Germany and Portugal. In these two countries the declining population outweighs the demand increasing effects of economic development and decreasing air fares. It can be concluded that the main drivers of long-distance holiday travel are population and economic trends. Nevertheless their effects are superimposed by the effects of travel times and travel costs. E.g. the relative widespread decline of rail and coach can be attributed to user costs, which are predicted to increase relative to the modes air and car. The mode coach is furthermore affected by the assumption of increasing congestion.

[17] It hast to be mentioned that the baseline scenario might be subject to revisions and changes within the framework of the subsequent use of the model LUNA in WP7 Scenarios.

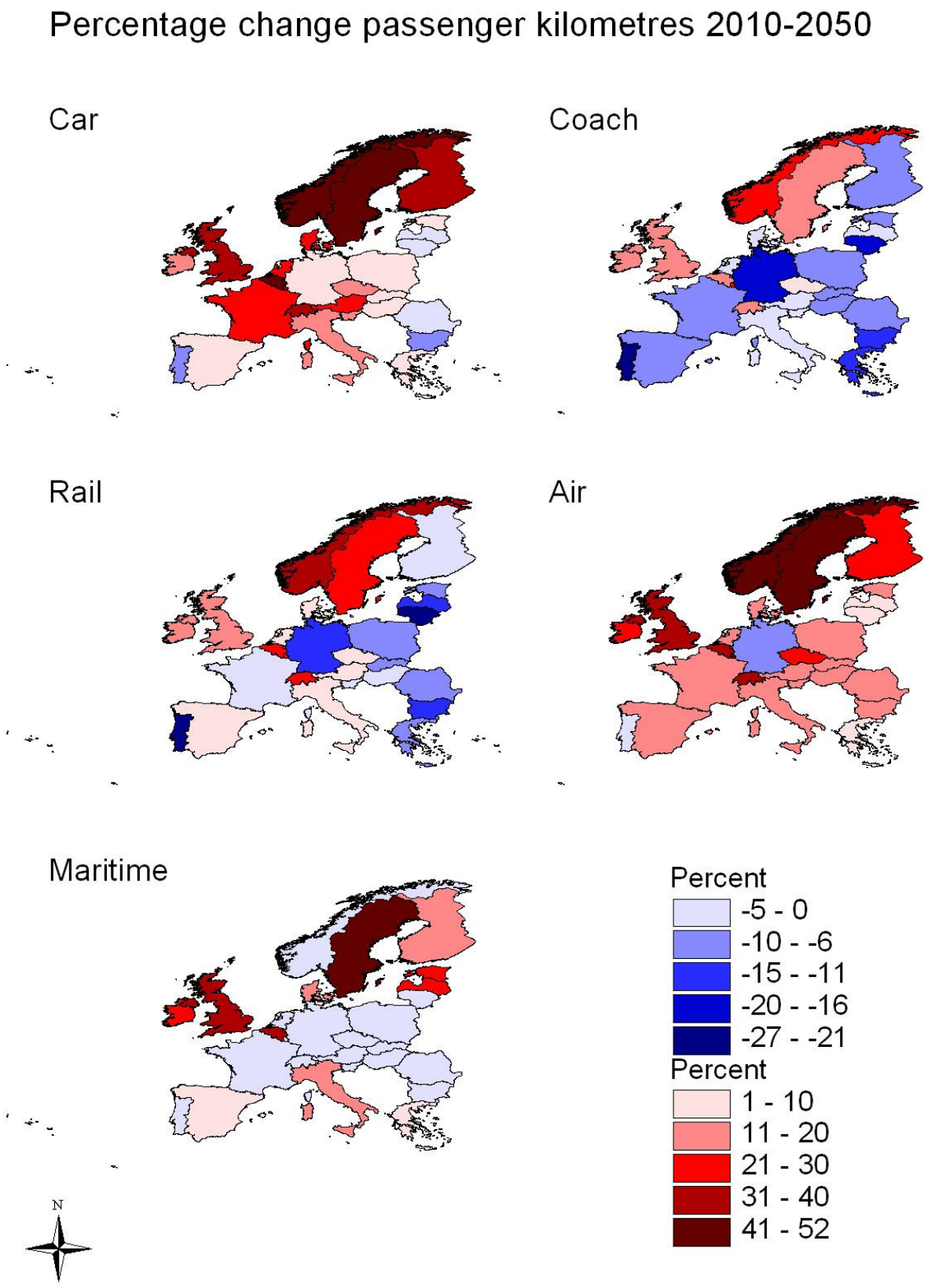


Figure 4-2 LUNA forecast percentage change in passenger kilometres by mode and country 2010-2050

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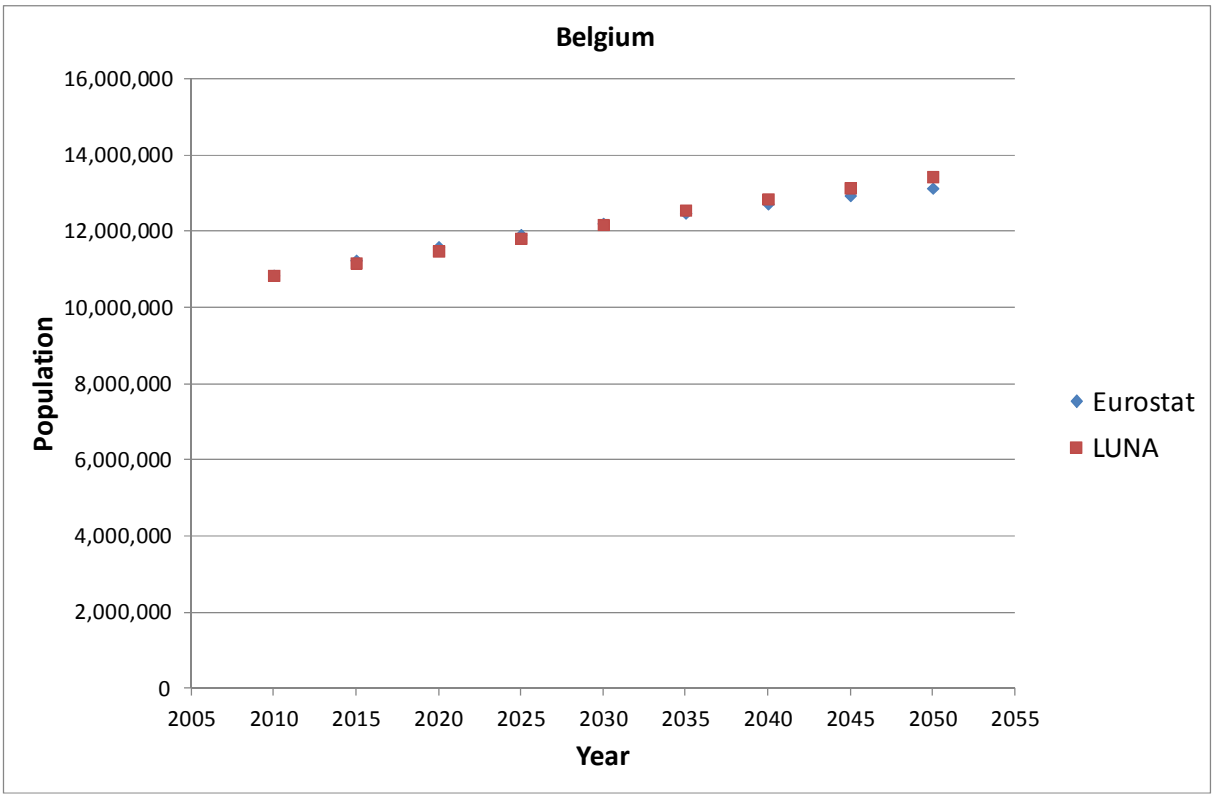
APPENDIX 1

THE 27 MEMBERS OF THE EUROPEAN UNION (EU) IN ALPHABETICAL ORDER AND THEIR COUNTRY CODE

Country	Country code	Country	Country code	Country	Country code
Austria	AT	Greece	GR	Portugal	PT
Belgium	BE	Hungary	HU	Romania	RO
Bulgaria	BG	Ireland	IE	Slovakia	SK
Cyprus	CY	Italy	IT	Slovenia	SI
Czech Republic	CZ	Latvia	LV	Spain	ES
Denmark	DK	Lithuania	LT	Sweden	SE
Estonia	EE	Luxembourg	LU	United Kingdom	UK
Finland	FI	Malta	MT		
France	FR	Netherlands	NL		
Germany	DE	Poland	PL		

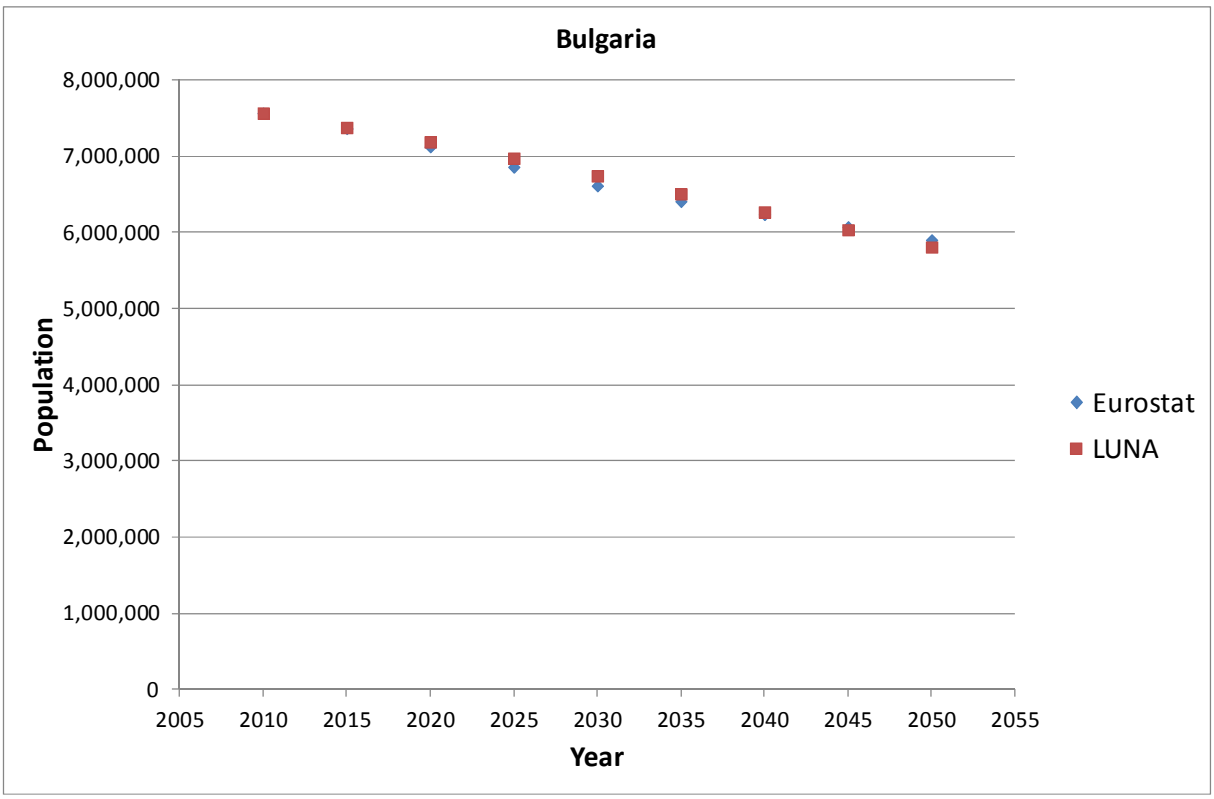
APPENDIX 2

COUNTRYWISE COMPARISON OF POPULATION FORECASTS EUROSTAT – LUNA RESULTS



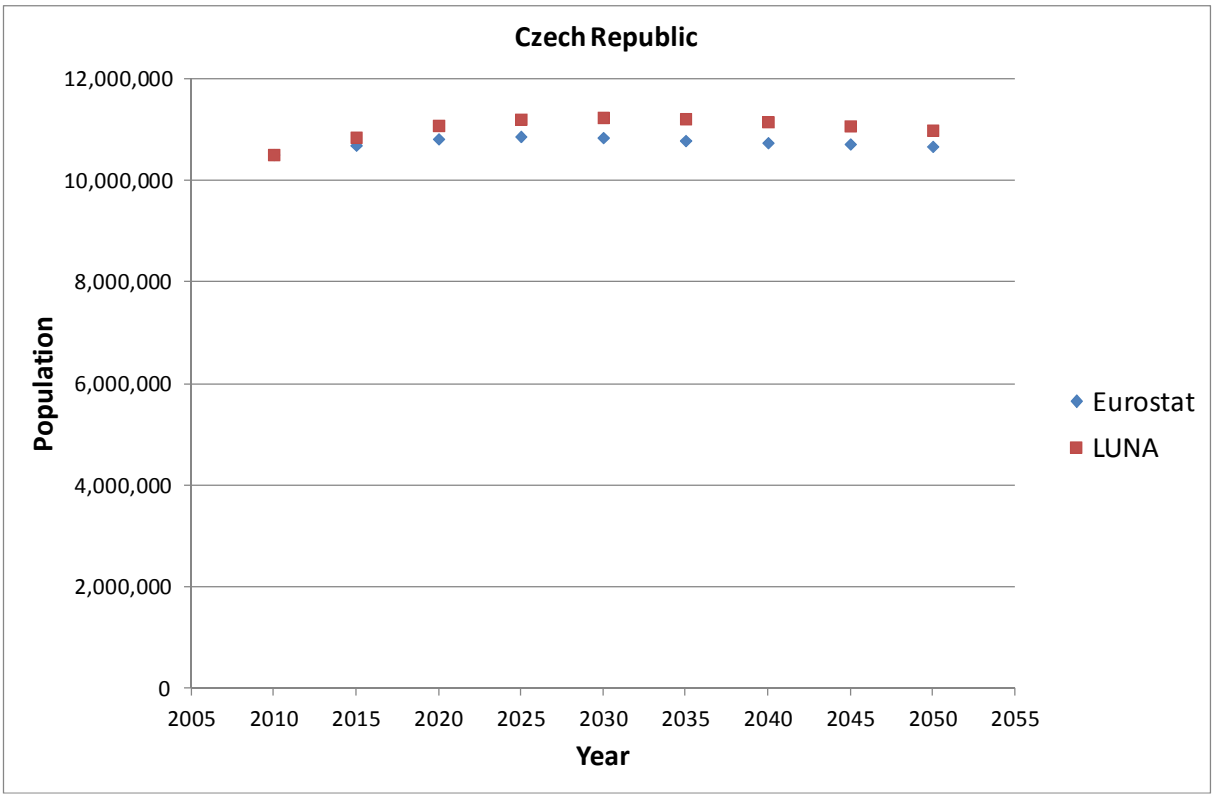
Data source: (Eurostat, 2011a)

Figure 0-1 Comparison population prediction Belgium 2010-2050 Eurostat – LUNA results



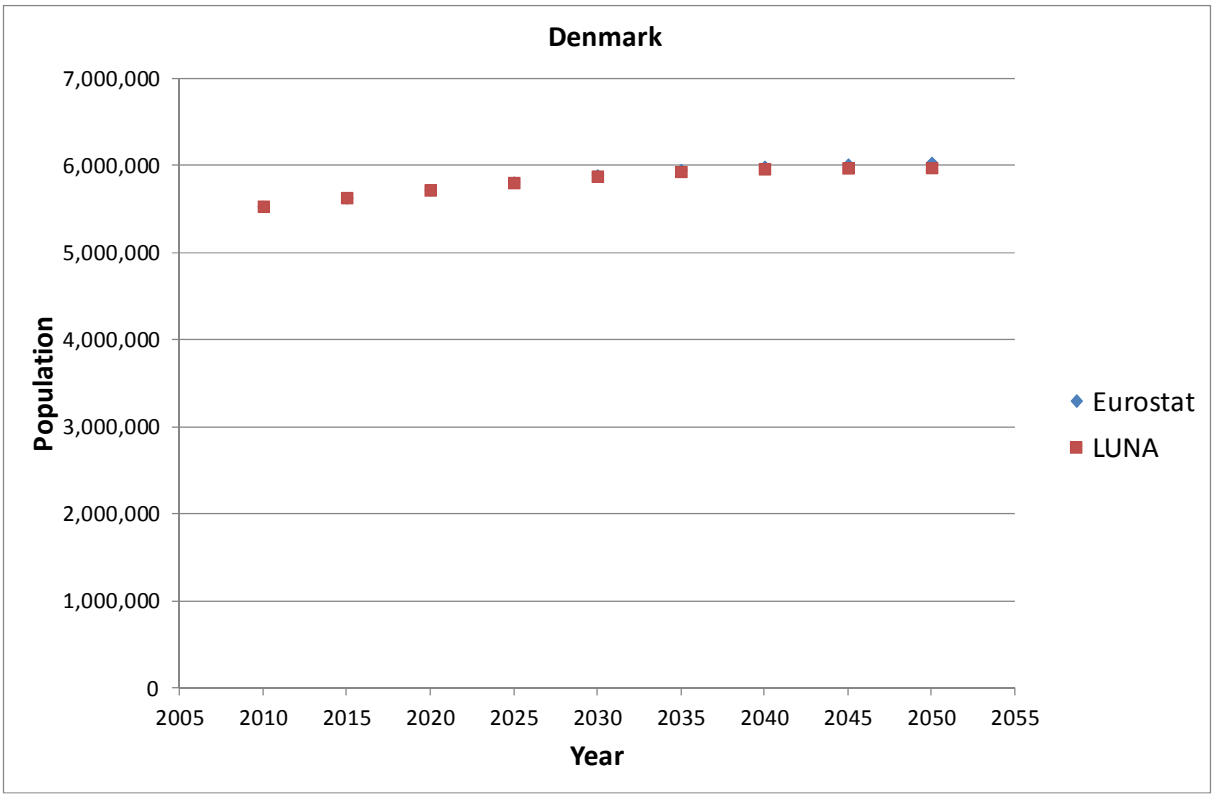
Data source: (Eurostat, 2011a)

Figure 0-2 Comparison population prediction Bulgaria 2010-2050 Eurostat – LUNA results



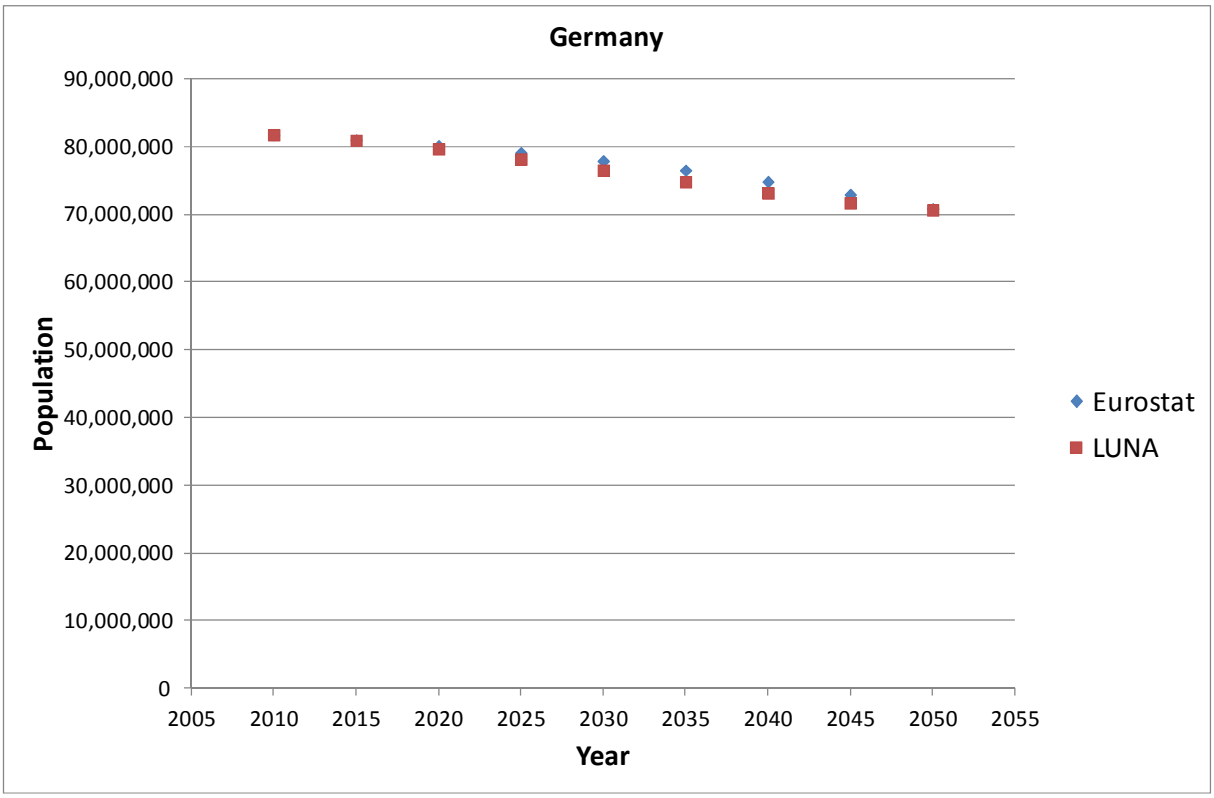
Data source: (Eurostat, 2011a)

Figure 0-3 Comparison population prediction Czech Republic 2010-2050 Eurostat – LUNA results



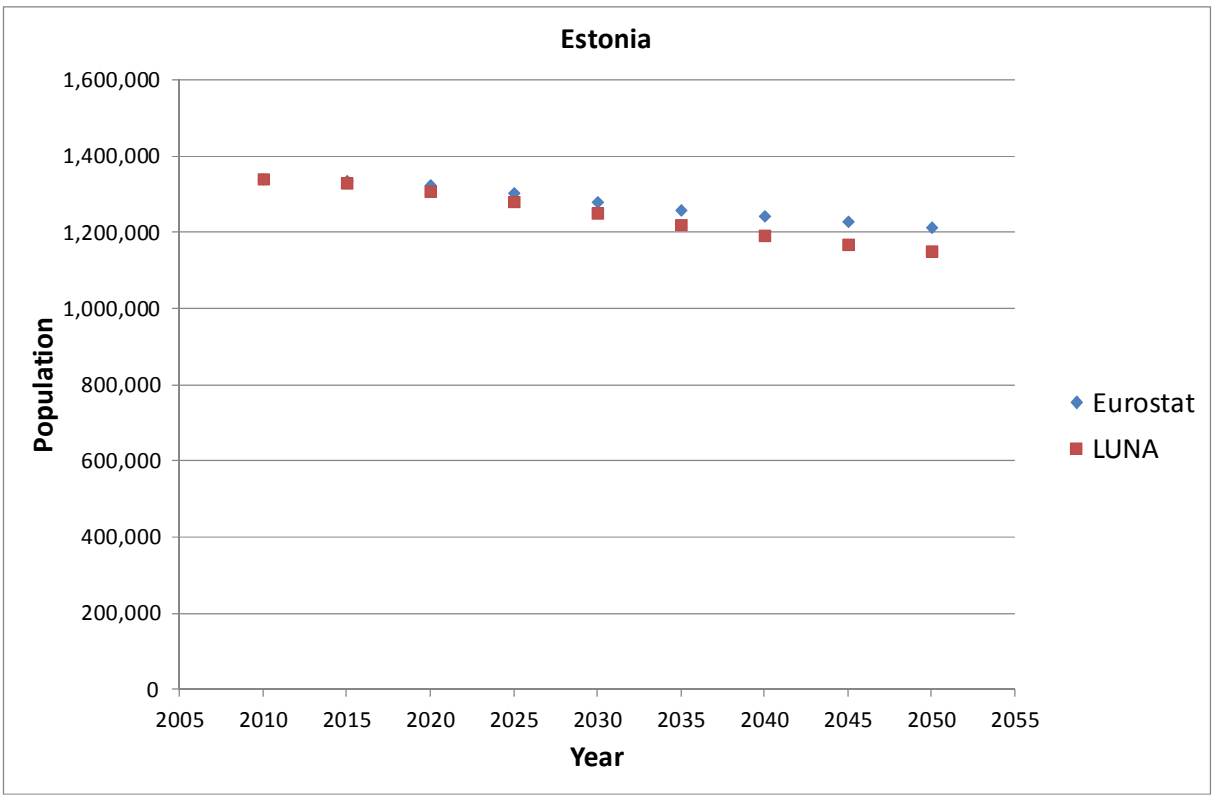
Data source: (Eurostat, 2011a)

Figure 0-4 Comparison population prediction Denmark 2010-2050 Eurostat – LUNA results



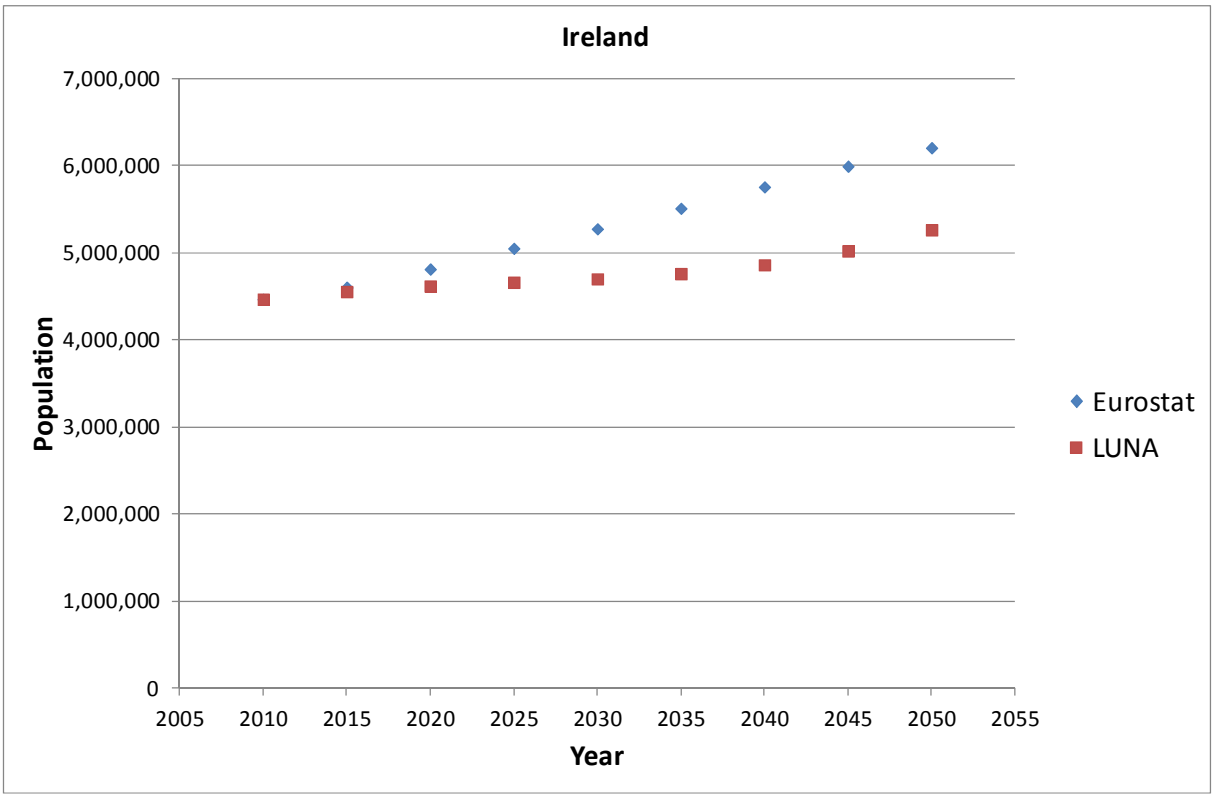
Data source: (Eurostat, 2011a)

Figure 0-5 Comparison population prediction Germany 2010-2050 Eurostat – LUNA results



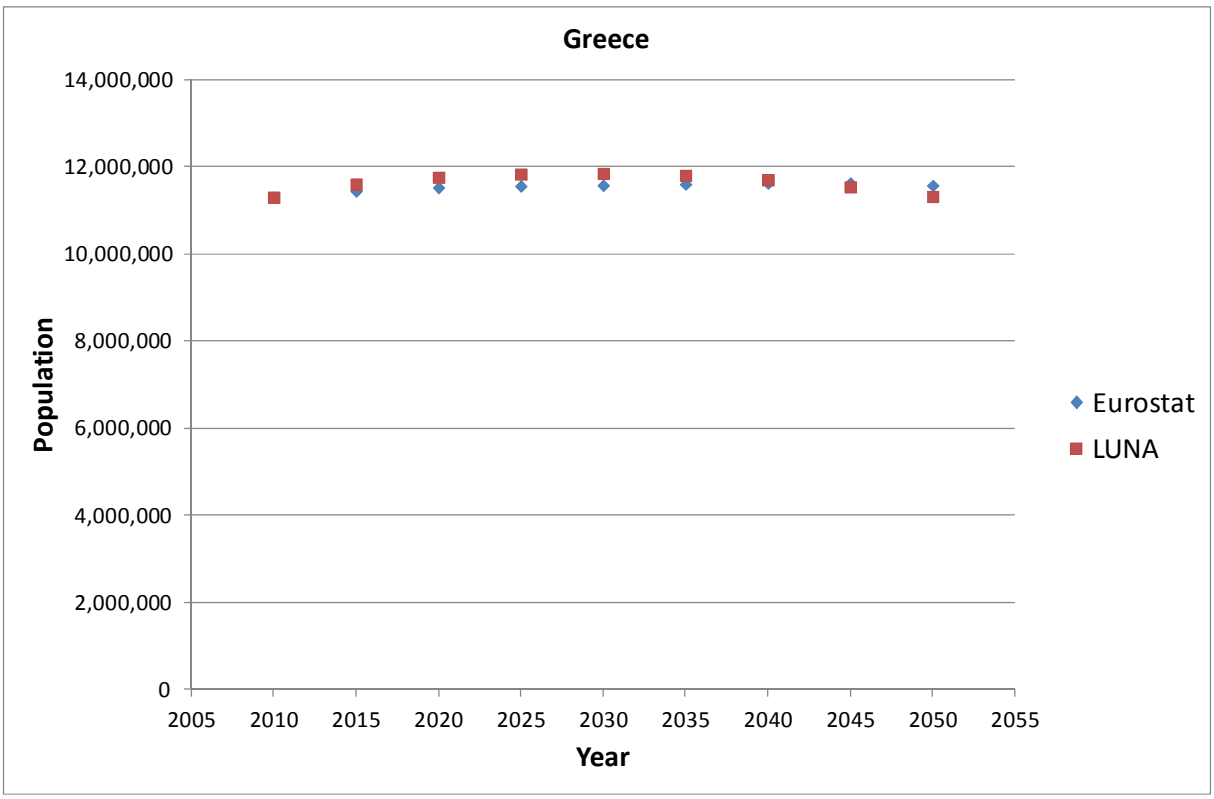
Data source: (Eurostat, 2011a)

Figure 0-6 Comparison population prediction Estonia 2010-2050 Eurostat – LUNA results



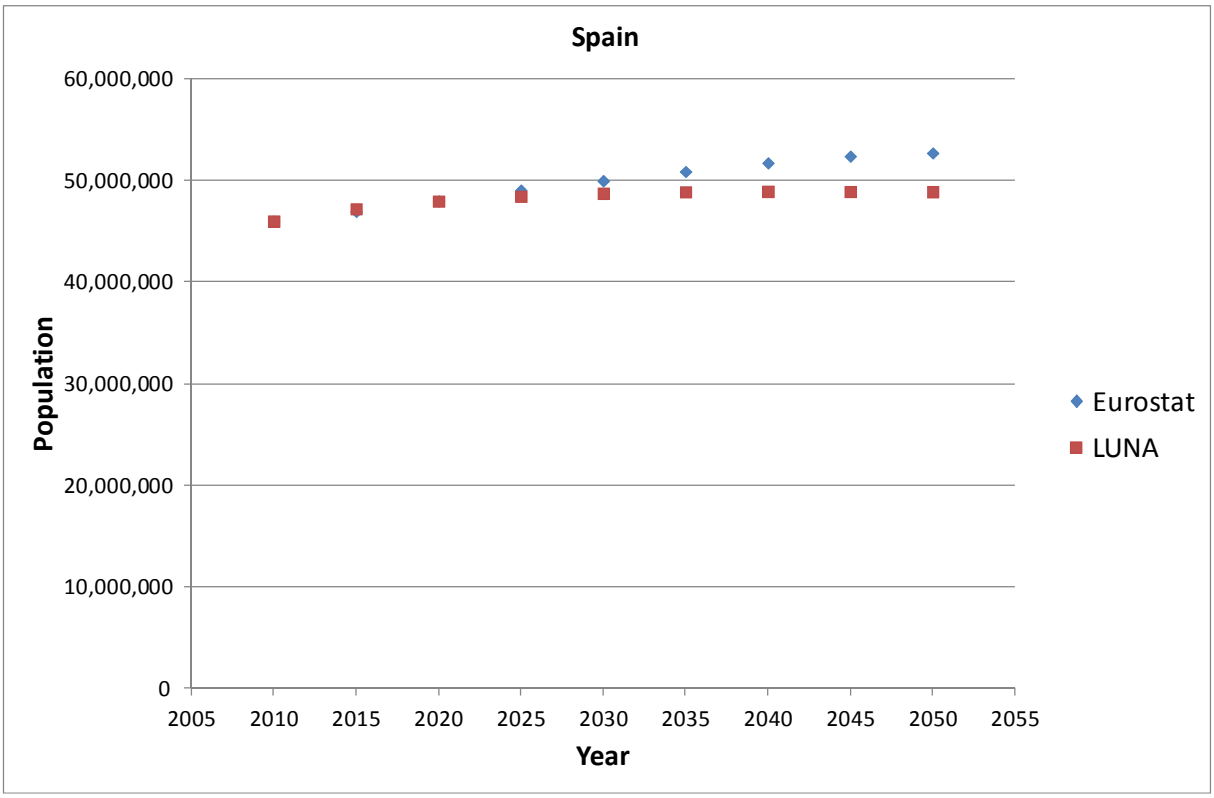
Data source: (Eurostat, 2011a)

Figure 0-7 Comparison population prediction Ireland 2010-2050 Eurostat – LUNA results



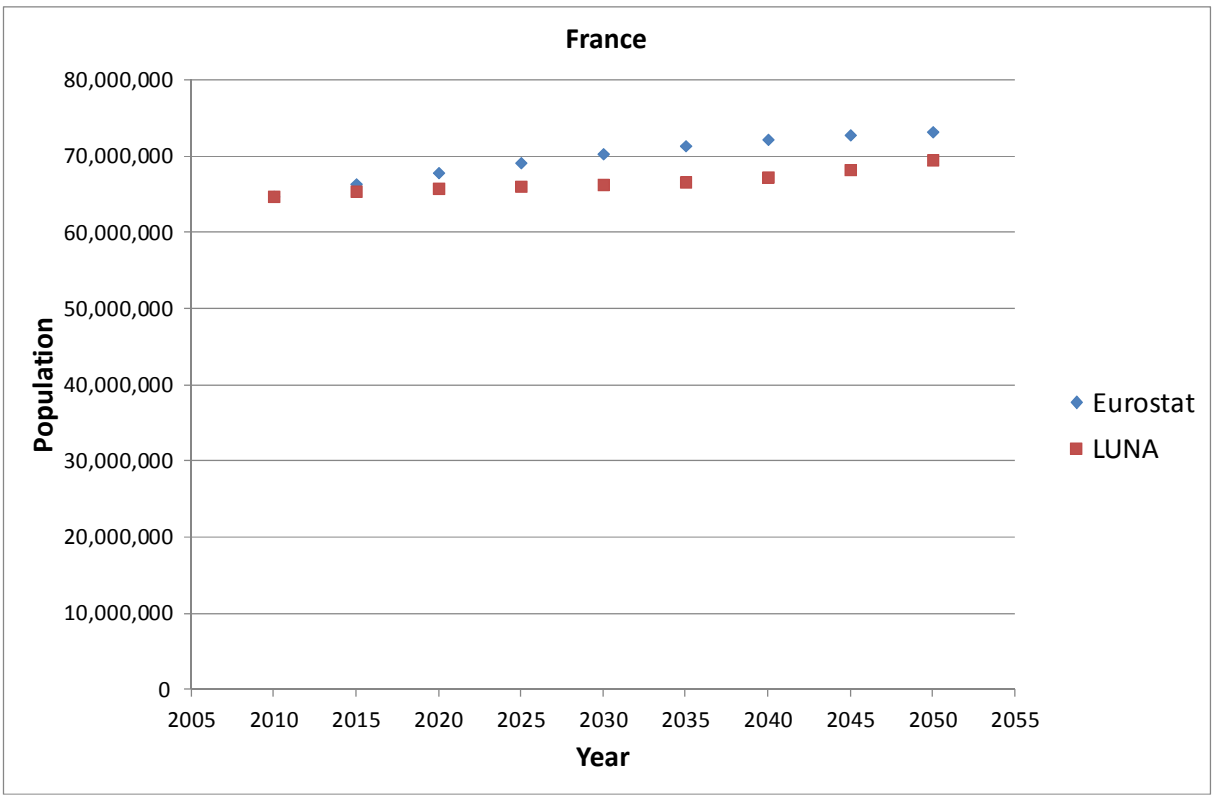
Data source: (Eurostat, 2011a)

Figure 0-8 Comparison population prediction Greece 2010-2050 Eurostat – LUNA results



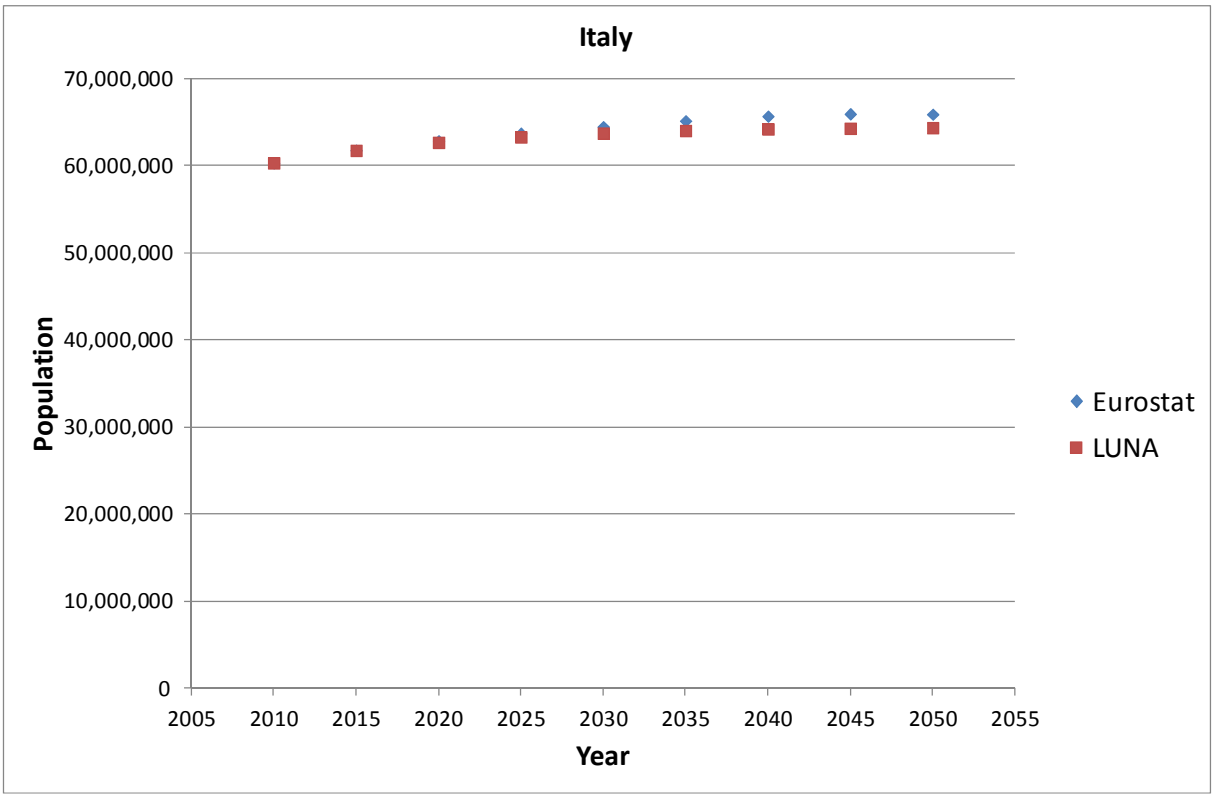
Data source: (Eurostat, 2011a)

Figure 0-9 Comparison population prediction Spain 2010-2050 Eurostat – LUNA results



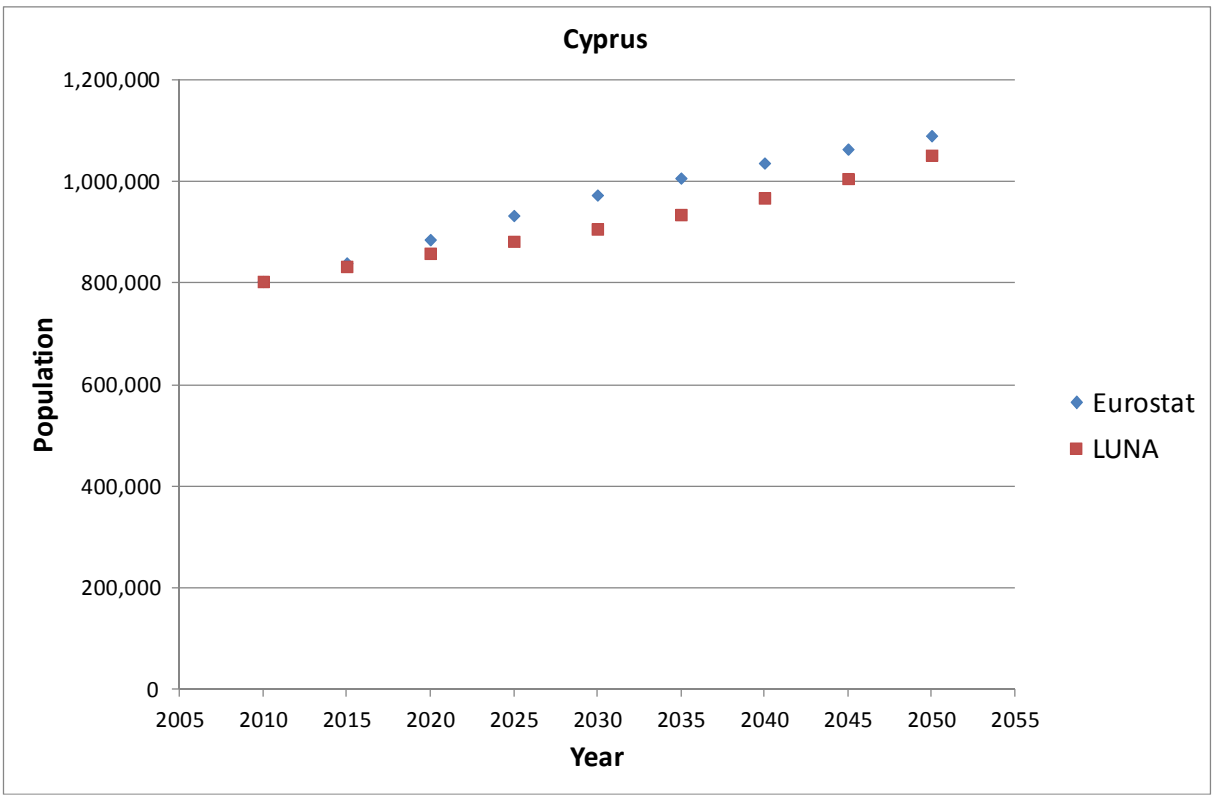
Data source: (Eurostat, 2011a)

Figure 0-10 Comparison population prediction France 2010-2050 Eurostat – LUNA results



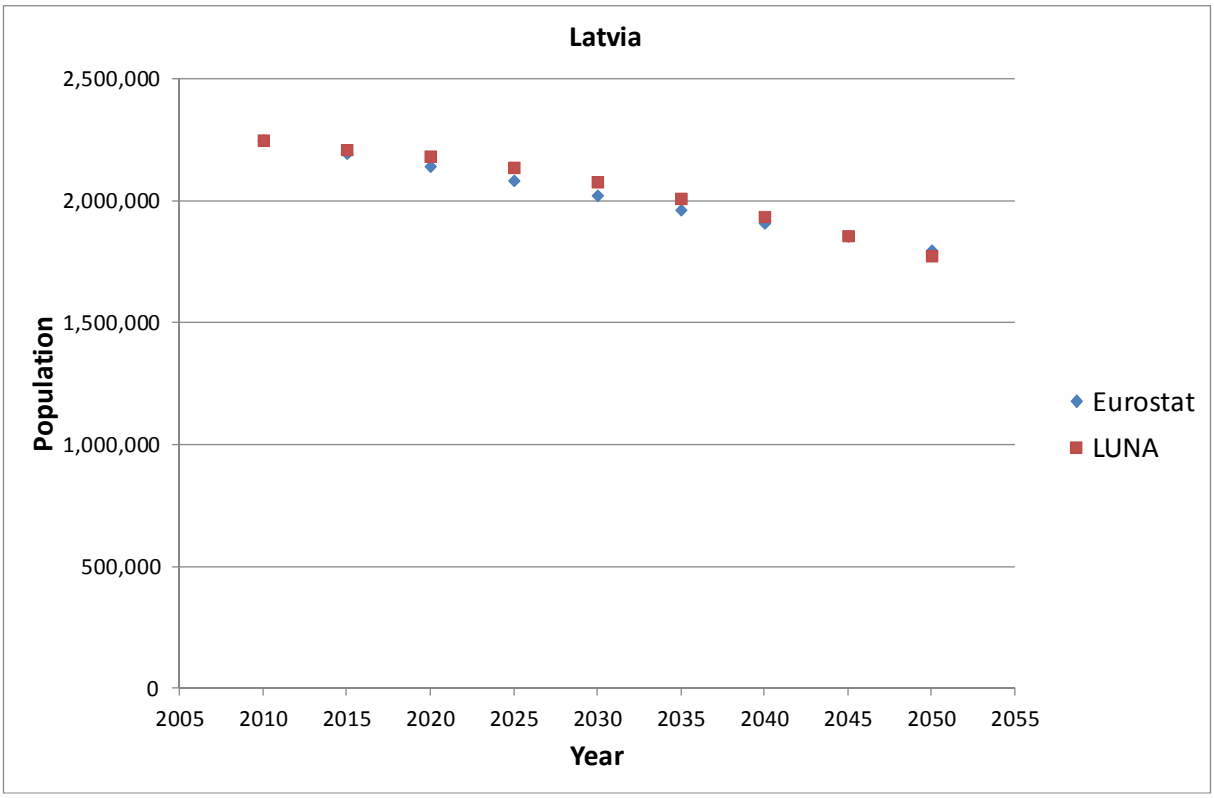
Data source: (Eurostat, 2011a)

Figure 0-11 Comparison population prediction Italy 2010-2050 Eurostat – LUNA results



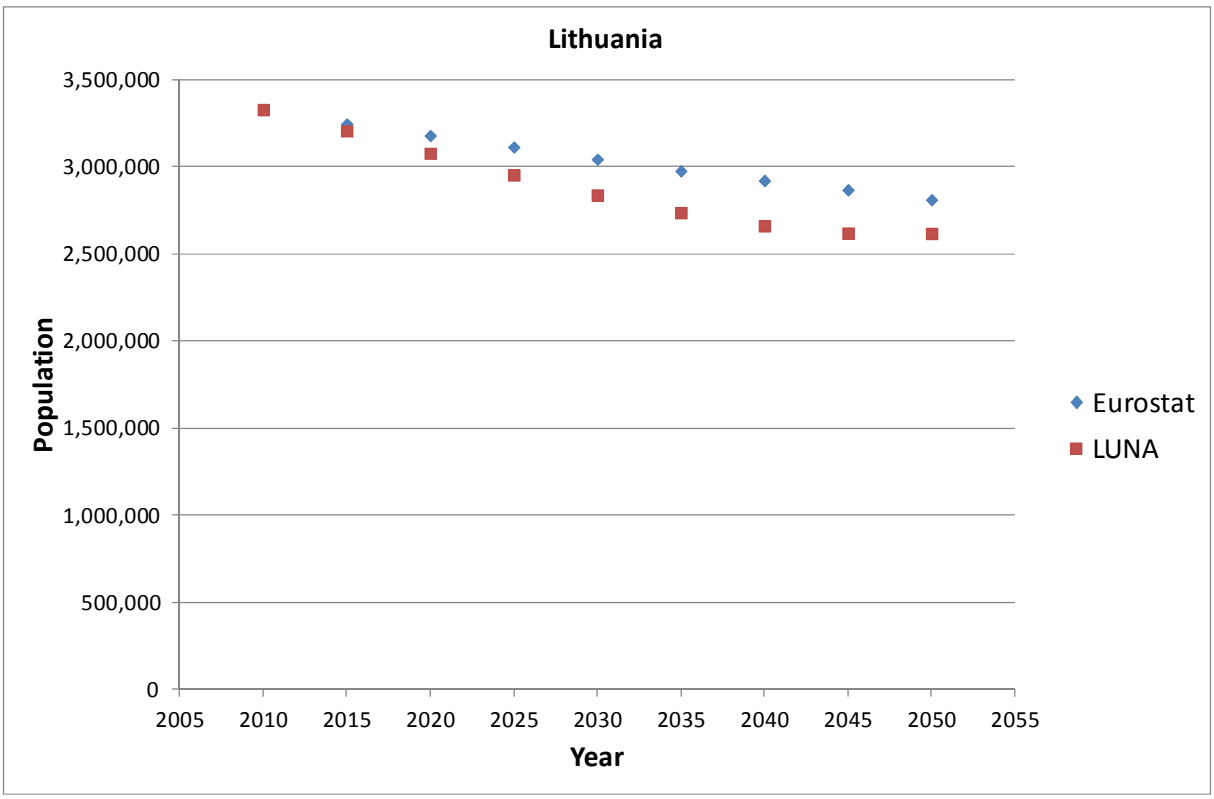
Data source: (Eurostat, 2011a)

Figure 0-12 Comparison population prediction Cyprus 2010-2050 Eurostat – LUNA results



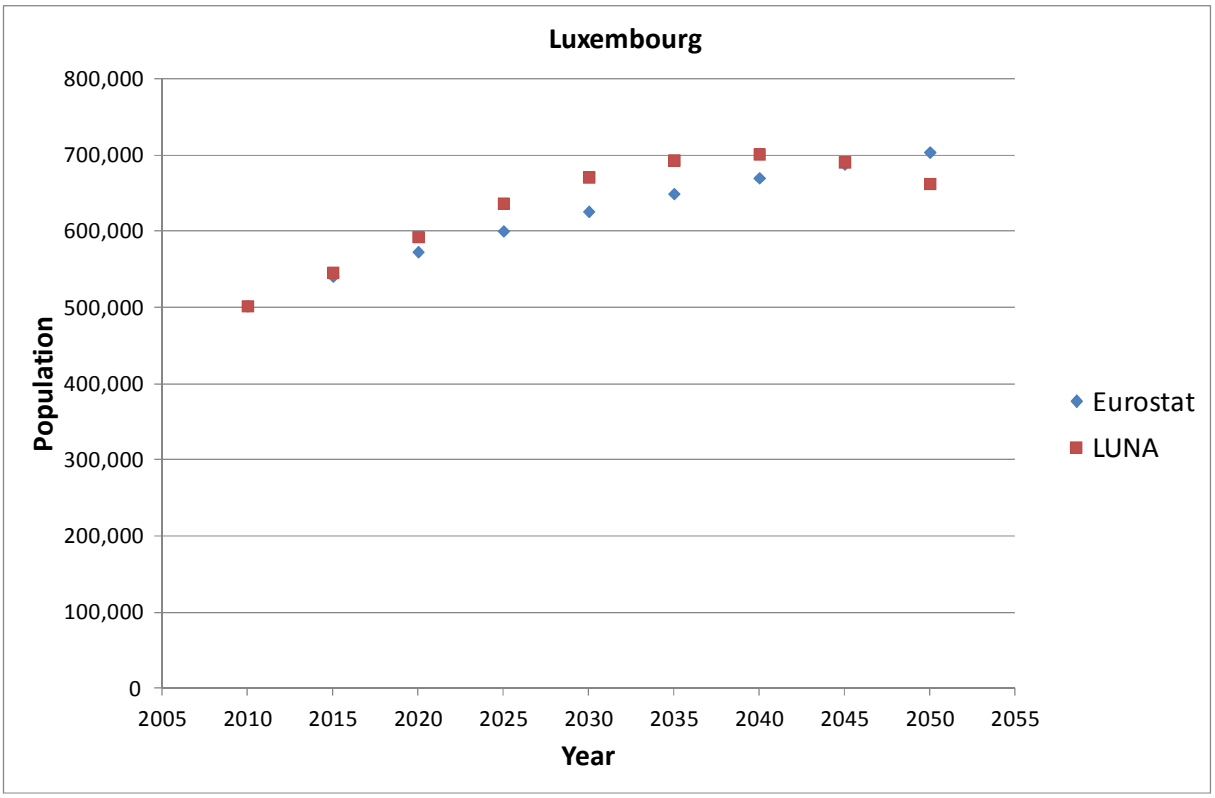
Data source: (Eurostat, 2011a)

Figure 0-13 Comparison population prediction Latvia 2010-2050 Eurostat – LUNA results



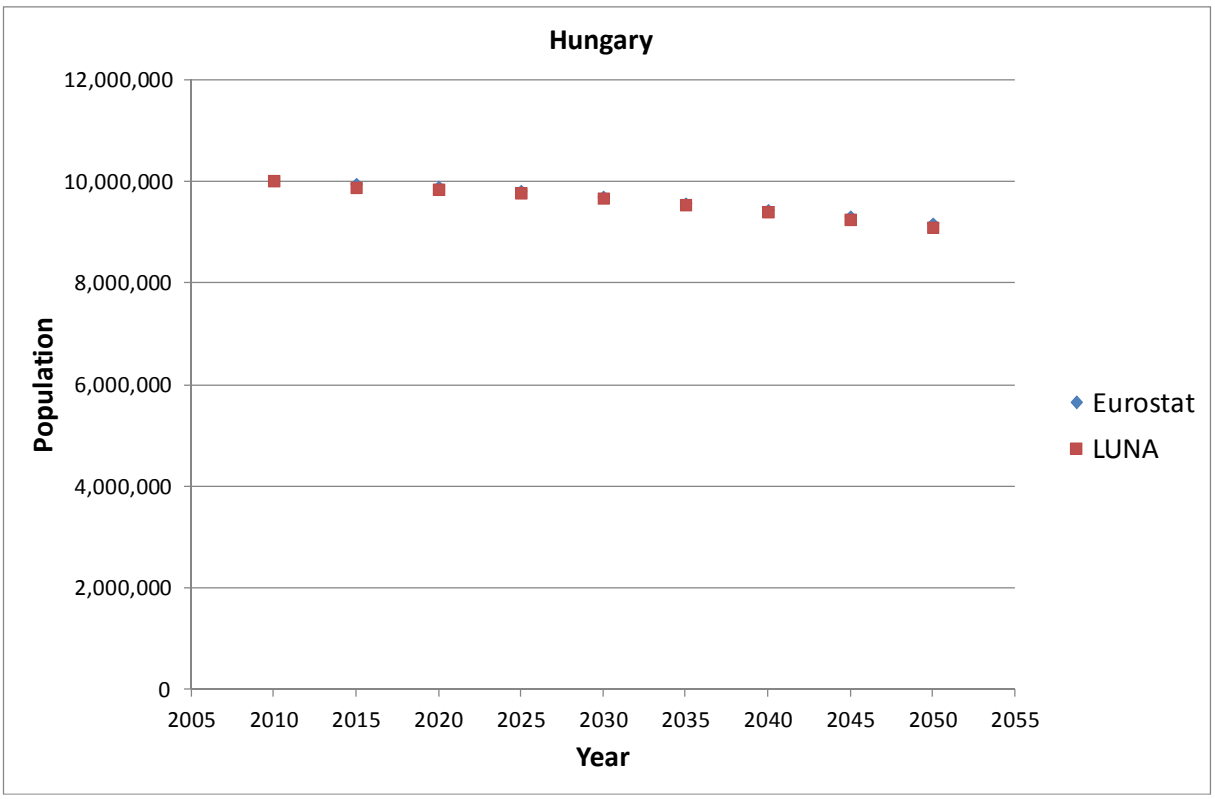
Data source: (Eurostat, 2011a)

Figure 0-14 Comparison population prediction Lithuania 2010-2050 Eurostat – LUNA results



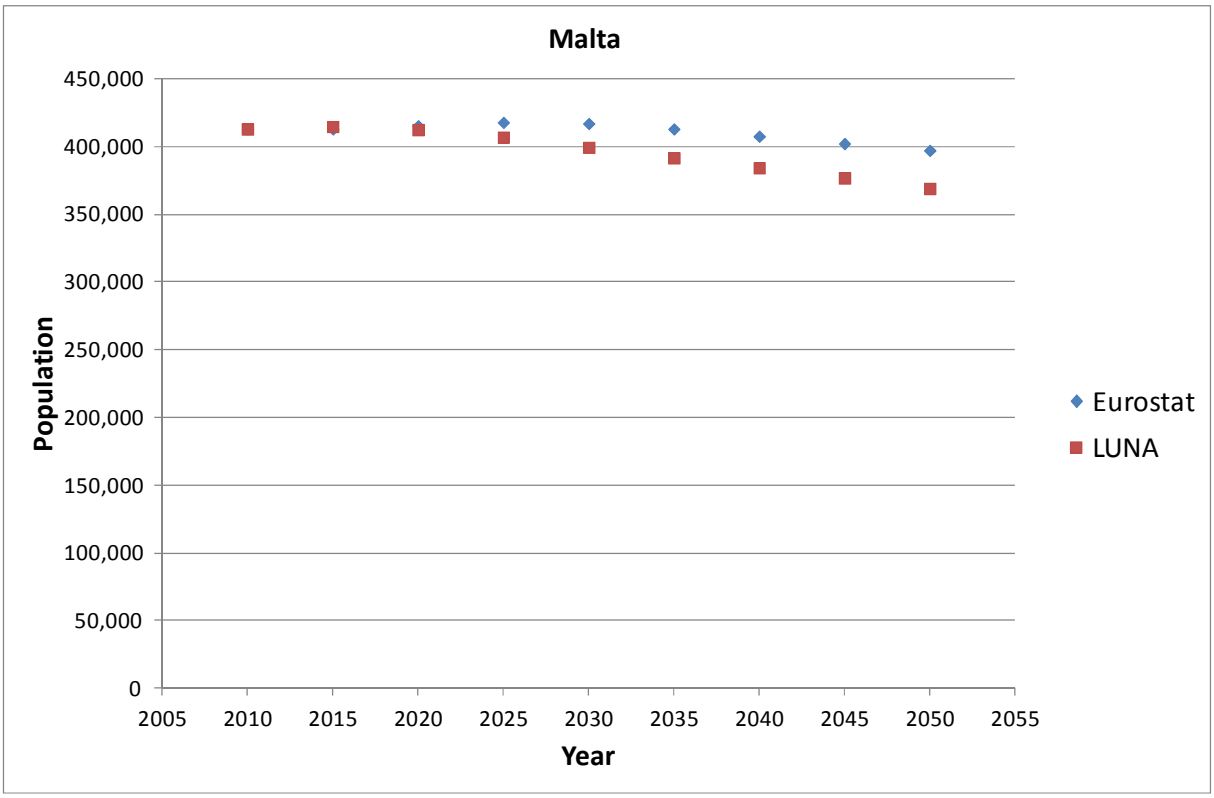
Data source: (Eurostat, 2011a)

Figure 0-15 Comparison population prediction Luxembourg 2010-2050 Eurostat – LUNA results



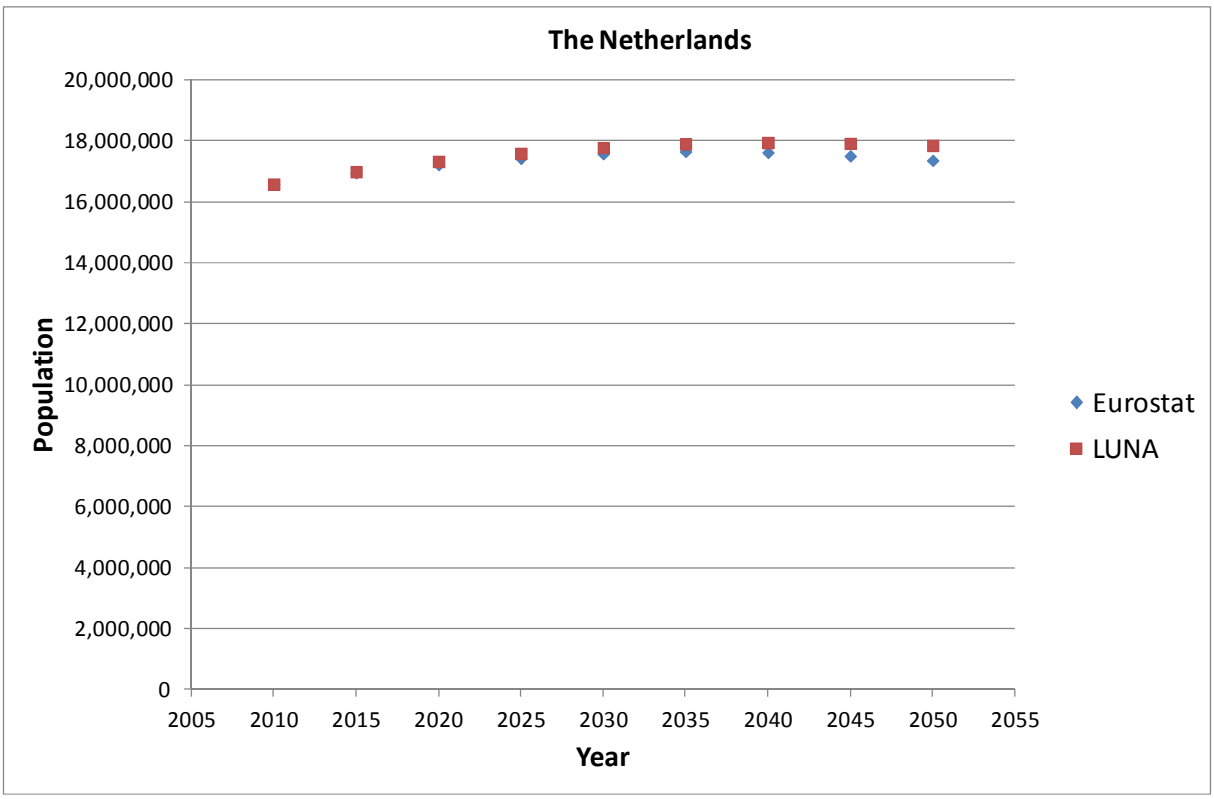
Data source: (Eurostat, 2011a)

Figure 0-16 Comparison population prediction Hungary 2010-2050 Eurostat – LUNA results



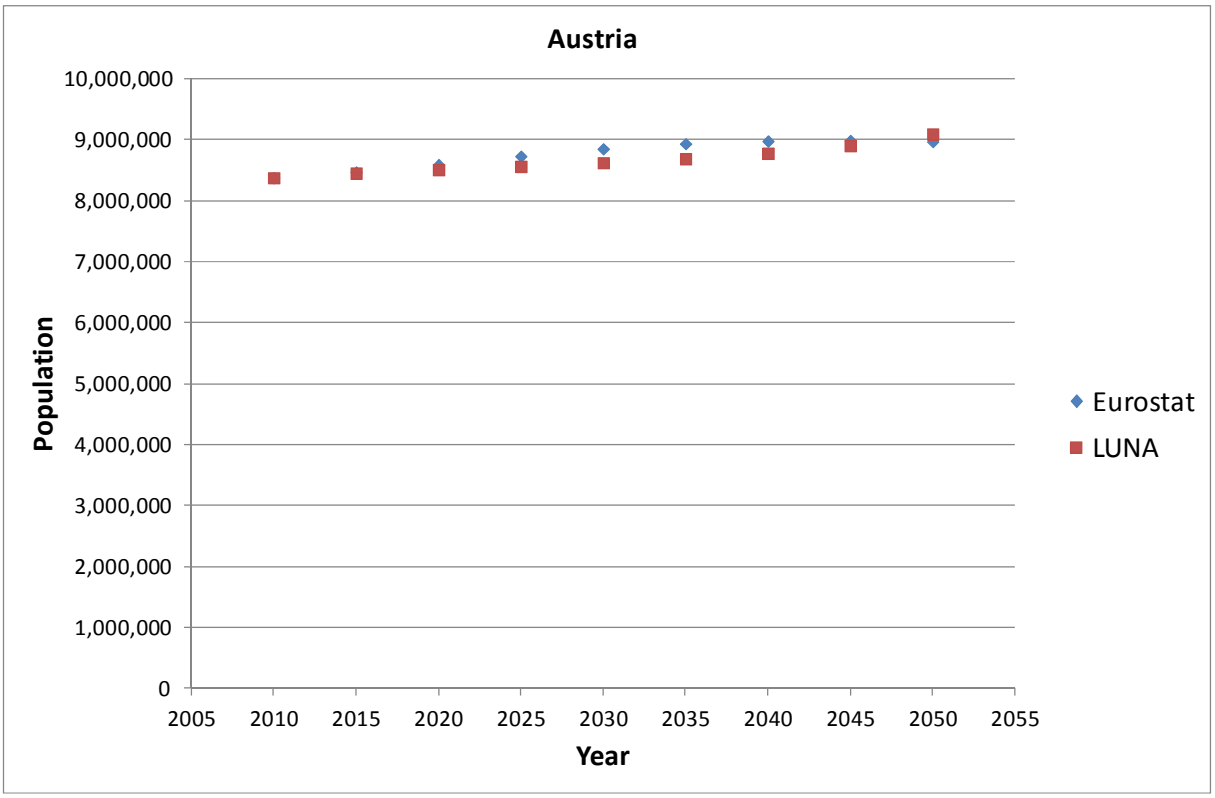
Data source: (Eurostat, 2011a)

Figure 0-17 Comparison population prediction Malta 2010-2050 Eurostat – LUNA results



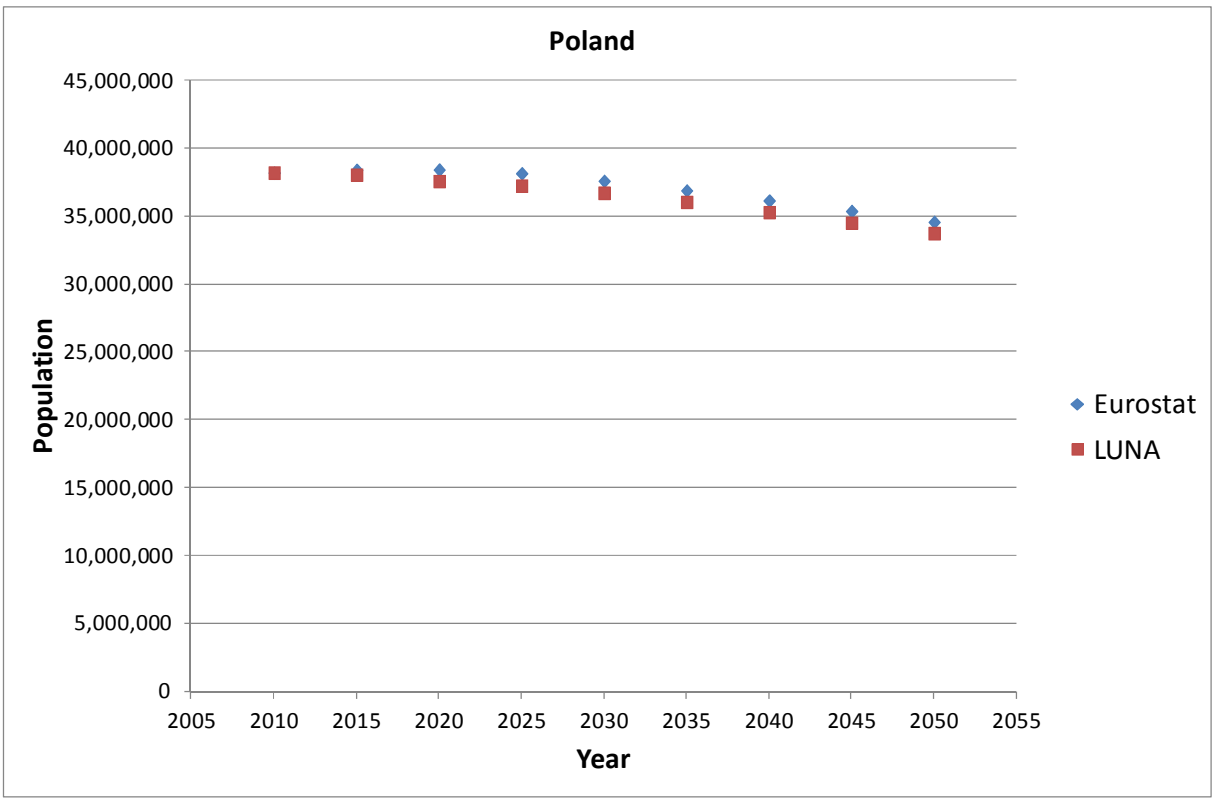
Data source: (Eurostat, 2011a)

Figure 0-18 Comparison population prediction The Netherlands 2010-2050 Eurostat – LUNA results



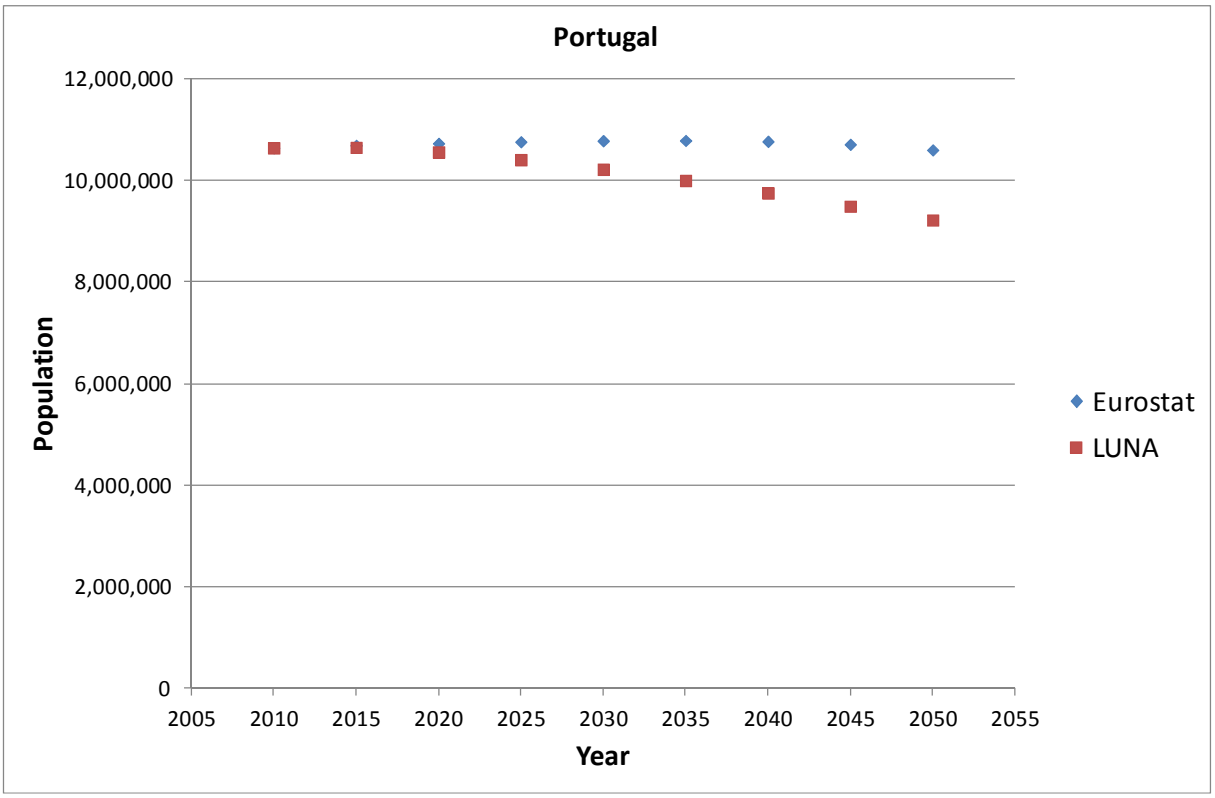
Data source: (Eurostat, 2011a)

Figure 0-19 Comparison population prediction Austria 2010-2050 Eurostat – LUNA results



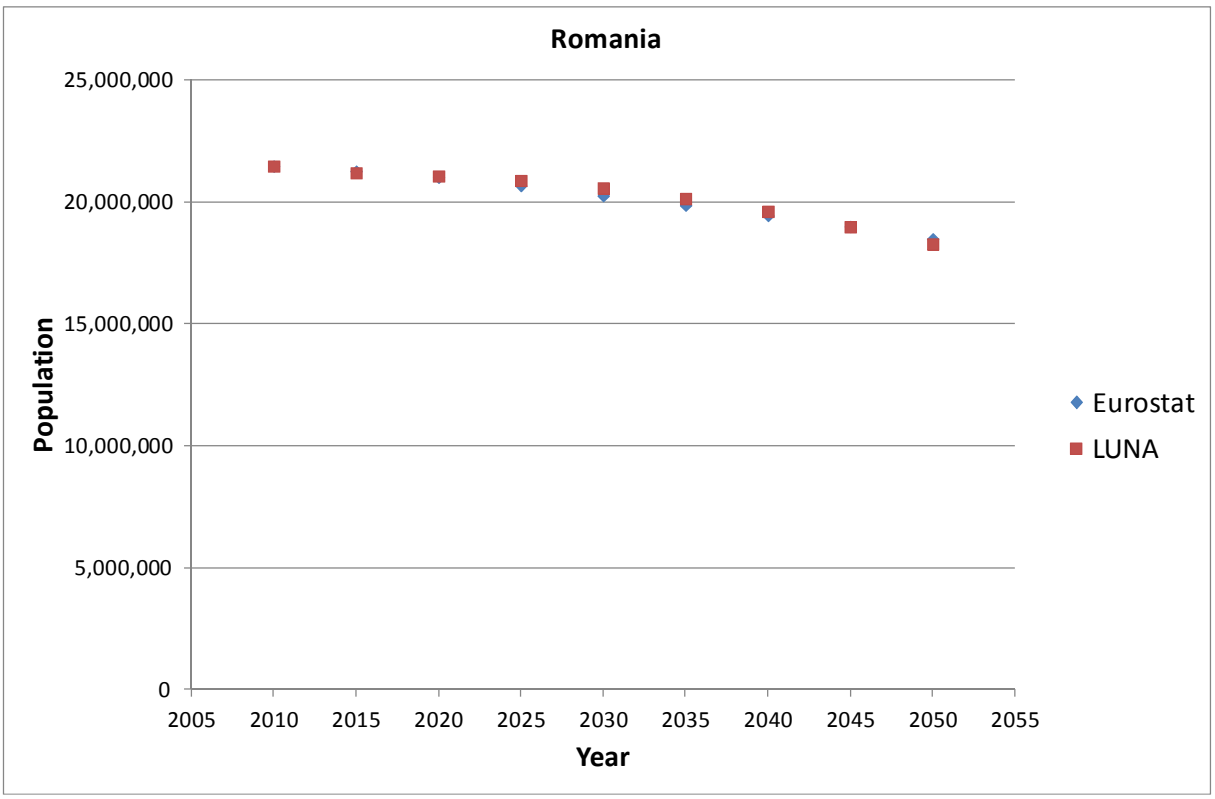
Data source: (Eurostat, 2011a)

Figure 0-20 Comparison population prediction Poland 2010-2050 Eurostat – LUNA results



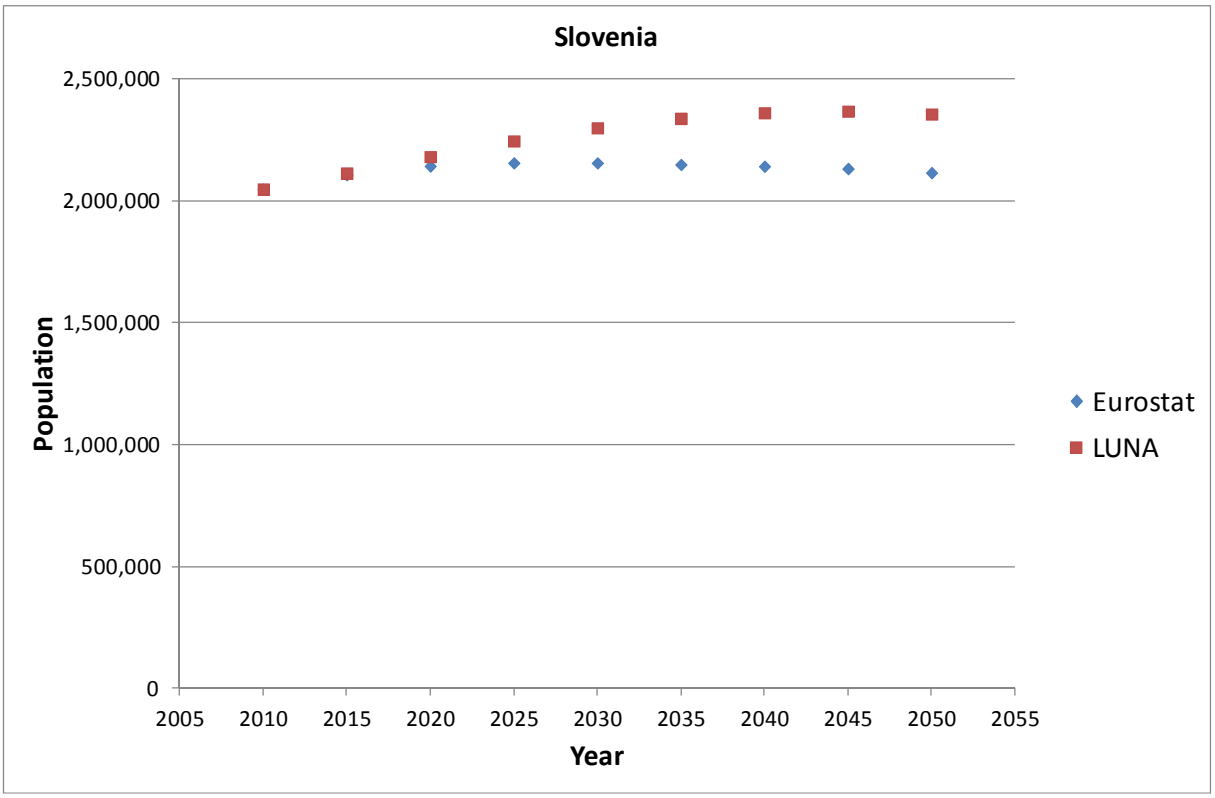
Data source: (Eurostat, 2011a)

Figure 0-21 Comparison population prediction Portugal 2010-2050 Eurostat – LUNA results



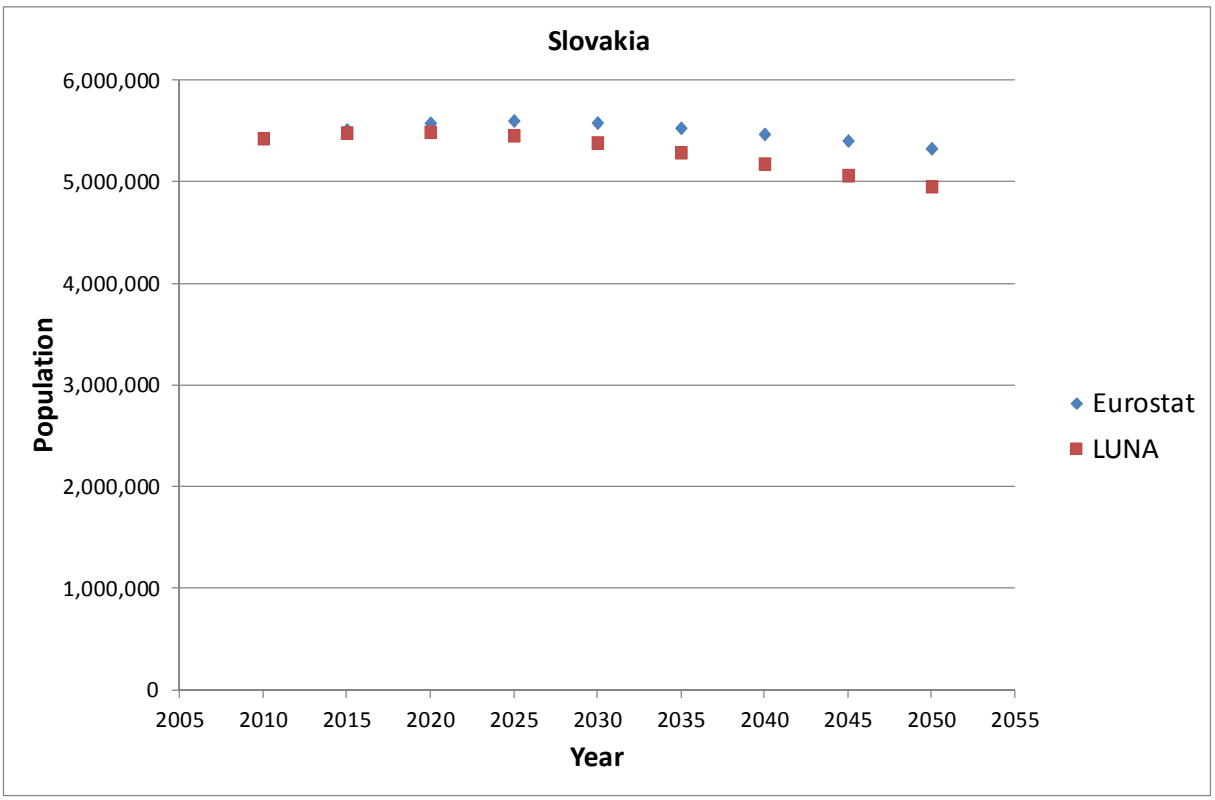
Data source: (Eurostat, 2011a)

Figure 0-22 Comparison population prediction Romania 2010-2050 Eurostat – LUNA results



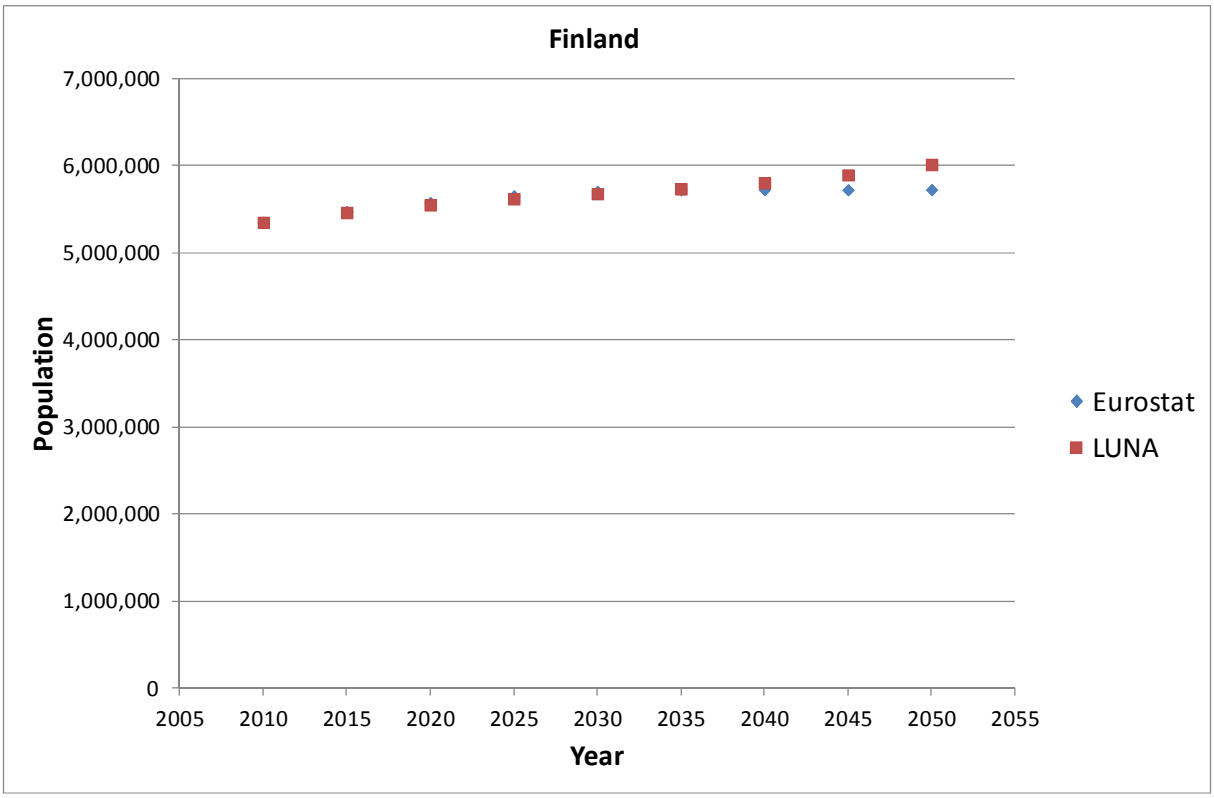
Data source: (Eurostat, 2011a)

Figure 0-23 Comparison population prediction Slovenia 2010-2050 Eurostat – LUNA results



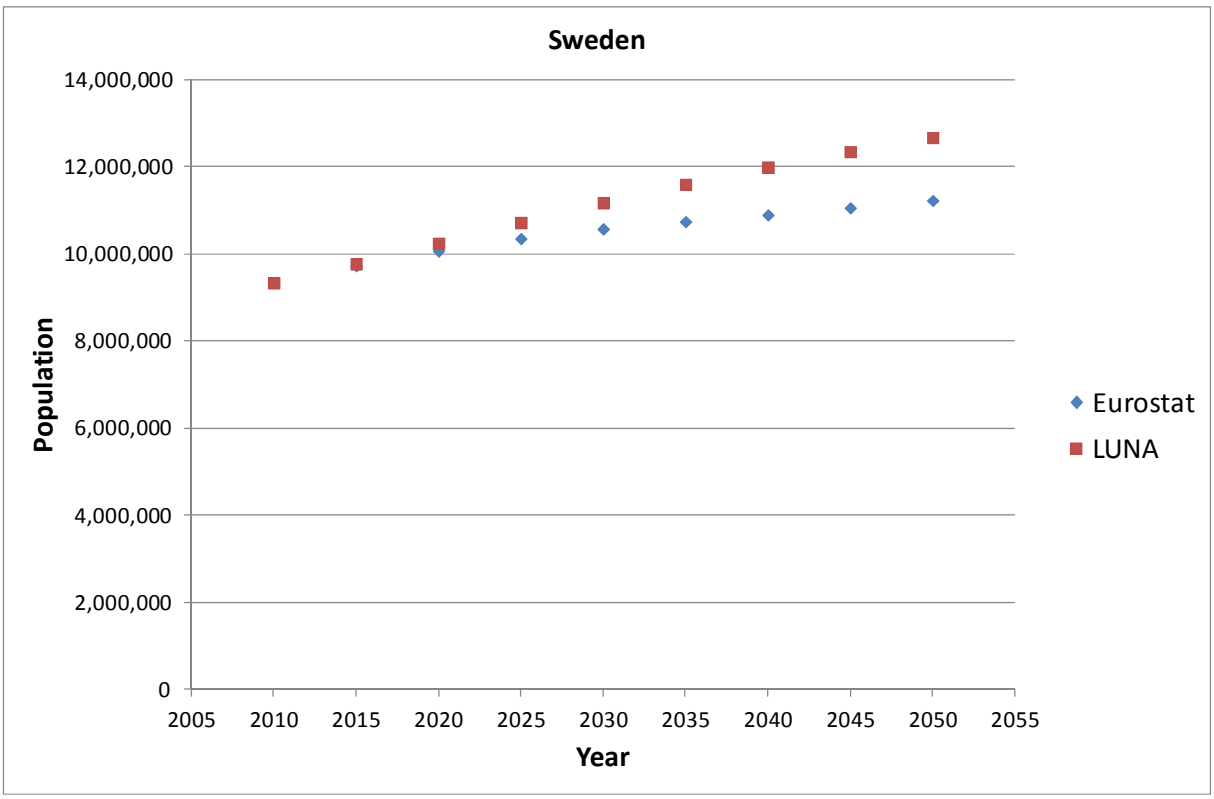
Data source: (Eurostat, 2011a)

Figure 0-24 Comparison population prediction Slovakia 2010-2050 Eurostat – LUNA results



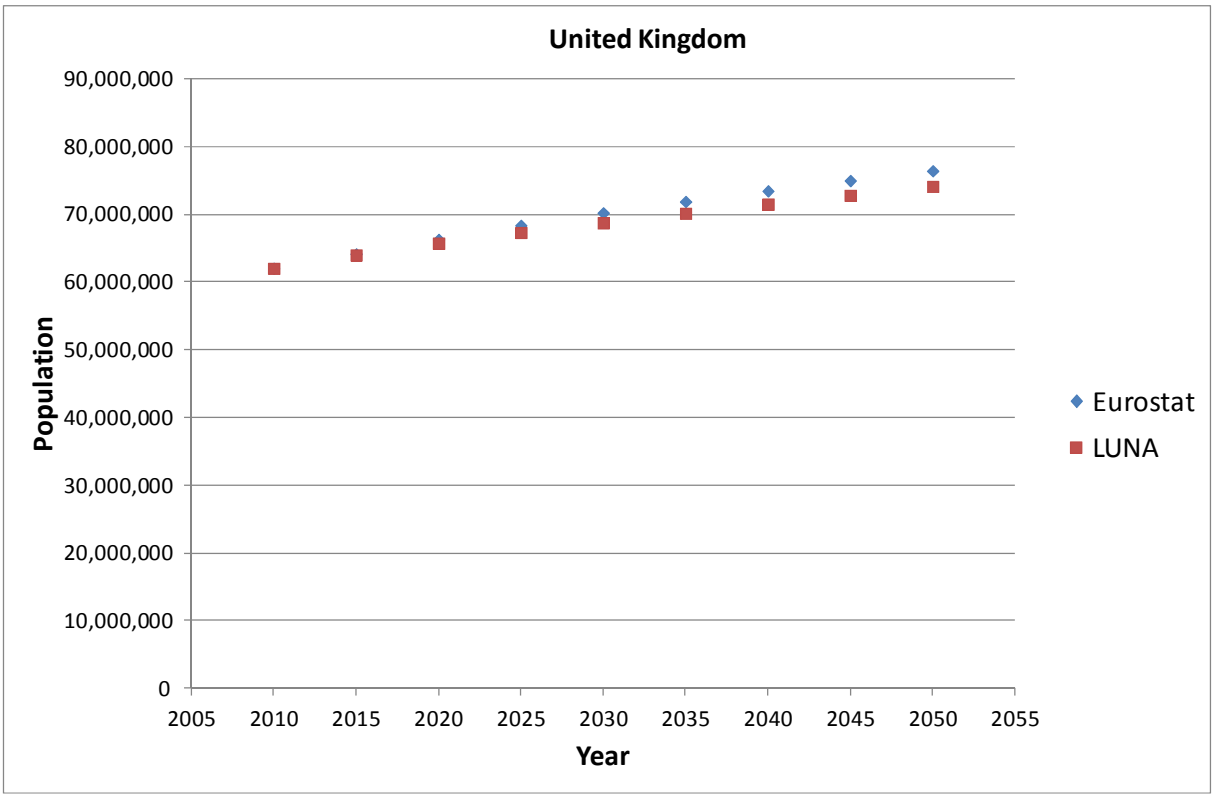
Data source: (Eurostat, 2011a)

Figure 0-25 Comparison population prediction Finland 2010-2050 Eurostat – LUNA results



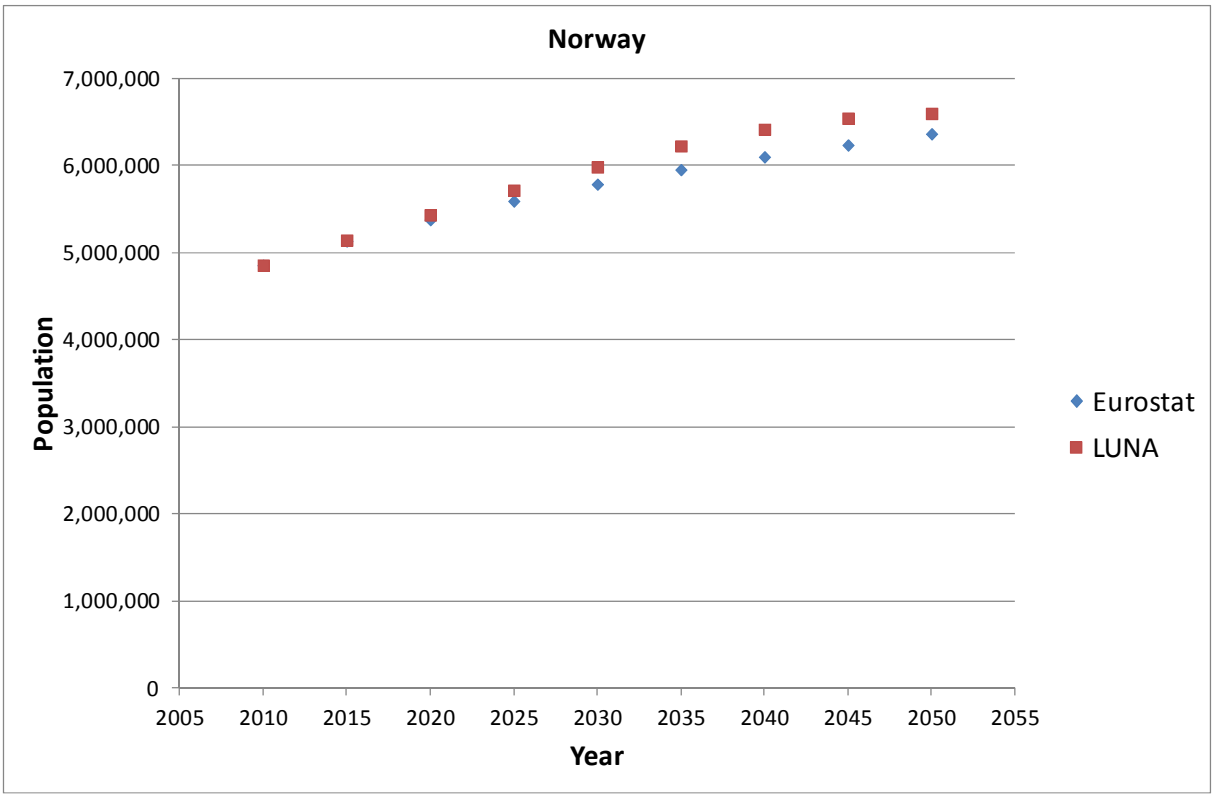
Data source: (Eurostat, 2011a)

Figure 0-26 Comparison population prediction Sweden 2010-2050 Eurostat – LUNA results



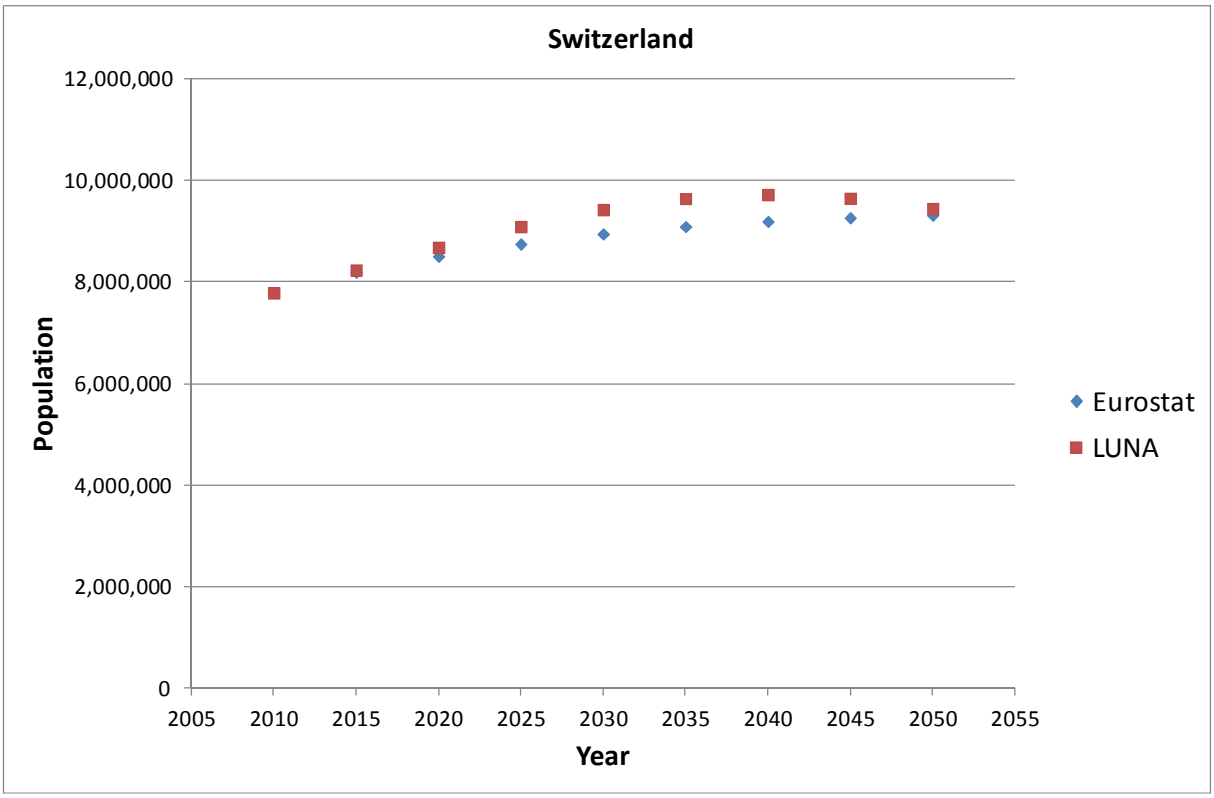
Data source: (Eurostat, 2011a)

Figure 0-27 Comparison population prediction United Kingdom 2010-2050 Eurostat – LUNA results



Data source: (Eurostat, 2011a)

Figure 0-28 Comparison population prediction Norway 2010-2050 Eurostat – LUNA results



Data source: (Eurostat, 2011a)

Figure 0-29 Comparison population prediction Switzerland 2010-2050 Eurostat – LUNA results