

# Visualizing groups of European destinations – using factor analysis and multidimensional scaling

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# ABSTRACT

This paper uses applies a technique called multidimensional scaling (MDS) to illustrate how European destinations are positioned in relation to each other. The basis for doing so is bednight statistics from Eurostat for the period 1998 to 2009 for 33 European destinations (countries, nations). For each destination bednights are registered in four categories: domestic hotel guests, foreign hotel guests, domestic guests at other types of accommodations, and foreign guests at other types of accommodation. With bednights on a monthly basis, this makes a data matrix with  $12*12*4=576$  cases. The variables are the destinations, up to 28, when combining a few of them. Months or quarters are dummy-variables, and so are the guest type, and type of accommodation. A series of MDS diagrams are shown. Factor analysis is used to form groups of destinations, which are also visible in the MDS diagrams. The European destinations for international visitors may be grouped by major language spheres.

Key words: Factor analysis; multidimensional scaling; destinations; competitors.

# Purpose

The purpose of this paper is to visualize how European destinations are positioned in relation to each other and how destinations can be grouped based on bednight statistics.

# Research questions

1. Based on time series of bednight statistics, which destinations are somewhat similar, and how can this be illustrated, using a **multidimensional scaling technique**?
2. Based on bednight statistics, which destinations can be grouped, using **factor analysis**?

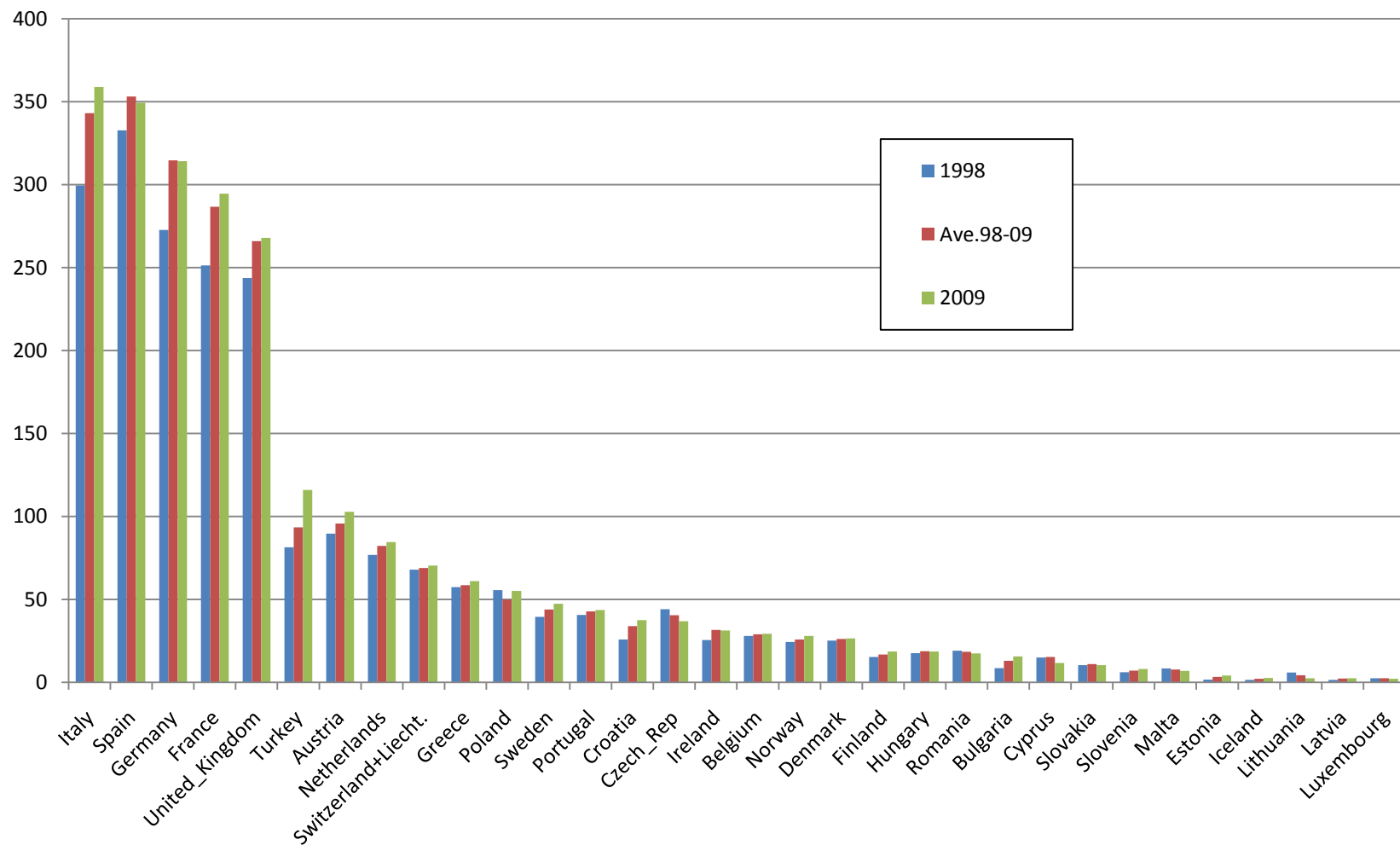
# The data

- Monthly bednight statistics from Eurostat (12)
- For a 12 year period: 1998-2009
- Two source markets: Domestic and international (2)
- Two types of accommodation: Hotels and other (2)

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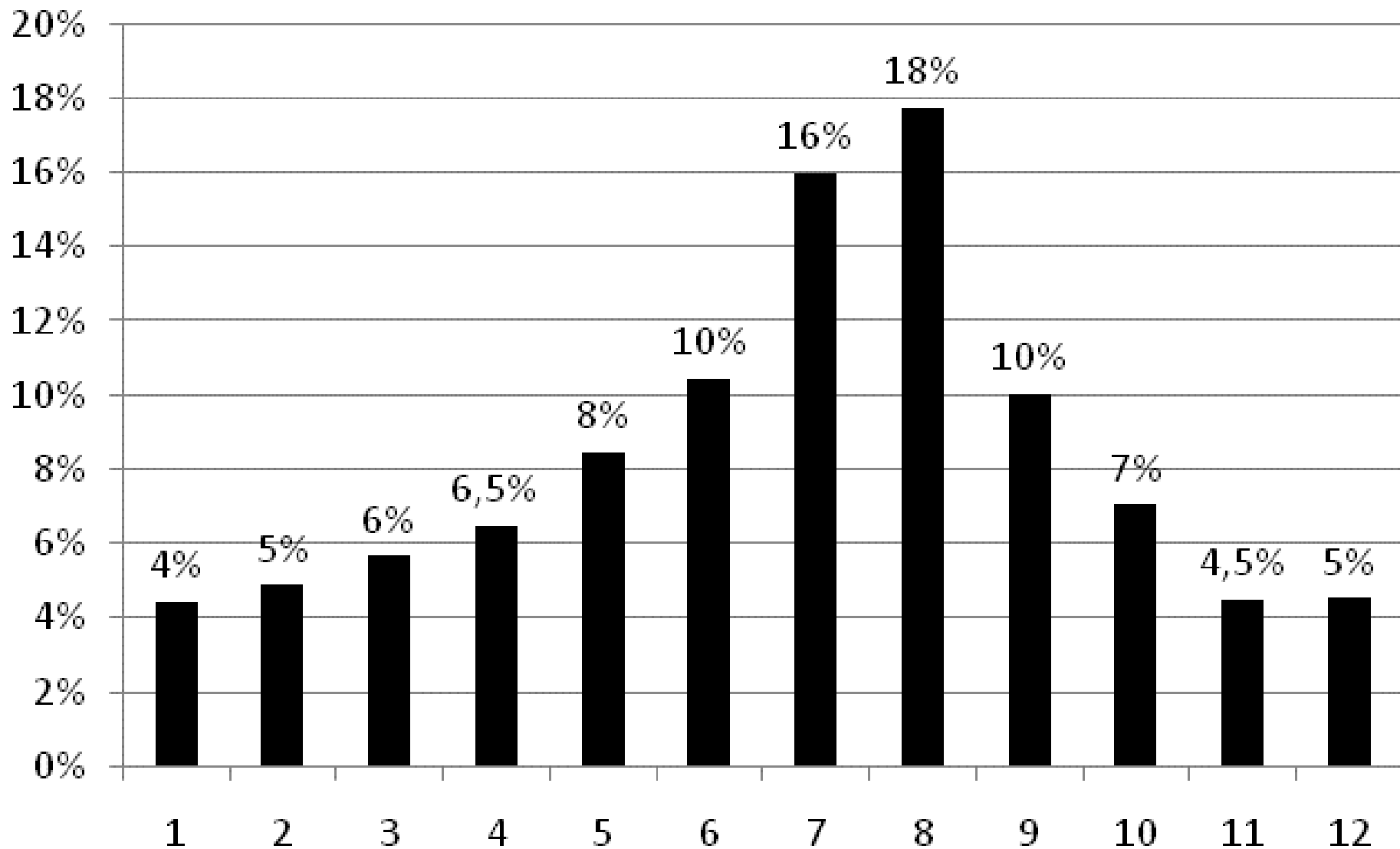
- $\rightarrow 12 * 12 * 2 * 2 = 576$  cases (rows)
- 33  $\rightarrow$  28 destinations (variables, columns)

# Bednights in commercial accommodations per year in Europe 1998-2009 (millions)

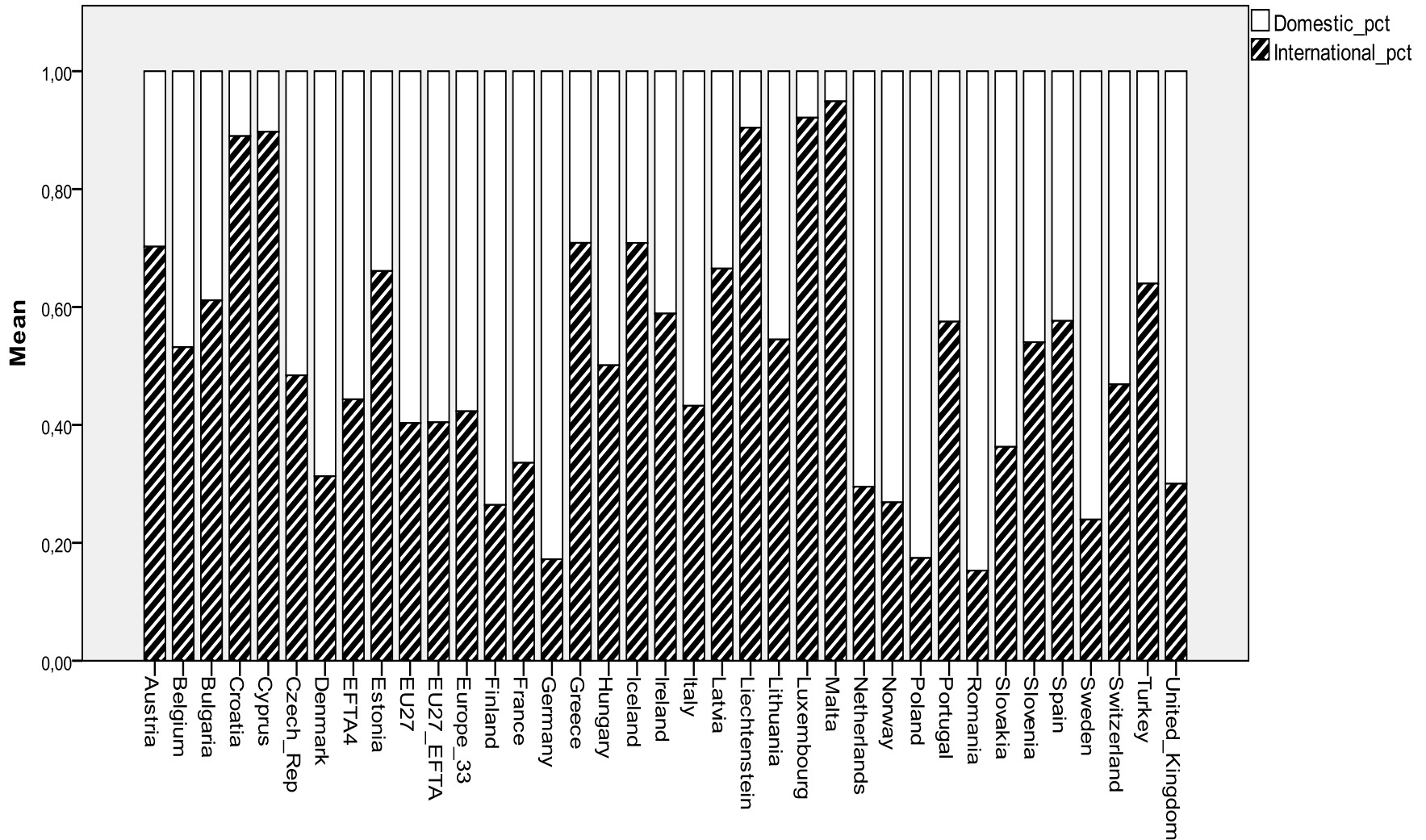


Source: Based on Eurostat. Own elaboration.

# Bednights by month: Season – all of Europe – all years under one 1998-2009



# Split of bednights on international and domestic visitors, by destination in Europe 2009

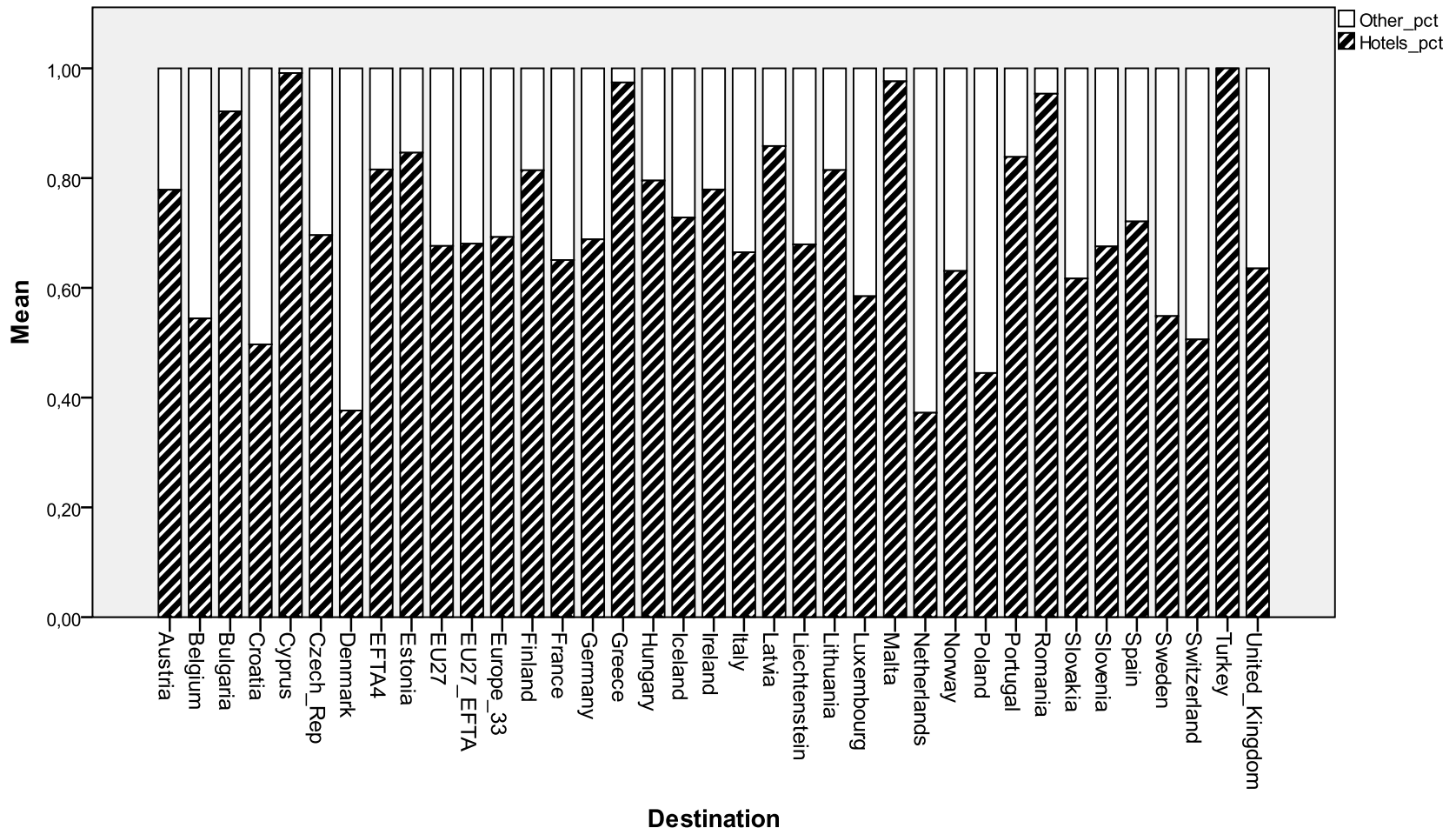


Source: Based on Eurostat.

Destination



# Split of bednights on hotels and other types of accommodations, by destination in Europe 2009



Source: Based on Eurostat.

# Split of bednights in Europe 2009 by source and type of accommodation

2009 (%)	Domestic	International	Total
Hotels	37,3	31,9	69,2
Other	20,4	10,4	30,8
Total	57,7	42,3	100,0

Source: Based on data from Eurostat supplemented by own elaborations.

Note: Total is 2444 million bednights (i.e. well over 2.4 billion for one year, 2009)

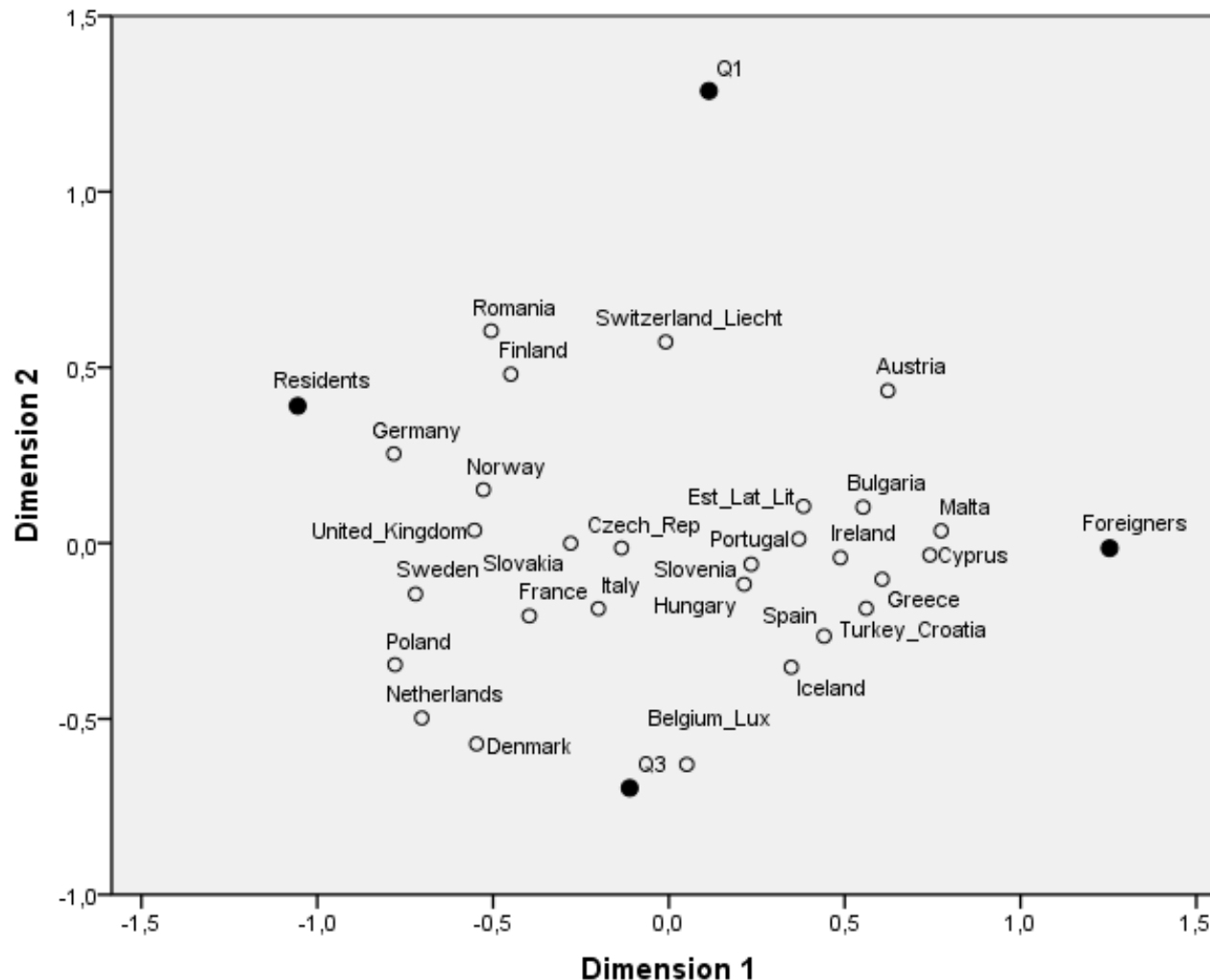
# The data matrix

With monthly data for a 12 year period, for hotels and for other commercial accommodations, and for residents and non-residents in both categories, this makes  $12*12*4=576$  records in a data matrix.

The 33 destinations are variables, columns, in the data matrix.

Additional variables (dummy-variables) indicate if the type of accommodation is hotels or not, the visitors are residents or not. Furthermore dummy variables indicate the month and quarter of visit, and there is a variable for the year.

# Position of European Destinations – based on all collective accommodations – 1998-2009 – including seasons and origin markets



Note:  
Based on  
over 28.4  
billion  
bednights,  
from  
Eurostat.

# Result of two factor analyses, one with all visitors, and one with non-residents only

All

1. The hot or international

2. The cool

3. Domestic

	Component		
	1	2	3
Ireland	,944	,120	,154
Cyprus	,942	,000	-,156
Malta	,937	-,005	-,223
Greece	,937	-,016	,099
Turkey_Croatia	,912	,002	,167
Portugal	,898	,237	,212
Est_Lat_Lit	,881	,085	,332
Spain	,867	,084	,284
Bulgaria	,866	,030	,151
Slovenia	,828	,435	,220
Iceland	,809	,395	,071
Hungary	,802	,237	,444
Austria	,787	,018	-,054
Netherlands	-,113	,917	,145
Poland	-,163	,893	,265
Denmark	-,028	,891	,196
Belgium_Lux	,458	,791	-,088
Czech_Rep	,470	,748	,267
Slovakia	,373	,720	,451
Sweden	-,093	,719	,587
Switzerland_Liecht	,317	,689	-,012
Romania	,124	-,142	,944
Finland	,206	,017	,930
Germany	-,132	,327	,860
Norway	,147	,432	,817
United_Kingdom	,135	,479	,792
Italy	,435	,357	,706
France	,243	,608	,636

	Component		
	1	2	3
Greece	,915	,297	,199
Bulgaria	,866	,275	,196
Turkey_Croatia	,866	,222	,408
Cyprus	,799	,499	,117
Spain	,766	,328	,507
Ireland	,765	,567	,246
Est_Lat_Lit	,753	,601	,179
Romania	,743	,624	,136
Poland	,716	,502	,357
Malta	,710	,660	,081
Portugal	,705	,669	,153
Iceland	,686	,304	,569
United_Kingdom	,648	,598	,387
Hungary	,629	,549	,462
Slovenia	,614	,610	,447
Austria	,232	,872	,152
Finland	,493	,771	,281
Czech_Rep	,574	,749	,227
Germany	,580	,711	,321
Slovakia	,428	,696	,487
Switzerland_Liecht	,405	,574	,403
Denmark	,038	-,024	,983
Sweden	,092	,056	,952
France	,263	,335	,885
Netherlands	,230	,263	,824
Norway	,330	,235	,822
Belgium_Lux	,298	,483	,753
Italy	,554	,386	,660

International

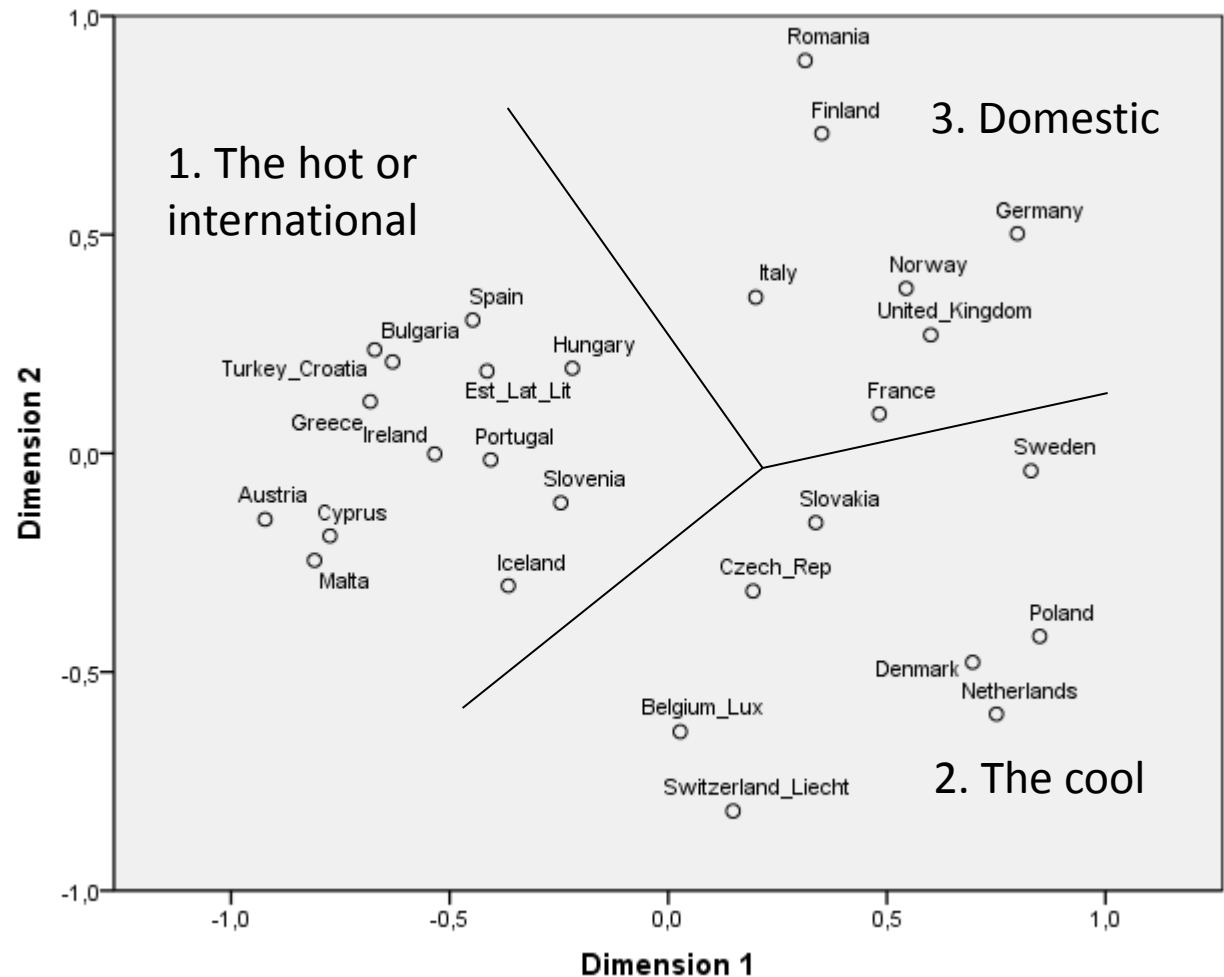
1. English language sphere

2. German language sphere

3. Scandinavian, Flemish, Latin

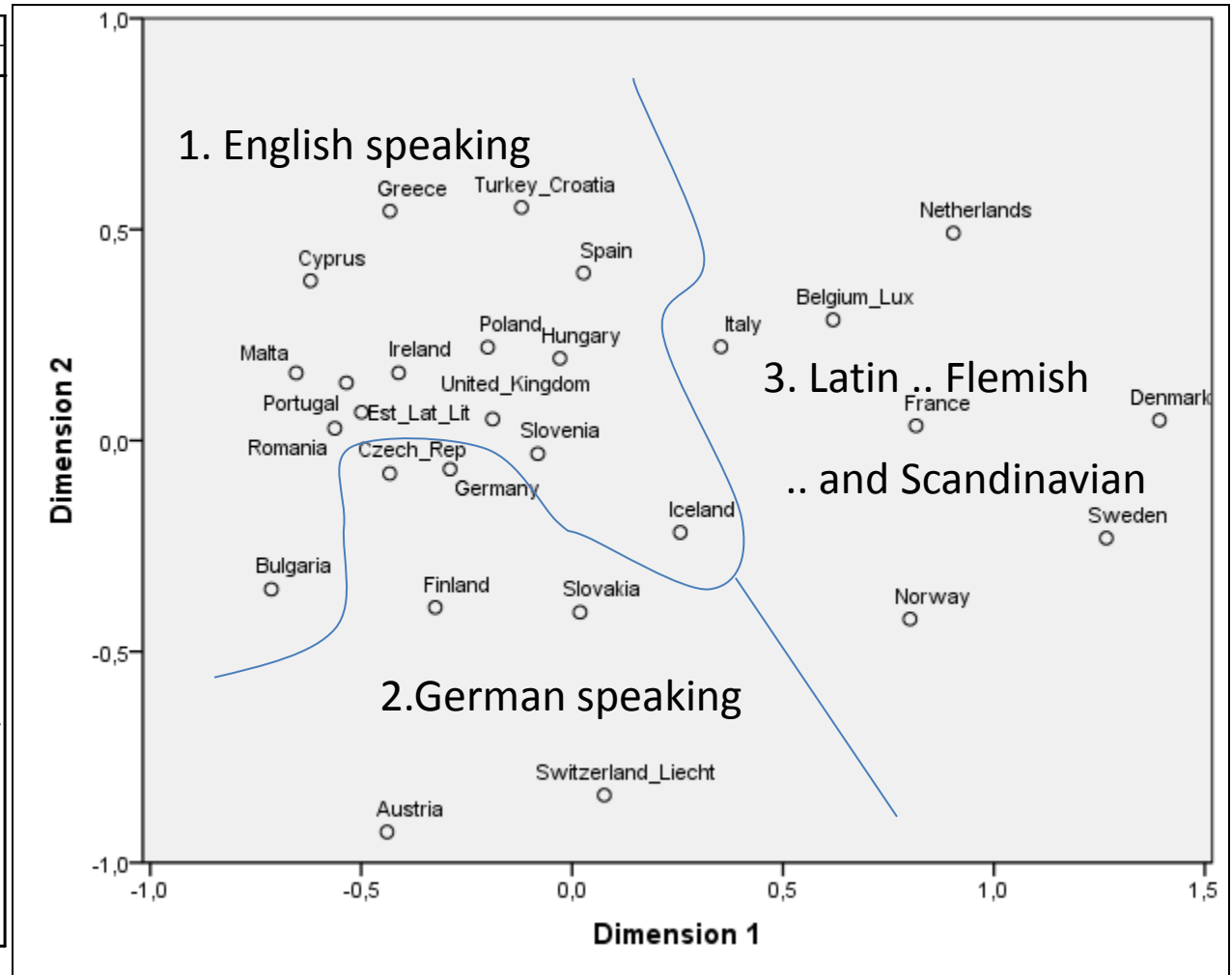
# Position of European Destinations – based on bednights of all visitors

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Norway	,147	,432	,817
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France	,243	,608	,636



# Position of European Destinations – international visitors only, all types of accommodation

	Component		
	1	2	3
Greece	,915	,297	,199
Bulgaria	,866	,275	,196
Turkey_Croatia	,866	,222	,408
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Italy	,554	,386	,660



# Conclusion

- **MDS has many applications**, and grouping of destinations is one of them.
- **MDS can be supported by factor analysis**, which is helpful in the interpretation of the MDS diagrams.
- **Proximity** – nearness or distance – between the variables in the original data set and in the resulting diagrams **is central in MDS analyses**.
- **Neighbouring countries** are typically top ranking foreign destinations. Thus **nearness and easy access** (low costs in terms of time and money) plays a role in tourists' choice of destination.
- Also the **ability to be understood** well at the holiday or business destination and an element of **cultural overlap** clearly plays a role in destination choice.