7 Trends in Prison Population 1995-2004

Roy Walmsley

This paper examines trends in prison populations in Europe between 1995 and 2004 in the light of data obtained from the 6th, 7th, 8th and 9th United Nations Surveys of Crime Trends and Operations of Criminal Justice Systems and the ongoing data collections of prison populations in Europe that are provided by the Council of Europe Annual Penal Statistics (SPACE)[1] and by the World Prison Population List[2] and the World Prison Brief[3]. Reference is also made to the situation in North America (Canada and the USA).

The data presented cover overall prison population levels, including the rate per 100,000 of the national population (the prison population rate), the levels of pre-trial/remand detention and the proportion of pre-trial/remand prisoners within the prison population total, and the occupancy levels in terms of the capacity of the prison systems.

At the end of 2004 Europe had 47 independent countries with their own prison administrations; indeed three of them - Bosnia & Herzegovina, Serbia & Montenegro and the United Kingdom - each had three such administrations[4]. There were also prisons in five dependent territories[5] and

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[1] The Council of Europe Annual Penal Statistics (SPACE) were inaugurated in 1983 by Pierre Tournier and are now prepared by Marcelo Aebi of the University of Lausanne; the most recently published figures were for 1 September 2005. The 2006 figures (Aebi and Delgrande) will be published early in 2008.

[2] The World Prison Population List (Roy Walmsley) was first published in 1999; the seventh edition appeared in January 2007 based on the latest figures available at 31 October 2006 including, for nine countries, figures from the Council of Europe Annual Penal Statistics. It is published by the International Centre for Prison Studies (ICPS), King's College, London.

[3] The World Prison Brief is an online database, available on the ICPS website www.prisonstudies.org, which regularly updates the information in the World Prison Population List and also presents more detailed information about prison populations, occupancy levels and prison administrations.

[4] Bosnia & Herzegovina has separate systems in its two entities – the Federation of Bosnia & Herzegovina and Republika Srpska - and one detention centre which is administered at the state level. In 2004 Serbia & Montenegro had separate administrations in Serbia and in Montenegro and a third system in Kosovo, under the authority of the United Nations. The United Kingdom has separate prison administrations for England & Wales, for Northern Ireland and for Scotland.

[5] Faeroe Islands (Denmark) and Gibraltar, Guernsey, Isle of Man and Jersey (all United Kingdom).

in five areas that were not under the control of the countries in which they are situated[6]. There was no prison in the Vatican City State (Holy See).

This paper is concerned with the 52 prison systems in the independent countries of Europe, excluding the state level detention centre in Bosnia & Herzegovina.

7.1   Trends in overall prison population levels

The predominant trend in European prison population levels between 1995 and 2004 was their growth. About three quarters of prison systems (35 out of 47 [7]) had more prisoners at the end of this period than at the beginning, and in seventeen of those that registered growth the increase was more than 25% (Table 7.1, figures for all countries at Annex Table 7A).

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[6] Abkhazia (in Georgia), Nagorno-Karabakh (in Azerbaijan but administered by Armenia), Northern Cyprus (administered by the internationally unrecognised Turkish Republic of Northern Cyprus), South Ossetia (in Georgia) and Transnistria (in Moldova).

[7] Five of the 52 prison systems are not included in this analysis. In two cases this is because data was not available before 2002 (Serbia & Montenegro: both Kosovo and Montenegro), although in both systems the prison population rose during the period for which figures were available, and in the other three cases (Liechtenstein, Monaco and San Marino) their figures cannot be used for comparative purposes because some prisoners are not included in the totals, as a result of the fact that they are held in prisons in Austria, France and Italy respectively.

Table 7.1. Increases in European prison population totals 1995-2004

	Prison population total 1995	Prison population total 2004	Variation in prison population total 1995-2004
Cyprus	170	546	+221.2%
Bosnia & Herzegovina: Federation	626	1,366	+118.2%
Serbia & Montenegro: Serbia	3,623*	7,556	+108.6%
Netherlands	10,249	20,075	+95.9%
Slovenia	635	1,085	+70.9%
Ireland	2,054	3,083	+50.1%
Greece	5,887	8,760	+48.8%
Spain	40,157	59,224	+47.5%
United Kingdom: England & Wales	50,962	74,657	+46.5%
Austria	6,180	9,000	+45.6%
Turkey	49,895	71,148	+42.6%
Malta	196	277	+41.3%
Macedonia (former Yugoslav repub. of)	1,156	1,618	+40.0%
Albania	3,177*	4,356*	+37.1%
Hungary	12,455	16,543	+32.8%
Poland	61,136	80,368	+31.5%
Sweden	5,767	7,332	+27.1%

(* Albania 1995-2005, Serbia & Montenegro: Serbia 1994-2004)

However, the best indicator of trends in overall prison population levels is not the prison population total but the prison population rate per 100,000 of the national population. The former is affected by changes in the size of the national population and does not therefore give so accurate a picture of the trends.

Removing the effect of changes in the size of the national population reveals that even more countries registered growth in prison population levels between 1995 and 2004. In fact thirty-seven of the forty-seven countries on which information is available (79%) had a higher prison population rate in 2004 than in 1995 (Table 7.2).

Table 7.2. Increases in European prison population rates 1995-2004

	Prison population rate 1995	Prison population rate 2004	Variation in prison population rate 1995-2004
Cyprus	26	75	+188%
Serbia & Montenegro: Serbia	37*	92	+149%
Bosnia & Herzegovina: Federation	25	53	+112%
Netherlands	66	123	+86%
Slovenia	32	54	+69%
Greece	56	82	+46%
Spain	102	138	+35%
United Kingdom: England & Wales	99	141	+42%
Albania	98*	139*	+42%
Austria	78	110	+41%
Macedonia (former Yugoslav repub. of)	59	80	+36%
Hungary	122	164	+34%
Poland	158	211	+34%
Ireland	57	76	+33%
Malta	53	69	+30%
Bulgaria	101	129	+28%
Sweden	65	81	+25%
Croatia	51	63	+24%
United Kingdom: Scotland	111	136	+23%
Turkey	82	100	+22%
Germany	81	98	+21%
Slovakia	147	175	+19%
Norway	55	65	+18%
Belgium	75	88	+17%
Bosnia & Herzegovina: Rep. Srpska	67*	75	+12%
Finland	59	66	+12%
Estonia	304	339	+12%
Moldova	263	293	+11%
Andorra	76	84	+11%
Italy	87	96	+10%
Georgia	171	183	+7%
Denmark	66	70	+6%
Luxembourg	114	121	+6%
France	89	92	+3%
Ukraine	397	410	+3%
Portugal	123	125	+2%
Switzerland	80	81	+1%

(* Albania 1994-2005, Bosnia & Herzegovina: Republika Srpska 1998-2004, Serbia & Montenegro: Serbia 1994-2004)

The countries that registered large increases were not confined to a particular part of the European continent. Those with traditionally low levels, such as the Netherlands, Scandinavian/Nordic countries and countries from former Yugoslavia (Bosnia & Herzegovina, Croatia, Macedonia, Serbia, Slovenia) registered increases similar to those of countries in other parts of Europe.

Ten countries registered a decrease in their prison population rates between 1995 and 2004 (Table 7.3).

Table 7.3. Decreases in European prison population rates 1995-2004

	Prison population rate 1995	Prison population rate 2004	Variation in prison population rate 1995-2004
Armenia	143*	89	-38%
Lithuania	351	234	-33%
Azerbaijan	317*	219	-31%
United Kingdom: N. Ireland	105	76	-28%
Belarus	535	437	-18%
Iceland	44	39	-11%
Romania	200	180	-10%
Latvia	381	353	-7%
Russian Federation	622	587	-6%
Czech Republic	189	179	-5%

(* Armenia 1994-2004, Azerbaijan 1997-2004)
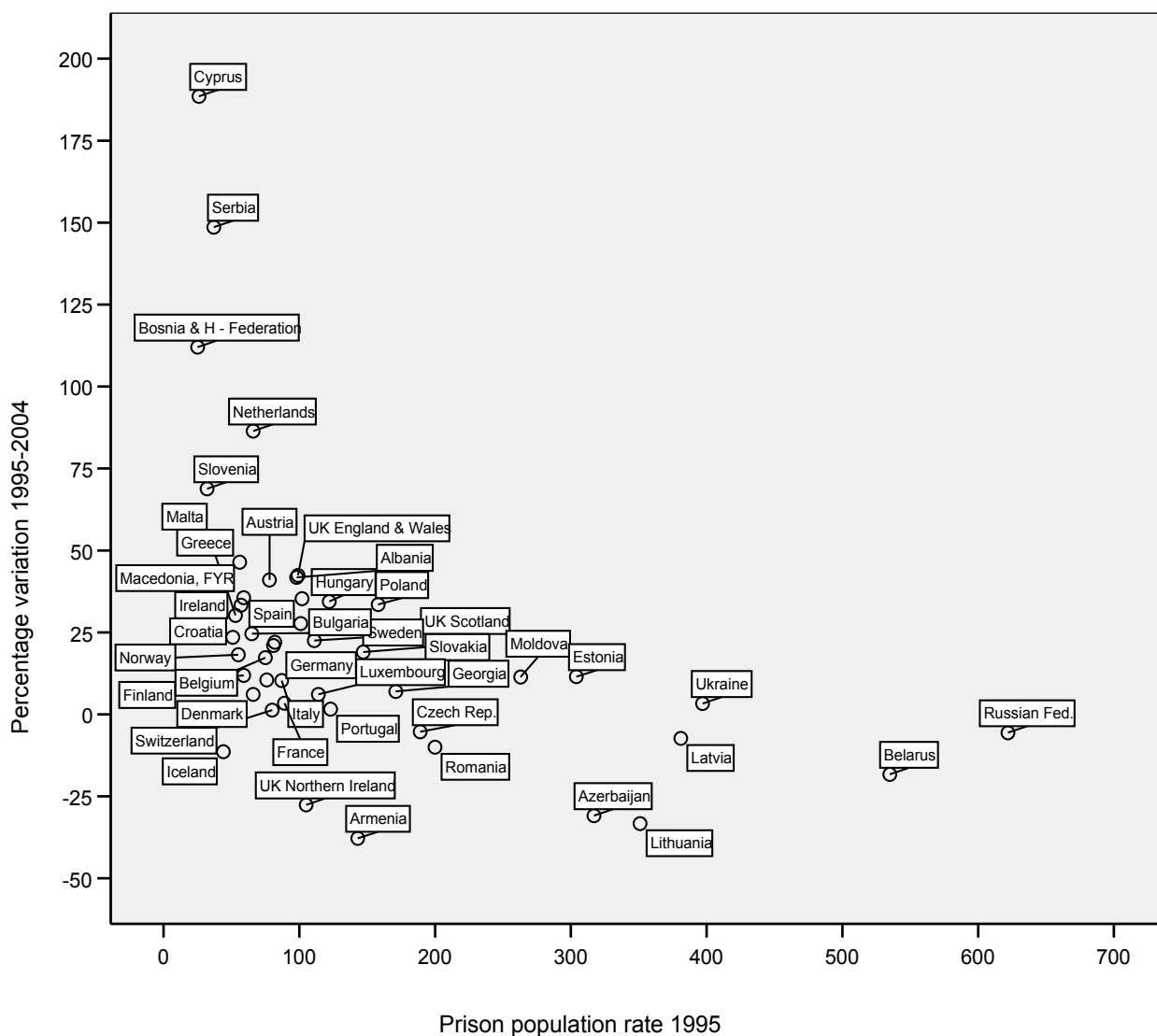
Figure 7.1. Variation in prison population rates 1995-2004

Most of the countries which registered decreases in their prison population totals between 1995 and 2004 were among those which in 1995 had the highest prison population rates in Europe. The decreases have resulted in the prison population levels in these countries, which come exclusively from those which only a few years before had been part of the Soviet Union and the socialist bloc in central and eastern Europe, moving in the direction of levels elsewhere in Europe. However, the scale of the decreases was insufficient to change the overall picture: the twelve countries with the highest European prison population rates in 1995 remained those with the highest levels in 2004 (Table 7.4).

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Table 7.4. Countries with highest European prison population rates (per 100,000 of national population), 1995 and 2004

	Prison population rate, 1995 (per 100,000 of national population)		Prison population rate, 2004 (per 100,000 of national population)
1. Russian Federation	622	1. Russian Federation	587
2. Belarus	535	2. Belarus	437
3. Ukraine	397	3. Ukraine	410
4. Latvia	381	4. Latvia	353
5. Lithuania	351	5. Estonia	339
6. Azerbaijan	317	6. Moldova	293
7. Estonia	304	7. Lithuania	234
8. Moldova	263	8. Azerbaijan	219
9. Romania	200	9. Poland	211
10.Czech Republic	189	10.Georgia	183
11.Georgia	171	11.Romania	180
12.Poland	158	12.Czech Republic	179

During the period 1995-2004 prison populations in a number of countries fluctuated. While, as was noted, the overall picture is one of growth in most countries, the growth was not always steady throughout the period (see annex table A). Amnesties and legislative changes are the most common cause of sudden shifts in prison population levels but increases and decreases are also often the result of changes in government policy and other factors that are specific to the countries concerned.

7.2   Trends in prison population levels in North America

In North America the prison population rate fell by 20% in Canada between 1995-96 and 2004-05 but in the United States, which has the highest prison population rate in the world, the rate rose by the same amount (end of 1995 to end of 2004). The United States totals do not include persons held in juvenile institutions (94,875 at 22.10.2003).

Table 7.5. Prison population levels in North America 1995-2004

	Prison population total 1995	Prison population rate 1995	Prison population total 2004	Prison population rate 2004	Variation in prison population rate 1995-2004
Canada	38,548	132	33,927	106	-20%
U.S.A.	1,585,586	601	2,135,335	723	+20%

7.3 Trends in pre-trial/remand imprisonment levels

Whereas the predominant trend in overall European prison population levels between 1995 and 2004 was their growth, the trend in respect of pre-trial/remand imprisonment levels was less clear-cut: twenty five prison systems registered growth - all of them more than 10% growth and fourteen of them more than 40% growth – but almost as many (twenty) registered a decrease[8] and in six cases the decrease was more than 40% (Tables 7.6 and 7.7). Thus a considerable number of countries whose prison population total rose between 1995 and 2004 did not register a rise in their pre-trial/remand imprisonment level. There were eleven of these: Bosnia & Herzegovina (the prison systems in both entities), Bulgaria, Estonia, France, Germany, Italy, Malta, Moldova, Poland and Portugal. As with the overall prison population totals it is noticeable that the largest decreases in pre-trial/remand imprisonment occurred mainly in countries of the former Soviet Union and the former socialist bloc in central and eastern Europe.

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[8] Seven of the 52 prison systems are not included in this analysis. Footnote (7) explained the absence of five of these. In addition, full pre-trial imprisonment data was not available in respect of 1995 for Albania and Serbia & Montenegro: Serbia.

Table 7.6. Increases in European pre-trial/remand imprisonment totals 1995-2004

	Pretrial/remand imprisonment total 1995	Pretrial/remand imprisonment total 2004	Variation in pretrial/remand imprisonment 1995-2004
Cyprus	32	96	+200.0%
Ireland	181	454	+150.8%
Georgia	2,183	4,618	+111.5%
Macedonia (FYR)	158*	300	+89.9%
Netherlands	3,434	6,410	+86.7%
Luxembourg	155	278	+79.4%
Slovakia	1,950	3,091	+58.5%
Slovenia	188	295	+56.9%
Andorra	30	47*	+56.7%
Sweden	1,032	1,561	+51.3%
Belgium	2,404	3,614	+50.3%
United Kingdom: Northern Ireland	350	512	+46.3%
Switzerland	1,703	2,441	+43.3%
Turkey	24,951	34,987	+40.2%
Croatia	653	912	+39.7%
Austria	1,621	2,193	+35.3%
Finland	318	427	+34.3%
Denmark	816	1,090	+33.6%
Iceland	6	8	+33.3%
Hungary	3,183	4,101	+28.8%
United Kingdom: Scotland	1,001	1,284	+28.3%
Spain	9,930	12,688	+27.8%
Greece	1,986	2,469	+24.3%
Norway	514	612	+19.1%
United Kingdom: England & Wales	11,308	12,495	+10.5%

(* Andorra 1995-2003, Macedonia 1994-2004)

Table 7.7. Decreases in European pre-trial/remand imprisonment totals 1995-2004[9]

	Pretrial/remand imprisonment total 1995	Pretrial/remand imprisonment total 2004	Variation in pretrial/remand imprisonment 1995-2004
Czech Republic	8,000	3,269	-59.1%
Armenia	1,912*	844	-55.9%
Lithuania	2,925	1,362	-53.4%
Azerbaijan	3,730*	1,765*	-52.7%
Romania	18,339	9,774	-46.7%
Russian Federation	253,000	149,173	-41.0%
Portugal	4,629	3,000	-35.2%
Estonia	1,671	1,096	-34.4%
Bulgaria	2,487	1,861	-25.2%
Germany	19,796	15,999	-19.2%
Moldova	2,990	2,457	-17.8%
Ukraine	43,845	39,021	-11.0%
Bosnia & Herzegovina: Federation	361	322	-10.8%
Latvia	3,161	2,824	-10.7%
United Kingdom: England & Wales	11,308	12,495	-10.5%
Italy	21,811	19,885	-8.8%
France	21,598	19,760	-8.5%
Malta	95	87	-8.4%
Bosnia & Herzegovina: Rep. Srpska	200	188	-6.0%
Poland	15,686	15,055	-4.0%

(* Armenia 1994-2004, Azerbaijan 1997-2003)

In North America, Canada recorded a 68% increase between 1995-96 and 2004-05 in the number of pre-trial/remand prisoners within the prison population (from 6,230 to 10,467). In the United States, figures are not available for the number of pre-trial/remand prisoners; there were some 430,530 untried prisoners in mid-2004.

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[9] In the earlier section on overall prison population levels the figures for France related to the part of France that is in Europe and thus fully comparable with the other European countries (known as France 'métropole'). Insufficient data was available on pre-trial detention in respect of the métropole and so the figures in this section and the next include French overseas 'départements' in Africa and the Caribbean.

7.4 Trends in the extent of pre-trial/remand imprisonment within the overall prison population

In more than three quarters of European prison systems (35 out of 45 in 1995 and 39 out of 49 in 2004) pre-trial/remand prisoners constituted between 15% and 40% of the prison population total.[10]

But it is evident from the preceding examination of the levels of pre-trial/remand imprisonment that there must have been changes between 1995 and 2004 in the extent of pre-trial/remand imprisonment within the overall prison population. Indeed pre-trial detainees constituted a larger proportion of the overall prison population in 2004 than 1995 in nineteen prison systems, including four in which the proportion increased by more than fifteen percentage points (Table 7.8). However, pre-trial/remand prisoners constituted a smaller proportion of the overall prison population in 2004 than 1995 in twenty six prison systems, including five in which the proportion decreased by more than fifteen percentage points (Table 7.9).

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[10] Just two systems had less than 15% of their prisoners in pre-trial/remand imprisonment in 1995 (Ireland 8.8% and Iceland 5%) and eight had more than 40% (Andorra 61.2%, Bosnia & H. – Federation 53.1%, Turkey 50.0%, Malta 48.5%, Italy 43.9%, Czech Republic 41.0%, France 40.6% and Romania 40.5%). In 2004 four systems had less than 15% of their prisoners in pre-trial/remand imprisonment (Ireland 14.4%, Finland 12.1%, Azerbaijan 10.8% and Iceland 7.0%) and six had more than 40% (Andorra 77.0%, Georgia 58.7%, Luxembourg 50.7%, Turkey 48.6%, Serbia & Montenegro – Kosovo 42.0% and Switzerland 40.8%).

Table 7.8. Increases in the extent of pre-trial/remand imprisonment within the overall prison population 1995-2004

	Pre-trial/remand prisoners as % of total prison population 1995	Pre-trial/remand prisoners as % of total prison population 2004	Pre-trial/remand prisoners as % of prison population: change in percentage points 1995-2004
Georgia	27.1%	58.7%	**+31.6**
United Kingdom: Northern Ireland	20.1%	39.5%	**+19.4**
Luxembourg	33.0%	50.7%	**+17.7**
Andorra	61.2%	77.0%*	**+15.8**
Switzerland	28.1%	40.8%	**+12.7**
Slovakia	24.7%	32.8%	**+8.1**
Belgium	31.8%	39.1%	**+7.2**
Netherlands	33.2%	39.6%	**+6.4**
Ireland	8.8%	14.4%	**+5.6**
Denmark	23.7%	29.0%	**+5.3**
Macedonia (FYR)	12.2%*	17.2%	**+5.0**
Croatia	27.3%	32.0%	**+4.7**
Sweden	17.9%	21.3%	**+3.4**
Latvia	33.4%	35.9%	**+2.5**
Iceland	5.0%	7.0%	**+2.0**
Austria	26.2%	28.1%*	**+1.9**
Cyprus	15.8%	17.6%	**+1.8**
Finland	10.5%	12.1%	**+1.6**
United Kingdom: Scotland	17.7%	18.6%	**+0.9**

(* Andorra 1995-2003, Austria 1995-2003, Macedonia 1994-2004)

Table 7.9. Decreases in the extent of pre-trial/remand imprisonment within the overall prison population 1995-2004

	Pre-trial/remand prisoners as % of total prison population 1995	Pre-trial/remand prisoners as % of total prison population 2004	Pre-trial/remand prisoners as % of prison population: change in percentage points 1995-2004
Bosnia & Herzegovina: Federation	53.1%	25.8%	**-27.3**
Czech Republic	41.0%	17.8%	**-23.2**
Malta	48.5%	29.2%	**-19.3**
Estonia	39.6%	24.0%	**-15.6**
Romania	40.5%	25.0%	**-15.5**
Portugal	37.5%	22.8%	**-14.7**
Germany	32.4%	19.7%	**-12.7**
Bulgaria	29.6%	18.5%	**-11.1**
Russian Federation	27.5%	17.6%	**-9.9**
Italy	43.9%	35.5%	**-8.4**
Poland	25.7%	18.7%	**-7.0**
Armenia	35.6%*	29.6%	**-6.0**
France	40.6%	35.1%	**-5.5**
Greece	33.7%	28.2%	**-5.5**
UK: England & Wales	22.1%	16.8%	**-5.3**
Lithuania	22.0%	16.9%	**-5.1**
Azerbaijan	15.0%*	10.8%*	**-4.2**
Spain	24.7%	21.4%	**-3.3**
Bosnia & Herzegovina: Rep. Srpska	22.9%*	19.7%	**-3.2**
Moldova	28.9%	26.2%	**-2.7**
Slovenia	29.0%	27.2%	**-1.8**
Belarus	23.5%	21.8%	**-1.7**
Turkey	50.0%	48.6%	**-1.4**
Ukraine	21.5%	20.2%	**-1.3**
Hungary	25.6%	24.8%	**-0.8**
Norway	21.4%	20.6%	**-0.8**

(*Armenia 1994-2004, Azerbaijan 1997-2003, Bosnia & Herzegovina: Republika Srpska 1998-2004)

In North America, Canada's above-mentioned 68% increase between 1995-96 and 2004-05 in the number of pre-trial/remand prisoners was accompanied by a 39% fall in the number of sentenced prisoners. There has thus been an increase of almost fifteen percentage points in the percentage of pre-trial/remand prisoners within the overall prison population. In the United States, figures for mid-1998 indicated that 18.4% of prisoners were untried. This had risen to 20.2% by mid-2004. These figures do not include remand prisoners who were convicted but unsentenced.

Table 7.10. Changes in the extent of pre-trial/remand imprisonment within the overall prison population in North America 1995-2004

	Pre-trial/remand prisoners as % of total prison population 1995	Pre-trial/remand prisoners as % of total prison population 2004	Pre-trial/remand prisoners as % of prison population: change in percentage points 1995-2004
Canada	16.2%	30.9%	**+14.7**
U.S.A.	not available	20.2%	-

7.5   Trends in occupancy levels

In 1995 sixteen of the 42 prison systems for which such information was available were holding more prisoners than their prisons were intended for[11] and in 2004 it was again sixteen prison systems that were occupied beyond their capacity, although for the latter year such information was available in respect of 44 systems. It must be remembered that in some systems that are not, as a whole, occupied beyond their capacity there will be some prisons that are overcrowded.

But despite the fact that the same number of systems were occupied beyond their capacity in each year the overall picture is that European prison systems became more overcrowded between 1995 and 2004. Twenty-seven prison systems registered higher occupancy (density) levels in 2004 than nine years earlier while fourteen systems registered lower levels (Tables 7.11 & 7.12). Insufficient information was available to provide such comparisons in respect of the other eleven systems.[12]

In some cases an increased occupancy level did not entail a similar increase in overcrowding. For example, some countries, including Bulgaria and Ukraine, increased the amount of space that is allowed per prisoner in fixing the capacity of the prisons, which automatically increased the occupancy rate of each prison even if there was no increase in the number of prisoners. In fact, although Bulgaria's occupancy level rose by almost 39 percentage points, their prison population only rose by 18%. In Ukraine's case their occupancy level rose by nearly 16 percentage points but their prison population actually fell by more than 5%. Lithuania is also among countries that increased the amount of space that is allowed per prisoner but, because of the size of the decrease in their prison

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[11] One of the 16 – the prison system in Belarus – was 131.8% occupied in 1995 but comparable information is not available for 2004. The occupancy levels in the other 15 overcrowded systems in 1995 and the 16 overcrowded systems in 2004 are shown in Tables 7.11 and 7.12 below.

[12] Albania, Armenia, Azerbaijan, Belarus, Bosnia & Herzegovina: Rep. Srpska, Liechtenstein, Monaco, San Marino, Serbia & Montenegro: Kosovo, Montenegro and Serbia.

population (almost 37%), they still managed to reduce their occupancy level.

Table 7.11. Increases in occupancy levels 1995-2004

	Occupancy level 1995	Occupancy level 2004	Occupancy level: change in percentage points 1995-2004
Cyprus	70.8%	160.6%	**+89.8**
Bulgaria	83.9%	122.8%	**+38.9**
Turkey	67.8%	103.7%	**+35.9**
Hungary	109.7%	144.9%	**+35.2**
Bosnia & Herzegovina: Federation	53.2%*	87.2%	**+34.0**
Slovenia	71.6%	98.4%	**+26.8**
Finland	73.7%	99.1%	**+25.4**
Germany	76.9%	102.2%	**+25.3**
Greece	136.5%	156.9%	**+20.4**
Austria	80.4%	97.4%*	**+17.0**
Ukraine	106.3%	122.0%	**+15.7**
Croatia	77.8%	91.3%	**+13.5**
Poland	101.0%	114.0%	**+13.0**
Slovakia	87.1%	99.0%	**+11.9**
Georgia	59.7%	71.2%	**+11.5**
Andorra	61.3%	71.8%*	**+10.5**
Sweden	93.1%	103.3%	**+10.2**
Italy	122.4%	131.5%	**+9.1**
United Kingdom: Scotland	100.0%	108.0%	**+8.0**
United Kingdom: Northern Ireland	79.1%	87.0%	**+7.9**
Norway	87.6%	95.4%	**+7.8**
Denmark	90.4%	95.6%	**+5.2**
France	109.0%	113.5%	**+4.5**
Macedonia (FYR)	74.7%	78.5%	**+3.8**
Netherlands	89.4%	92.6%	**+3.2**
Estonia	95.7%	97.4%	**+1.7**
Ireland	92.9%	94.5%	**+1.6**

(Andorra 1995-2003, Austria 1995-2003, Bosnia & Herzegovina: Federation 1997-2004)

Table 7.12. Decreases in occupancy levels 1995-2004

	Occupancy level 1995	Occupancy level 2004	Occupancy level: change in percentage points 1995-2004
Romania	151.8%	104.0%	**-47.8**
Portugal	136.2%	100.3%	**-35.9**
Malta	89.1%	62.1%	**-27.0**
Russian Federation	104.2%	82.1%	**-22.1**
Luxembourg	99.2%	80.2%	**-19.0**
Iceland	100.8%	83.9%	**-16.9**
Moldova	97.5%	83.1%	**-14.4**
Latvia	98.4%	85.0%	**-13.4**
Lithuania	96.6%	86.0%	**-10.6**
Czech Republic	107.3%	98.9%	**-8.4**
United Kingdom: England & Wales	101.1%	95.6%	**-5.5**
Belgium	116.7%	114.2%	**-2.5**
Spain	130.9%	129.5%	**-1.4**
Switzerland	92.4%	91.4%	**-1.0**

7.6   Conclusion - main points

The predominant trend in European prison population levels between 1995 and 2004 was their growth. The countries that registered large increases were not confined to a particular part of the European continent. Growth was recorded in 37 of the 47 prison systems for which comparable information is available for that period. The 12 countries with the highest prison population rates in 1995 also had the highest levels in 2004.

The trend in respect of pre-trial/remand imprisonment levels was less clear-cut: 25 prison systems registered growth but 20 registered a decrease. As with the overall prison population totals, the largest decreases in pre-trial/remand imprisonment occurred mainly in countries of the former Soviet Union and the former socialist bloc in central and eastern Europe.

In both 1995 and 2004 pre-trial/remand prisoners in more than three quarters of European prison systems constituted between 15% and 40% of the prison population total. In a majority of countries (26) pre-trial/remand prisoners constituted a smaller proportion of the overall prison population in 2004 than 1995; in 19 they were a larger proportion.

European prison systems have become more overcrowded between 1995 and 2004. Twenty-seven prison systems registered higher occupancy levels in 2004 than nine years earlier while fourteen systems registered lower levels. In some cases an increased occupancy level did not entail a

similar increase in overcrowding; this was when a prison system had increased the amount of space per prisoner in fixing the capacity of the prisons, thus automatically increasing the occupancy rate per prison even if there was no increase in the number of prisoners.

Annex Table to Chapter 7

7A. Prison population totals 1995-2004 and prison population rates (per 100,000 of national population)

	Total prison population (and prison population rate) **1995**	**Total prison population** (and prison population rate) **1998**	**Total prison population** (and prison population rate) **2001**	**Total prison population** (and prison population rate) **2004**	**Variation in prison population** total **1995-2004**
Albania	3,177 (98)	2,922 (87)	3,053 (90)	4,356 (139)*	+37.1%
Andorra	49 (76)	40 (61)	48 (72)	61 (84)	+24.5%
Armenia	5,354 (143)*	7,608 (201)	7,428 (195)	2,856 (89)	-46.7%
Austria	6,180 (78)	6,962 (87)	6,915 (86)	9,000 (110)	+45.6%
Azerbaijan	24,851 (317)*	24,826 (312)	17,956 (221)	18,259 (219)	-26.5%
Belarus	54,869 (535)	63,157 (620)	55,156 (554)	42,806 (437)	-22.0%
Belgium	7,561 (75)	8,271 (81)	8,764 (85)	9,243 (88)	+22.2%
Bosnia & Herzegovina - Federation	626 (25)	754 (30)	1,041 (42)	1,366 (53)	+118.2%
Bosnia & Herzegovina - Republika Srpska		872 (67)	849 (65)	1,052 (75)	+20.6%
Bulgaria	8,529 (101)	11,541 (139)	8,971 (110)	10,066 (129)	+18.0%
Croatia	2,388 (51)	2,119 (46)	2,623 (59)	2,803 (63)	+17.4%
Cyprus	170 (26)	226 (34)	369 (56)	546 (75)	+221.2%
Czech Republic	19,508 (189)	22,067 (214)	19,320 (188)	18,343 (179)	-6.0%
Denmark	3,438 (66)	3,413 (64)	3,150 (59)	3,762 (70)	+9.4%
Estonia	4,401 (304)	4,791 (344)	4,803 (351)	4,576 (339)	+4.0%
Finland	3,018 (59)	2,569 (50)	3,040 (59)	3,446 (66)	+14.2%
France (European part)	51,623 (89)	50,744 (86)	44,618 (75)	55,355 (92)	+7.2%
Georgia	8,048 (171)	10,406 (231)	7,688 (176)	7,867 (183)	-2.2%
Germany	66,146 (81)	78,592 (96)	80,333 (98)	81,166 (98)	+22.7%
Greece	5,887 (56)	7,129 (68)	8,343 (79)	8,760 (82)	+48.8%
Hungary	12,455 (122)	14,366 (142)	17,275 (173)	16,543 (164)	+32.8%
Iceland	119 (44)	103 (38)	110 (39)	115 (39)	-3.4%
Ireland	2,054 (57)	2,648 (71)	3,025 (78)	3,083 (76)	+50.1%
Italy	49,642 (87)	49,050 (85)	55,136 (95)	56,090 (96)	+13.0%
Latvia	9,633 (381)	10,070 (410)	8,831 (373)	8,179 (353)	-15.1%
Liechtenstein**	18 (60)*	24 (75)*	17 (50)*	7 (19)	-
Lithuania	12,782 (351)	13,205 (383)	9,516 (273)	8,063 (234)	-36.9%
Luxembourg	469 (114)	392 (92)	357 (80)	548 (121)	+16.8%
Macedonia (FYR)	1,156 (59)	859 (43)	1,518 (75)	1,618 (80)	+40.0%
Malta	196 (53)	260 (69)	257 (65)	277 (69)	+41.3%
Moldova	9,781 (263)	10,521 (287)	10,037 (276)	10,591 (293)	+8.3%
Monaco**		13 (39)		32 (96)*	-
Netherlands	10,249 (66)	13,333 (85)	15,246 (95)	20,075 (123)	+95.9%
Norway	2,398 (55)	2,519 (57)	2,666 (59)	2,975 (65)	+24.1%
Poland	61,136 (158)	54,373 (141)	79,634 (206)	80,368 (211)	+31.5%
Portugal	12,343 (123)	14,598 (144)	13,260 (128)	13,152 (125)	+6.6%
Romania	45,309 (200)	52,149 (232)	49,841 (222)	39,031 (180)	-13.9%
Russian Federation	920,685 (622)	1,009,863 (688)	923,765 (638)	847,004 (587)	-8.0%
San Marino**	5 (-)*	2 (-)*	1 (-)*	0 (-)	-
Serbia & Montenegro - Kosovo			965 (54)*	1,199 (63)*	(+24.2%)

Table 7A continued					
Serbia & Montenegro - Montenegro			710 (104)*	734 (108)*	(+3.4%)
Serbia & Montenegro - Serbia	3,623 (37)*	5,150 (52)*	6,160 (76)	7,556 (92)	+108.6%
Slovakia	7,899 (147)	6,628 (123)	7,433 (138)	9,422 (175)	+19.3%
Slovenia	635 (32)	848 (43)	1,092 (55)	1,085 (54)	+70.9%
Spain	40,157 (102)	44,763 (114)	46,962 (117)	59,224 (138)	+47.5%
Sweden	5,767 (65)	5,290 (60)	6,089 (68)	7,332 (81)	+27.1%
Switzerland	5,655 (80)	6,041 (85)	5,160 (71)	5,977 (81)	+5.7%
Turkey	49,895 (82)	64,907 (102)	61,336 (89)	71,148 (100)	+42.6%
Ukraine	203,988 (397)	206,000 (413)	198,885 (406)	193,489 (410)	-5.1%
United Kingdom: England and Wales	50,962 (99)	65,298 (125)	66,301 (127)	74,657 (141)	+46.5%
United Kingdom: Northern Ireland	1,740 (105)	1,531 (91)	877 (52)	1,295 (76)	-25.6%
United Kingdom: Scotland	5,657 (111)	6,082 (120)	6,172 (122)	6,885 (136)	+21.7%

* For some countries, as a result of the incompleteness of available data, the figures shown are for a date that differs from the one at the top of the column:
Albania: the figure shown for 2004 is actually for February 2005.
Armenia: the figure shown for 1995 is actually for 1 January 1994.
Azerbaijan: the figure shown for 1995 is actually for 1 June 1997.
Liechtenstein: the figures shown for 1995, 1998 & 2001 are actually for 22 May 1994, 30 June 1999 and 1 September 2002 respectively.
Monaco: the figure shown for 2004 is actually for 1 September 2005.
San Marino: the figures shown for 1995, 1998 & 2001 are actually for 1 January 1994, 1999 and 1 September 2002 respectively.
Serbia & Montenegro: Kosovo. The figures shown for 2001 & 2004 are actually for 30 June 2002 and April 2005 respectively.
Serbia & Montenegro: Montenegro. The figures shown for 2001 & 2004 are actually for 25 April 2002 and 1 September 2003 respectively.
Serbia & Montenegro: Serbia. The figures shown for 1995 & 1998 are actually for 1 January 1994 and 1 January 1997 respectively.

** The figures for Liechtenstein, Monaco and San Marino cannot be used for comparative purposes; some persons imprisoned in these three countries are not included in the countries' prison population totals because they are held in prisons in Austria, France and Italy respectively.

8 An Empirical Approach to Country Clustering

Paul Smit, Ineke Haen Marshall and Mirjam van Gammeren

8.1 The importance of the classification of countries

There are – by the most recent count –about 200 nation-states in the world. These 200 countries vary in almost any dimension one can imagine: location, climate, size, language, religion, density of population, level of literacy, economic development, criminal justice resources, legal system and, of course, crime. An important first step in understanding crime in a global perspective is to somehow organize the large number of countries into more manageable groupings. That is – first and foremost – a purely *practical* matter. It is simply not possible to provide detailed descriptions of some 200 countries individually and make sense out of it all. Hence, researchers, policy makers and government officials tend to simplify the complex reality by grouping the large set of individual countries into a smaller set of country clusters. Secondly, in addition to providing an important ordering and simplification function, classification of countries has important *theoretical* relevance. For instance, differences in crime patterns found between country clusters are assumed to be linked to particular (cultural, political, socio-economic or demographic) characteristics shared by the countries which are grouped together in a cluster (see Marshall 2002). We will elaborate on this theoretical point below. The current chapter explores the implications of the classification of countries for comparative analysis based on the 6-9th UN Crime Trends Surveys for Europe and North America. We start this chapter by first providing a brief background discussion on country clustering.

Dividing the world by geographical *continents* (i.e. Europe, North America, Central America, South America, Asia, Africa and Oceania) is the most simple and most frequently used approach in grouping countries together. This classification is used, for example, by the World Bank. In some of its publications, the United Nations divides the "world macro regions and components" into continents, further refined by location (i.e. Africa: Eastern Africa, Middle Africa, Northern Africa, Southern Africa, Western Africa; or Asia: Eastern Asia, South Central Asia, South Eastern Asia, and Western Asia). The World Health Organization, in the 2002 publication *World Report on Violence and Health* (WHO 2002) groups countries into those of the European region, region of the Americas, South-East Asian region, Eastern Mediterranean region, African region, and the Western Pacific region. In the *World Report*, the WHO further subdivides these regions by low-income, middle-income, and high income countries. Another example is the classification of countries used by the International Crime Victim Survey: The ICVS has employed Western

Europe, Central and Eastern Europe, Africa, Latin America, Asia and the New World as their device of grouping countries together (e.g. Van Dijk 1999, 26) A few more examples will be discussed in the next section.

It is important to realize that the different country classifications have important implications for the kind of comparisons that may be made. For example, Australia is either considered part of Oceania (together with New Zealand, but also with Melanesia, Micronesia and Polynesia); or part of the Western Pacific Region (WHO) (together with Japan and China, for example), or part of the New World (ICVS) (with the US, Canada, and New Zealand). It is obvious that using the US, Canada, and New Zealand as a comparison group (for Australia) differs tremendously from comparing Australia with Japan and China. Or, to take yet another example, the United States is either considered to be part of North America (UN), or part of the Americas (WHO) (together with Canada, the Caribbean, Central and South America), or part of the New World (ICVS) (together with Canada, New Zealand and Australia). Again, the implications for the different sets of comparisons that can be made should be obvious.

Geographic proximity (such as the use of continents, or subcontinents) is probably the most popular and frequently used criterion to cluster countries. Sometimes overlapping with geographic proximity is the use of classifications based on socio-economic theories. Using the Human Development Index (HDI) is one such example: it reflects the assumption that there is a link between level of human development (which tends to be tied to particular world regions) and other social phenomena such as level of violence, corruption and crime. The United Nations often employs the HDI to group countries; routinely comparisons between 'developing' countries versus 'industrial' countries are made (See Newman 1999).

Certain cross-national (comparative) crime theories can only be tested if the country clusters reflect the theoretically important concepts. For instance, tests of modernization theory tend to group countries based on their level of economic development and urbanization (Shelley 1981). On the other hand, institutional anomie theory classifies countries by their levels of social welfare protections (Messner and Rosenfeld 2007). Criminologists who want to test Marxist world system theory distinguish three groups of nations reflecting their position in the global market system: countries belong either to the core, semi-periphery, or periphery (Shannon 1992). Sometimes countries are grouped together by their legal tradition or legal culture (see for example Nelken 2000), reflecting the assumption that these countries share a set of meaningful common characteristics resulting in distinct patterns of informal social control, the nature and extent of behaviour labelled as criminal, and level of penetration of the law into everyday life (e.g. compare countries under Islamic Sharia law with secular western countries under the civil law system). On a more general level, large cultural configurations, 'civilizations' or 'world cultural domains' have been the core organizing tools of scholars interested in issues related to ancient and current global history and international relations (for example Bagby 1958; Braudel

(1963/1987); Huntington 1997). Some proponents of this perspective claim that there is reasonable empirical support for the existence of seven or eight separate current cultural domains in the world (i.e., Sinic, Japanese, Hindu, Islamic, Orthodox Christianity, Western Christianity, Latin American and African). Following this line of reasoning, it is possible to place almost all countries in the world into one of the 7 or 8 cultural groupings. An example from the field of criminology is Marshall's work adopting a revised version of Braudel's cultural world regions to explore global homicide patterns (Marshall 2002). From a somewhat different angle, there is a fast-growing body of research which uses the World Values Survey to empirically cluster countries in groups, sometimes – but not always - supporting the existence of particular cultural regions (Inglehart et al. 2004).

Another rationale behind grouping countries is illustrated by the work done by Butchart and Engstrom who wanted to test whether relations between economic development, economic inequality, and child and youth homicide rates are sex- and age- specific, and whether a country's wealth modifies the impact of economic inequality on homicide rates (Butchart and Engstrom 2002). They "grouped the study countries into four arbitrarily defined levels of violence by age-standardized homicide rates among 0-24 year olds" (2002, 799). Specifically, they used four groups: high violence countries (homicide more than 10 per 100,000, medium violence countries (3-9.99), low violence countries (1-2.99) and very low violence countries (less than .99), and they examined how a set of independent variables were related to age- and sex- specific homicide rates in these four country clusters. In this particular example, the authors employed one variable (homicide rate), and used arbitrary cut-off points to form the four clusters.

We will conclude this brief overview with perhaps one of the best-known examples of a clustering of countries with a clear theoretical rationale, Esping-Andersen's *The Three Worlds of Welfare Capitalism* (Esping-Andersen 1990). Although Esping-Anderson's clustering has nothing to do with crime or justice, his is an important example of a theoretically-based classification of western countries. This is basically a typology of welfare states.[1] Based on qualitative analysis, he categorized advanced capitalist societies into three types of institutional arrangements, each designed to reconcile economic development with measures to protect citizens against the risk of the market place: the conservative corporatist welfare state (particularly in Germany and Austria), the liberal welfare state (primarily in Anglo-Saxon countries), and the social democratic welfare state (in the Scandinavian countries). Esping-Andersen' model was further elaborated by others by adding a fourth type

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[1] A clarifying comment needs to be made at this point. What we refer to as (empirical) grouping, clustering, or classification (of countries) sometimes is referred to as using or creating (conceptual) typologies (of countries). Thus, we may draw from the large body of work on creating typologies.

to the typology, that they called "Latin' or southern, because it was found mainly in Southern European countries. Several subsequent analyses have been done to attempt to come to a quantitative confirmation of the relevance of this particular clustering of countries (see, for example, Saint-Arnaud and Bernard 2003) – an endeavor paralleling ours in the current chapter. Indeed, a major focus of the following analysis centers around the usefulness of an elaboration on Esping-Andersen's country clusters by the Finnish researcher Lappi-Seppälä (Lappi-Seppälä 2007).

To summarize our argument thus far: Classification (or grouping/clustering) of countries for descriptive and/or analytic purposes is a pervasive practice in comparative work; the classification criteria used have important theoretical and pragmatic implications; there is a need to become much more explicit about the rationale behind country clustering. The next section briefly describes how we attempt to problematise the practice of country clustering employed in comparative analysis using Europe and North American crime and justice data.

8.2   Commonly used country groupings in European and American research on crime and justice

Although the preceding discussion focused on how to simplify (global) comparisons between and among some 200 countries, similar reasoning underlies the need to employ classification devices when conducting comparative analysis with a smaller number of countries. A case in point is Europe, a continent which comprises about 50 individual countries. Some observers have argued that it is appropriate to conceive of 'Europe' as a distinct cultural entity (which thus may be contrasted with North America, or Africa), while others have noted that deep-seated national differences within Europe are of crucial significance. For example, Van Swaaningen (1997, x) argues with regard to Western Europe that "[…] nowhere in the First World does such a diversity occur in such small geographical area. A multiplicity of nations with differing political systems, legal cultures and social structures exist next to each other." The heterogeneity of Europe is illustrated by the prevalent use of several well-established regional country clusters within Europe (Scandinavia or the Nordic countries, Southern Europe, former socialist countries, and so on). However, even within these more homogeneous clusters, adjacent individual countries vary significantly in many ways (for example, Sweden and Norway, or Switzerland and Germany).

An additional complicating factor is that – often (and also in our current exercise) – Europe is contrasted with 'America' (narrowly interpreted to mean the United States; sometimes it includes Canada, but rarely ever Mexico although theoretically this is part of North America). Although it may be questioned whether it makes sense to attempt sweeping comparisons between one (or two) particularly large nation-states (North America) and an aggregate of individual nation-states (Europe), it is done all the time. Almost since its very foundation, it has

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been believed that America is unique, and that it in crucial ways is different and distinct from other western countries (Lipset 1991, 1; cited in Marshall 2001). The assumption is that there are peculiarly American approaches to major social sectors – to government, to the economy, to culture, religion, to education, and to public policy and to their interaction in the larger society around them (Shafter 1991, viii; cited in Marshall 2001). Countless books and articles have been written by (mostly European) observers emphasizing the differences in behaviours and institutions between Europe and the US. Although often 'Europe' is contrasted with 'America', there are also numerous occasions where Europe and North America are grouped *together,* based on perceived commonalities (such as level of economic and social development, shared cultural heritage, and so on). Indeed, a considerable part of research and theorizing on social issues (including crime and justice) tend to focus on 'western' developed countries, which automatically invites comparisons between 'similar' (i.e. western and developed) countries in Europe and North America. Frequently, however, North America (in particular the US) is placed in a separate category because it is considered such an 'outlier' that it will distort the picture (i.e. the US figures will dominate the outcome). From the several different examples of country groupings that exist (see, for example, Vogel 2003), we have selected two classifications for closer scrutiny. The first, and perhaps the most simple is the politically based clustering of countries primarily based on their membership in the EU, with a secondary basis in other political or regional considerations (i.e. the addition of Russia) (see Table 8.1). This classification is referred to in Table 8.1 as the 'hybrid EU-based classification' (or 'EUb'). It subdivides Europe, North America and some adjacent Asian countries into five clusters. The first cluster consists of the 'old' EU member states (referred to as EU15[2]); the second cluster includes those states that became EU members after 2004 and the EU candidate countries (referred to as EU12+). The third cluster consists of a small group of five countries (Iceland, Norway, Monaco, Vatican City and Switzerland) that do not belong to the EU, but can be seen as part of Western Europe. This cluster is referred to as 'other West'. The fourth cluster ('other East') exemplifies the 'hybrid' and fluid character of this classification; Central and Eastern European Countries (CEE) initially referred to Economies in Transition in Central and Eastern Europe and included a number of countries which now belong to the second cluster EU12+ (such as Czech Republic, Poland, Slovakia and Slovenia). The US and Canada make up the fifth category.

The second example taken from Lappi-Seppälä (2007) and referred to as 'L-S' in the remainder of this chapter is an elaboration of Esping-Andersen and has a strong conceptual foundation. [See second column in Table 8.1]. Lappi-Seppälä argues that this classification system takes into account a number of unifying and separating factors (e.g. social welfare

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[2] If one counts the UK as three (England & Wales, Northern Ireland, and Scotland), it makes more sense to talk about EU17.

investment, income inequality, geography, political traditions and orientations, and history and cultural traditions) in a fairly balanced way (Lappi-Seppälä, personal communication, February 26th, 2008). Lappi-Seppälä's work on the relationship between welfare regimes and penal policies expands on Esping-Andersen by adding several additional clusters. He distinguishes six clusters: (1) a Northern European cluster, (2) a Western European cluster, (3) Mediterranean Europe, (4) Anglo Saxon countries, (5) the Baltic countries and (6) Eastern Europe. See Table 8.1 for a detailed description of which countries belong to which clusters.

Table 8.1. The 'EUb' and 'L-S' classifications

EU based classification: 'EUb'	Lappi-Seppälä: 'L-S'
EU15	*Northern Europe*
Austria	Denmark
Belgium	Finland
Denmark	Iceland
Finland	Norway
France	Sweden
Germany	
Greece	*Western Europe*
Ireland	Austria
Italy	Belgium
Luxembourg	France
Netherlands	Germany
Table 8.1 continued	
Portugal	Luxembourg
Spain	Netherlands
Sweden	Switzerland
UK: England & Wales	
UK: Northern Ireland	*Mediterranean Europe*
UK: Scotland	Cyprus
	Greece
EU12 and candidates	Italy
Bulgaria	Holy See (Vatican)
Croatia	Malta
Cyprus	Monaco
Czech Republic	Portugal
Estonia	Spain
Hungary	Turkey
Lithuania	
Latvia	*Anglo Saxon countries*
Macedonia, FYR	Canada
Malta	England and Wales
Poland	Ireland
Romania	Northern Ireland
Slovakia	Scotland
Slovenia	USA
Turkey	
	Baltic countries
other West	Estonia

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Holy See (Vatican)   Lithuania
Iceland   Latvia
Monaco
Norway   *Eastern Europe*
Switzerland   Albania
                                 Armenia
other East   Azerbaijan
Albania   Belarus
Armenia   Bulgaria
Azerbaijan   Czech Rep
Belarus   Croatia
Georgia   Georgia
Kazakhstan   Hungary
Kyrgystan   Kazakhstan
Moldova   Kyrgystan
Russia   Moldova
Ukraine   Poland
                                 Romania
USA and Canada   Slovakia
Canada   Slovenia
USA   Russia
                                 Ukraine

What these classification schemes have in common is that they are based on explicit or implicit assumptions about within-cluster commonalities and between-cluster differences that are useful in comparative analysis of crime and criminal justice. This gets at the very heart of the cross-national approach: Comparative research is concerned with exploring "questions of difference and sameness – whether the crime patterns of the comparative countries are similar or distinctive and what this says about the wider culture and structure of societies" (Young 2008, 56).[3]

8.3   Purpose of this chapter

In the remainder of this chapter we use an explorative data analysis technique (Categorical Principal Components Analysis or CATPCA) to determine empirically the degree to which two existing country classifications ('EUb' and 'L-S') reflect a reasonable approach to country grouping and to use the empirical results to improve on one or both classifications without violating the conceptual idea (geographical, geopolitical, cultural) behind these classifications. That is, we are trying to

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[3] There are two fundamental approaches as to the question of which countries are suitable for comparison. The 'most different' approach looks to include countries whose structure and culture are as unlike one another as possible, whereas the 'most similar' approach seeks to compare countries that are alike one another in these regards (Westfeld and Estrada 2008, 19; see also Marshall and Marshall 1983).

obtain a quantitative confirmation of the relevance and plausibility of these two classifications of countries which have been used in prior work on comparative crime and justice. We will be using a large number of indicators to reflect different aspects of crime and justice, giving all of them the same weight. Thus, primarily the empirical associations that emerge among these indicators will dictate how the countries are grouped (cf. Saint-Arnaud and Bernard 2003). Important is that our grouping will be anchored in crime and justice-related indicators, rather than on geo-political and geographic factors. Exploring the plausibility of existing country clusters ('EUb' and 'L-S') is the primary purpose of this chapter. However, "[a] typology is useful only if we can use it do to something else" (Arts and Gelissen 2002; in Saint-Arnaud and Bernard 2003, 506). Consistent with this statement, a secondary purpose of the current chapter is to determine the interrelationship between countries and indicators, both the crime and criminal justice related variables that were actually used in the analysis and the socio-economic variables that were imported in the solution afterwards.

8.4   Methodology

In this paragraph we will explain what steps are taken in our analyses and why CATPCA was chosen as the statistical method used. A detailed description of this method can be found in appendix 8.2. Next, we will describe the variables used and why we decided to use these (and not other) variables.

The analysis

The first step in the analysis is to determine relative positions of countries in relation to each other based exclusively on the scorings on crime and criminal justice related variables. The idea is to identify which countries are close to each other (i.e. correlate in their scorings on the variables used) and which countries are not like each other.

In the second step we determine how two existing classification schemes of countries (the 'EUb' and 'L-S' classifications as mentioned in 8.2) relate to the findings of the first step in our analysis. Are countries that are positioned in the same cluster in the 'EUb' or 'L-S' classification indeed close to each other in respect of the scorings on their crime and criminal justice variables? Do those clusters form homogeneous groups of countries?

As a result of this step a choice will be made to use either the 'EUb' or the 'L-S' clustering as a starting point for the remainder of our analysis.

In the third step of our analysis, the clustering resulting from the second step will be refined by combining clusters and also by moving countries from one cluster to another. Primarily this is done based on empirical findings (i.e. the relative country positions derived in the first

analysis step). However, it is important to realise that relying solely on empirical results to decide on a classification is not satisfactory and could give unrealistic results. As an example: although – as will be shown below - empirically Hungary was placed near to the USA in some of our analyses it would be counter-intuitive to place them in the same cluster, because – as was mentioned in paragraph 8.3 – we want to keep some conceptual idea (geographical, political, cultural) as a guiding principle for the clustering. Having said that, there are still many empirical decisions to be made within such a conceptual context: "does it make sense to have a separate 'Anglo-Saxon' category if our guiding principle is cultural", or "where exactly can we draw the line between 'West' and 'South' geographically spoken". These are exactly the kind of questions that we want to answer in this part of the analysis.

In the fourth and last analysis step we will address the question of in what way the clusters are different from each other in respect to the country scorings on the variables. In other words: what values of which variables cause clusters to be different? This will be done for the crime and criminal justice variables used to determine the relative positions of countries (and clusters), but also for other, socio-economic variables like income, unemployment rate, and educational expenditures[4].

The choice of CATPCA

Essentially the purpose of this chapter is – by using crime-related variables – to look at the empirical plausibility of existing clusterings of countries as described in paragraph 8.2, and to use these empirical findings to make amendments to those clusterings.

This means that while there are other techniques aimed specifically at clustering (e.g. Latent Class Analysis, see McCutcheon 1987), we decided to use a more explorative technique like CATPCA, because we did not want to mechanically determine clusters of countries but are more interested in the relative positions of countries in relation to each other and the variables used in our analysis. And CATPCA does precisely that: it constructs a n-dimensional solution space in which both countries and variables are placed. And although the technique is explorative, the way we use it still has a clear theoretical basis by the choice of the variables used, i.e. *only* crime and criminal justice related variables.

The following characteristics of CATPCA make this technique particularly suitable for our purpose. Firstly, as mentioned above, CATPCA gives the opportunity to explore the relative position of countries and variables and the interrelationship between countries and variables in the solution space, which is precisely what we want to do in

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[4] Actually, these socio-economic variables do not 'cause' the differences between countries and clusters because they were not used in determining the relative positions of countries. But countries do score on these variables and the differences of these country scores can be seen also in relation to the clusters chosen.

step one and four of our analysis. Secondly, it is possible to evaluate the theoretically (e.g. based on geopolitical factors) determined classifications and see how they fit in the solution space. This is step two in our analysis. Thirdly (this is purely a technical reason, but also very important in view of the fact that missing values are a huge problem in international data sets), CATPCA is very tolerant towards missing values. This is important because there are countries and variables (such as victim survey related variables) in our dataset with many missing values. In the fourth place, CATPCA gives the possibility to use ordinal data instead of numerical data. Lastly, with CATPCA it is possible – as we want to do in step four of our analysis – to use variables in a passive way, i.e. variables that have not been used in constructing the solution but are positioned in the solution space anyhow. In this way variables that are not directly crime related (such as unemployment, income etc.) can be examined in relation to countries, in relation to the original crime-related variables and in relation to the chosen classifications.

The variables used

We consider two sets of variables. The *active* variables are the variables that are used to compute the solution, the *passive* variables are not. However, the passive variables are placed in the solution space afterwards to see how they relate to the objects (countries), the active variables and the other passive variables. Obviously, the solution we find is highly dependent on the choice of the active variables used. Because our aim was to see how existing classifications of countries behave when looking at crime and the way countries react to crime, the first decision we made was to restrict the active variables to those variables that are directly related to crime and the criminal justice system only. All other variables (socio-economic variables such as income, education level etc.) were used passively.

The following considerations were used in the choice of variables:

- We did not want too many variables: the more variables, the more complicated the interpretation of the results would be.

- The set of variables should cover as many aspects of crime and criminal justice as possible, such as number of victims, recorded crime, suspected offenders, convictions, prison population. But also resources, 'non-traditional' crime and opinions of the public.

- There should be some variables giving information on the trends over the last few years.

- Although CATPCA will handle missing values in a correct and neutral way one should be very careful with variables with too many missings, in particular when mostly the same countries have the missing values on these variables.

- When two variables are obviously and strongly correlated the solution could be dominated by these two variables. This was indeed the case

with the variables 'recorded theft' and 'recorded violent crime'. Replacing the violent crime variable with 'recorded homicide' resulted in a more heterogeneous variable set. A similar argument was used to use ratios (e.g. the number of suspected offenders divided by the number of recorded offences) instead of direct measurements.

This resulted in a set of 18 active and 9 passive variables listed in Table 8.2.

Table 8.2. Variables used

	Variable	Description
Active variables		
1	vict	Total victimization, incidence rates
2	theft	Recorded thefts
3	homicide	Recorded homicides
4	susp/rec	The number of suspected offenders divided by the number of recorded offences
5	conv/susp	The number of convicted offenders divided by the number of suspected offenders
6	pris	Number of prisoners
7	juv	Percentage of juvenile suspected offenders
8	fem	Percentage of female suspected offenders
9	sat	Satisfaction with the police
10	unsafe	Feelings of unsafety
11	corrup	Corruption index
12	pol	Number of police
13	judges	Number of professional judges
14	theft-g	Change in recorded thefts, 2000-2004
15	viol-g	Change in recorded violent crime, 2000-2004
16	pris-g	Change in number of prisoners, 2000-2004
17	juv-g	Change in percentage of juvenile suspected offenders, 2000-2004
18	pol-g	Change in number of police, 2000-2004
Passive variables		
19	gdp	Gross income per capita
20	gdp-g	Change in gross income per capita, 1990-2004
21	unempl	Unemployment rate
22	yunempl	Youth unemployment rate
23	hdi	Human Development Index
24	gini	Income distribution (low=more equal distribution)
25	pubed	Expenses on education
26	gdi	Gender related development index
27	sosexp	Social protection expenditure

The variables 1-13 refer to the year 2003. This year was chosen instead of 2004 (the last available year) because there were fewer missing values for 2003. For the variables 14-18 the mean annual change over the period 2000-2004 was calculated, using all but at least two years in this period that had no missing values. The variables 1-6 cover a variety of aspects of crime and the criminal justice system. Except for recorded crime, where a property crime (all theft) and a violent crime (homicide) were chosen, total crime was used. This was for practical reasons, selecting specific crime types would have resulted in too many missing values. The variables 7, 8 and 17 give information on offender characteristics. Since the percentage of female offenders is fairly stable in time, changes were

only taken for juvenile offenders. In order to get a more comprehensive picture, some variables were added on criminal justice resources (12, 13 and 18) and opinions and feelings of citizens on crime (9 and 10). Finally, we used only 3 values for each variable: low, medium and high. See also appendix 8.1 for a discussion on the variables used.

8.5   Results

In this paragraph the results of the CATPCA analysis are presented and discussed. First we look at the implications of the analysis for the clustering of countries. This was the primary goal of the research in this chapter. Next, the interrelationship between countries and variables will be discussed, both the crime and criminal justice related variables that were actually used in the analysis and the socio-economic variables that were imported in the solution afterwards.

Country clusterings

Before the first analysis was executed we decided to leave some countries out for two reasons. Either because they were too small (as a result Vatican City and Monaco with less than 100,000 inhabitants were left out) or they had too many missing values. This was the case for Kazakhstan, Armenia and Macedonia, even after using other sources and interpolation of figures (see appendix 8.1). This left us with 44 countries.

Also the choice was made to use a 2-dimensional solution space. Not only is a 2-dimensional solution easier to present, it was also to be expected that higher dimensions would not contribute much to the solution[5]. However, we did look at the 3-dimensional solution afterwards to see if either unexpected results in the 2-dimensional solution could be explained in the third dimension or to ensure that decisions (on the clustering) were also supported when taking the third dimension into account.

The results of the first step in our analysis, where the countries are positioned in the 2-dimensional space in such a way that countries that score very differently on the crime and criminal justice related variables tend to be placed far apart, can be seen in Figure 8.1.

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[5] Based on experiences with other research where CATPCA was used. And this was also confirmed numerically when the analysis was done in three dimensions.
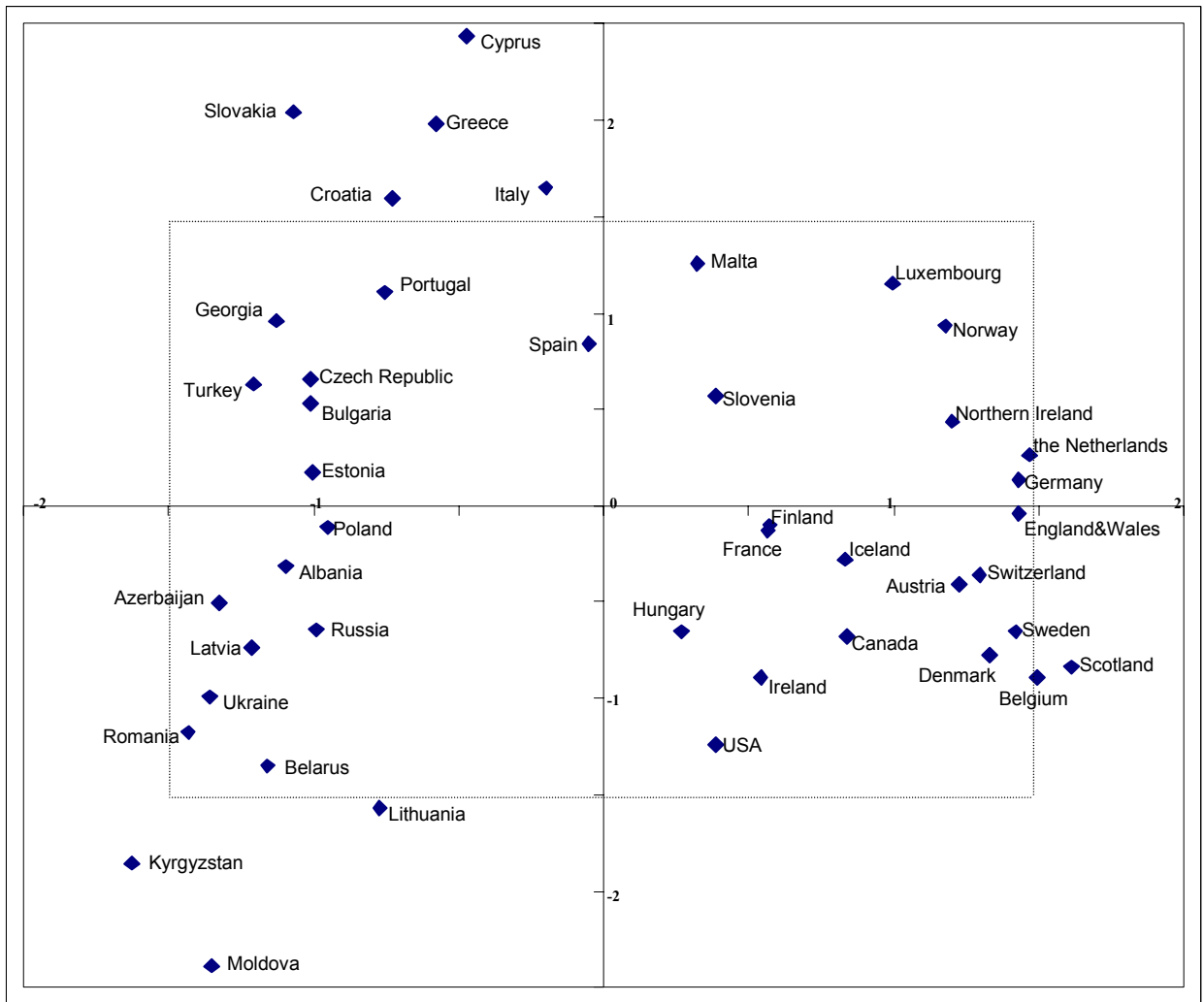
Figure 8.1. Country positions in the two-dimensional solution space

The scale of Figure 8.1 is from -2 to +2 on the x-axis and from -2.5 to +2.5 on the y-axis[6]. This is the same scale as for Figure 8.3, however for Figures 8.2, 8.4 and 8.5 the scale is different: from -1.5 to +1.5 on both axes. The dotted lines in Figures 8.1 and 8.3 define the areas of Figures 8.2, 8.4 and 8.5.

While a discussion on a possible interpretation of the two dimensions must be postponed until the positions of the variables themselves in the solution space are shown also, it is already clear that the results are not counterintuitive. It is not surprising for example that England & Wales, Germany and the Netherlands are near to each other but far from Kyrgyzstan. And that Portugal and Spain can be found near to each other but in yet another part of the solution space.

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[6] The unity used in the figures has no real meaning. It is a consequence of the way CATPCA handles the normalisation of the category scores.

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For our second analysis step the two existing clusterings 'EUb' and 'L-S' were taken (see paragraph 8.3). The analysis was carried out again, but now with the 'EUb' and 'L-S' clusterings as passive variables. This did not change the positions of the individual countries, but this way it could be determined whether these two clusterings were discriminating between countries according to their scores on the active (crime and criminal justice related) variables and whether the individual categories (such as EU12+ or 'Anglo Saxon countries') within a clustering were discriminating compared to each other. Based on the first results (not shown here) we decided to modify the 'L-S' clustering slightly. The original 'Eastern Europe' category was by far the largest (16 countries) and the countries within this category were rather spread out over the solution space, suggesting that this was not a homogeneous category. Therefore this category was split into two categories: 'Former Soviet states' and 'Eastern Europe' (all eastern European countries that were not former Soviet states)[7].

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[7] There was also some justification for this decision in the third dimension. While 11 of these 16 countries were positioned near the origin in the third dimension, Romania and Bulgaria had large negative values and Ukraine, Belarus and Georgia large positive values.
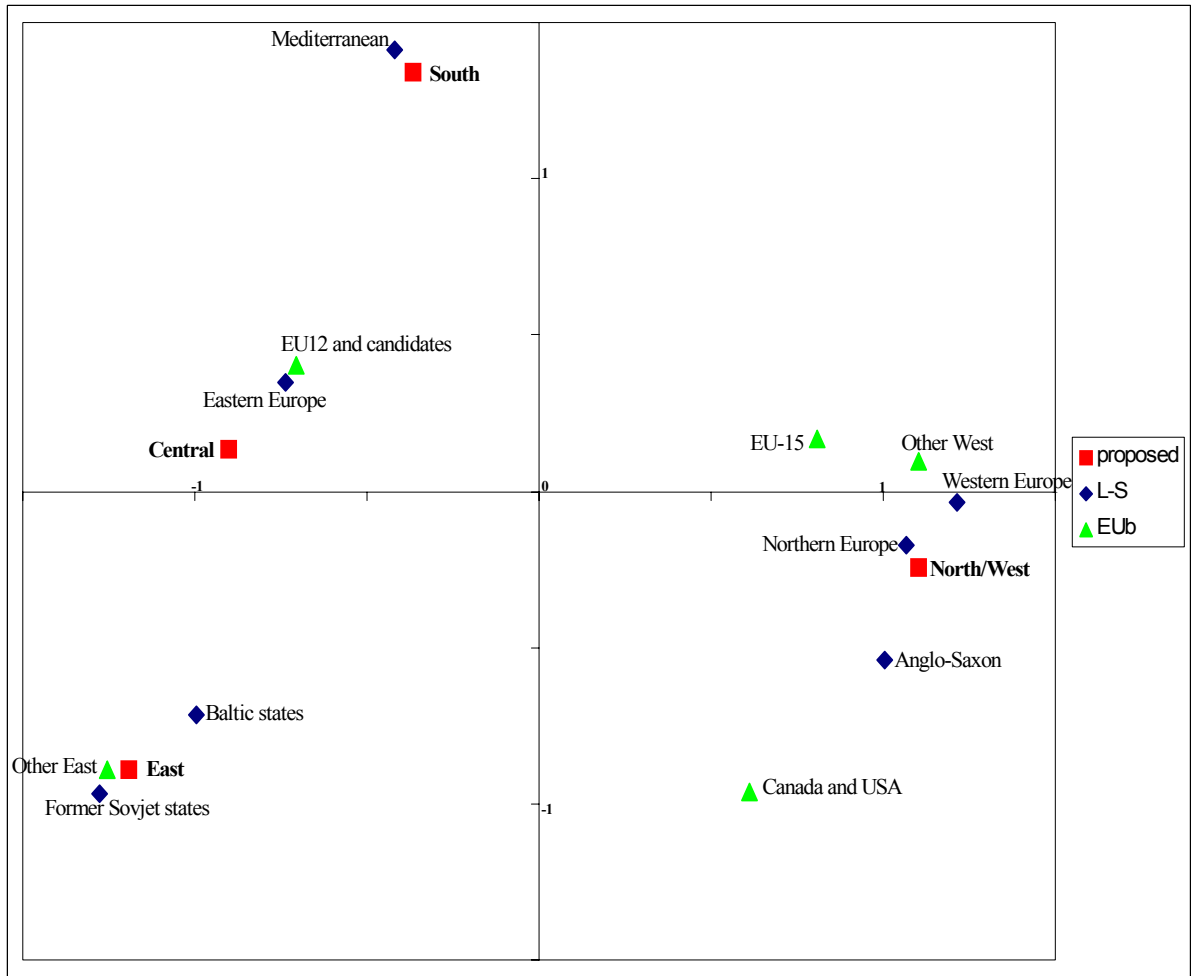
Figure 8.2. The 'EUb' and 'L-S' classifications in the solution space together with the proposed classification

The positions of the categories from the (modified) 'EUb' and 'L-S' clusterings can be seen in Figure 8.2. Both country clusterings (EUb and L-S) are indeed discriminating: if they were not, their respective categories (e.g. Anglo- Saxon or EU12+) would have been positioned near the origin. Here they are typically on a distance of about 1 from the origin. More precisely, the discriminating 'power' of a variable can be expressed numerically as a vector length with a value between 0 (not discriminating at all) and 1 (highly discriminating). For 'EUb' this length was 0.76, for 'L-S' it was 0.93.

Looking at the individual categories in 'L-S', Western- and Northern European and the Anglo-Saxon countries are very close to each other. This means that they could probably be combined without loss of discriminating power. The same holds for the Baltic states and the former Soviet states and also for the 'EU-15' and 'other Western' countries in the 'EUb' clustering.

In our third analysis step, we arrived at the following proposal for a 'theoretically-based, but empirically adapted' clustering (as is the purpose of this chapter) with four categories, i.e. 'North/West', 'South', 'Central' and 'East':

- As a starting point we used the 'L-S' classification for two reasons. Firstly, as mentioned above, the classification (with a vector length of 0.93) was more discriminating than the 'EUb' classification. Secondly, the categories resulting from the 'L-S' classification are more evenly distributed. For the 'EUb' classification the 'EU-15' combined with the 'other West' category consists of 20 countries, 'EU12 and candidates' 14 countries, 'Other East' 8 countries and 'Canada and USA' 2 countries. Whereas the four groups to be formed from the 'L-S' classification had 18, 9, 7 and 10 countries[8].

- The four categories in our proposal were basically formed as suggested from Figure 8.1 out of the 'L-S' clustering. 'Western-', 'Northern Europe' and 'Anglo Saxon' were combined into 'North/West', 'Mediterranean' was renamed 'South', 'Eastern-Europe' was renamed 'Central' to distinguish this category from the last one 'East', where the Baltic states and the former Soviet states were combined[9].

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[8] Of course it would be tempting to try to split the first (North/West) category into two categories. However, there seems to be no plausible way to do this as can be seen from the country positions in Figure 8.2. Possibly a more detailed analysis on only these 18 countries could help here.

[9] Actually, the Baltic states are of course actually former Soviet states. However, the decision to combine the Baltic states with the former Soviet states and not with the category 'Central' was made with some hesitation. Although the Baltic states were close to the former Soviet states in the 2-dimensional solution, in the 3- dimensional solution this distance was larger and actually about the same as the distance between the Baltic states and the category 'Central'. Other possibilities, i.e. to keep them as a separate category or to put them into the 'North/West' category were empirically not attractive either (see Figure 8.3.).

- For various reasons, within our modified 'L-S' classification some countries were moved from 'Central' to 'South' and vice versa. This will be discussed in the following paragraph.

The positions of the clusters in the proposed classification are also shown in Figure 8.2. And it turned out that this classification has an even better discriminating power (0.99) than the original (modified) 'L-S' classification it was based on.

Country positions

The object scores (the country positions) derived from the analysis are again shown in Figure 8.3, but now they are explicitly placed in one of the clusters of our proposed clustering scheme.
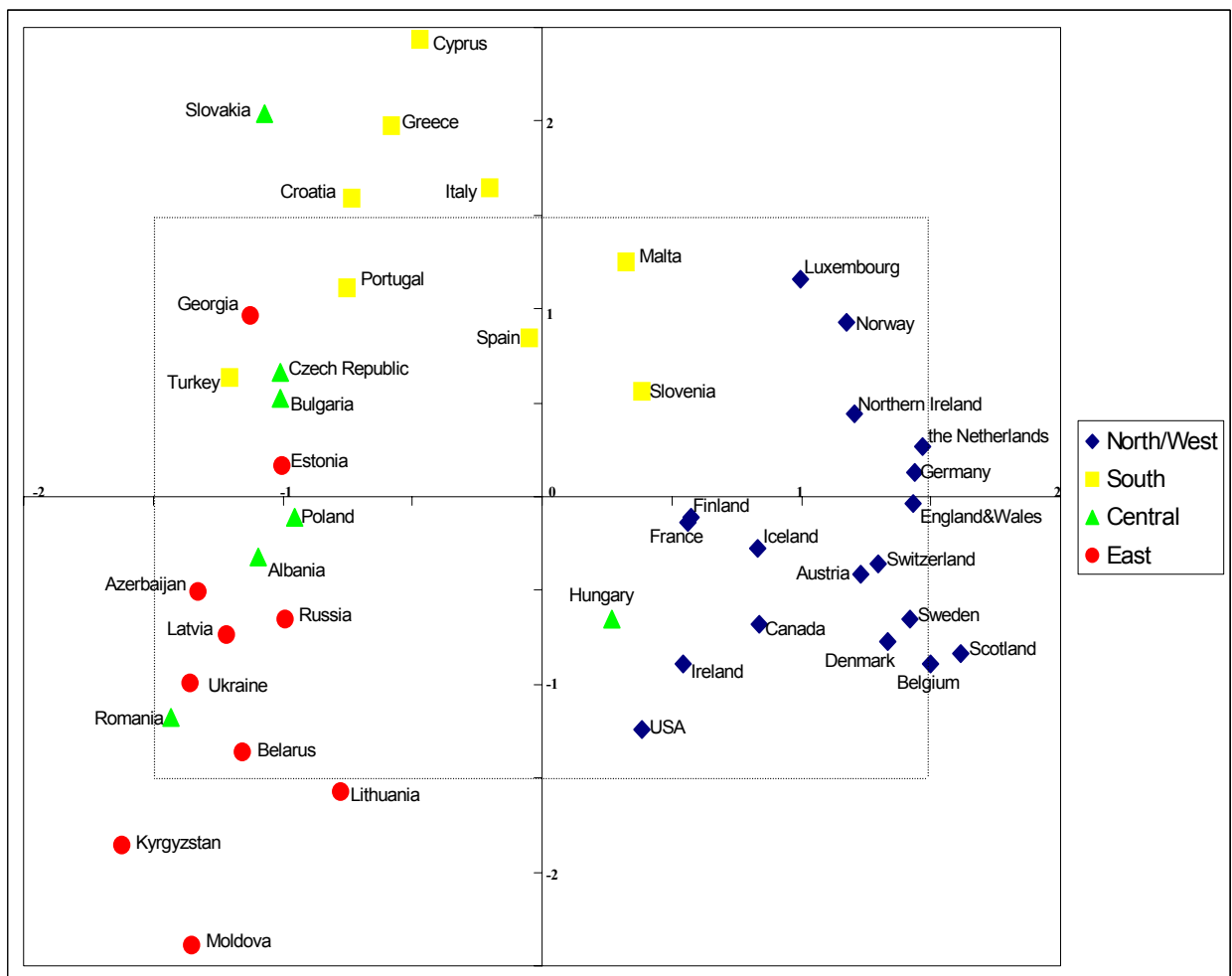
Figure 8.3. Country positions and clustering

Clearly the countries in the category 'North/West' and those in the category 'South' form homogeneous groups. Interestingly, as can be seen

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there are no obvious subdivisions *within* the category 'North/West', even though this is the category with the most countries. For example, taking 'Scandinavian' or 'Anglo-Saxon' countries together as distinct categories (as is often done) has no empirical justification in this analysis. That is, Finland, Sweden, Norway, and Denmark are not clustered together more closely than say the USA, Northern Ireland, England & Wales, Ireland and Scotland. The 'Central' and the 'East' categories are less homogeneous, with in particular Hungary and Slovakia as outliers in the 'Central' category. Although *empirically* (i.e. based on our analysis) Slovakia could be better placed in the 'South' category and Hungary in 'North/West', there was no compelling conceptual reason (geographical, political, cultural, ...) to do this.

However, there were two countries, Croatia and Slovenia, that we decided to move from the 'Central' to the 'South' category based on the findings of our analysis. The conceptual justification was mainly geographical (actually the 'South' category turns out to be in fact 'Mediterranean' which was the name of the original category in the 'L-S' classification), but also reflects the political history of the former Yugoslavian countries which is somewhat different from the other 'countries in transition' in the category 'Central'.

Also we decided to put Turkey in the category 'South', although there was no empirical reason to do this. As can be seen in Figure 8.3, Turkey could also, maybe even better, have been positioned in the category 'Central'. However, all other countries in the category 'Central' are the 'countries in transition' that used to be in the sphere of influence of the former Soviet-Union, which Turkey is clearly not. Therefore, conceptually, Turkey is better placed in the category 'South'.

The resulting clustering based on both the original 'L-S' classification and the empirical findings in our analysis can now be defined (or conceptually described) as follows:

• First, all countries that used to be Soviet states are placed in the category 'East'.

• Secondly, all 'countries in transition' i.e. all countries that used to be in the sphere of influence of the Soviet Union before the 90's are placed in the category 'Central'. The former Yugoslavian countries are not in this category.

• The remainder of the countries are divided in two categories 'North/West' and 'South' on geographical grounds only. With 'South' meaning south of the Pyrenees and the Alps. The USA and Canada are placed in the category 'North/West'.

Using this scheme it is now also possible to include those countries that were not part of the analysis (see Table 8.3).

Summarizing the decisions on clustering that were made, we started with two existing classifications and then used our analysis to choose between these two classifications and to modify (by combining or

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dividing categories and by replacing some countries) the chosen classification. This was done in such a way that the resulting classification was also conceptually sound. Needless to say, the mixing of conceptual and empirical justifications for making decisions about assigning particular countries to different country clusters requires a precarious balancing act – an issue which we will further address in the final paragraph of this chapter.

The variables in the solution

It is important to realise that the findings as presented in Figures 8.1-8.3 and the resulting classification are exclusively based on the scoring of countries on crime and criminal justice related variables. The obvious question to ask is now how these variables have contributed to the solution (in CATPCA terms: where are the variable categories placed in the solution space) and if we can give a sensible meaning to the (two) dimensions in the solution space.

The positions of the variables (or, more precisely, two of the three possible values of the variables, i.e. 'high' and 'low') are shown in Figure 8.4.

Figure 8.4. The active variables in the solution space

italic small type   low score on this variable
bold larger type   high score on this variable

The scale of Figure 8.4 is again the same as in Figure 8.2, between -1.5 and +1.5 on both axes. The farther away a (value of a) variable is from the origin, the more it has contributed to the solution[10].

Looking at the variables derived from victim surveys (i.e. *vict* – total victimization, *sat* – satisfaction with the police, and *unsafe*– feelings of unsafety) it must be kept in mind that there are some missing values for these variables, in particular for countries in the 'East' category. This is why the values are mainly placed near the other three categories (i.e. South, North/West and Central). In general, high satisfaction with the police, a high number of victims and low feelings of unsafety are characteristics for the countries in 'North/West'. Low victimisation is very close to the origin (which means that this variable does not contribute much to the solution), but high feelings of unsafety and low satisfaction with the police are close together and farther removed from the origin in the solution space and apparently characteristics of many countries in 'South' and 'Central'.

It is noteworthy that a high number of police (*pol*) is also close to high feelings of unsafety and low satisfaction with the police. Looking at the location of the low value of the number of police (in italics in Figure 8.4) and the (roughly comparable location of the) high value of the *change* in the number of police (*pol-g* – in bold in Figure 8.4)), a possible interpretation may be that at least some of the countries in 'North/West' are increasing their lowly staffed police force. Both values (high and low) for the number of judges (*judges*) are near the origin, which makes it difficult to draw any conclusions for this variable.

Recorded theft (*theft*) follows a clear 'North/West' (high) versus 'Central' and 'East' (low) pattern. Looking at the *change* in recorded theft (*theft-g*) (but also in the almost identically positioned change in recorded violent crime- *viol-g*) the values are perpendicular to recorded theft, meaning that there is probably no correlation between the two. On the other hand, the recorded homicide variable (*homicide*) appears to be a strong discriminator, with high levels of homicide in 'East' countries and low levels in many 'South' and 'North/West' countries.

Although (or maybe because of) the number of recorded theft[11] is low in many countries in 'East' and 'Central', the proportion of suspected offenders per recorded offences (*susp/rec*) as well as the proportion of convicted per suspected offenders (*conv/susp*) is high in these countries. It

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[10] If for example a variable does not correlate with any of the other variables, it would be placed near the origin.
[11] Actually, and more to the point in this respect the *total* number of recorded crimes follows very much the same pattern as the number of recorded thefts.

is possible that this accounts for the observation that the number of prisoners (*pris*) is also high in the East and Central clusters. However, the *change* in the prison population (*pris-g*) is almost exactly the inverse of the level variable of the number of prisoners, suggesting that the differences in prison population between countries are lessening.

Countries in 'South' and 'Central' can be characterised by a low proportion of juvenile (*juv*) and female offenders (*fem*) (and also a low change in the juvenile offender population *juv-g*) in contrast to the 'North/West' countries with higher proportions of juvenile and female offenders. Finally, examination of Figure 8.4 suggest that high levels of corruption (*corrupt*) are typical for the East and Central clusters, whereas North/West countries report fairly low levels of corruption

In addition to examining the interrelationship between countries (more precisely, country clusters) and criminal justice-related indicators, one of the goals of this chapter is to explore the role of commonly-used socio-economic variables that were imported in the solution afterwards. These socio-economic variables that were positioned in the solution although they were not used in the construction of the solution can be found in Table 8.2 (passive variables). These variables can be seen in Figure 8.5.
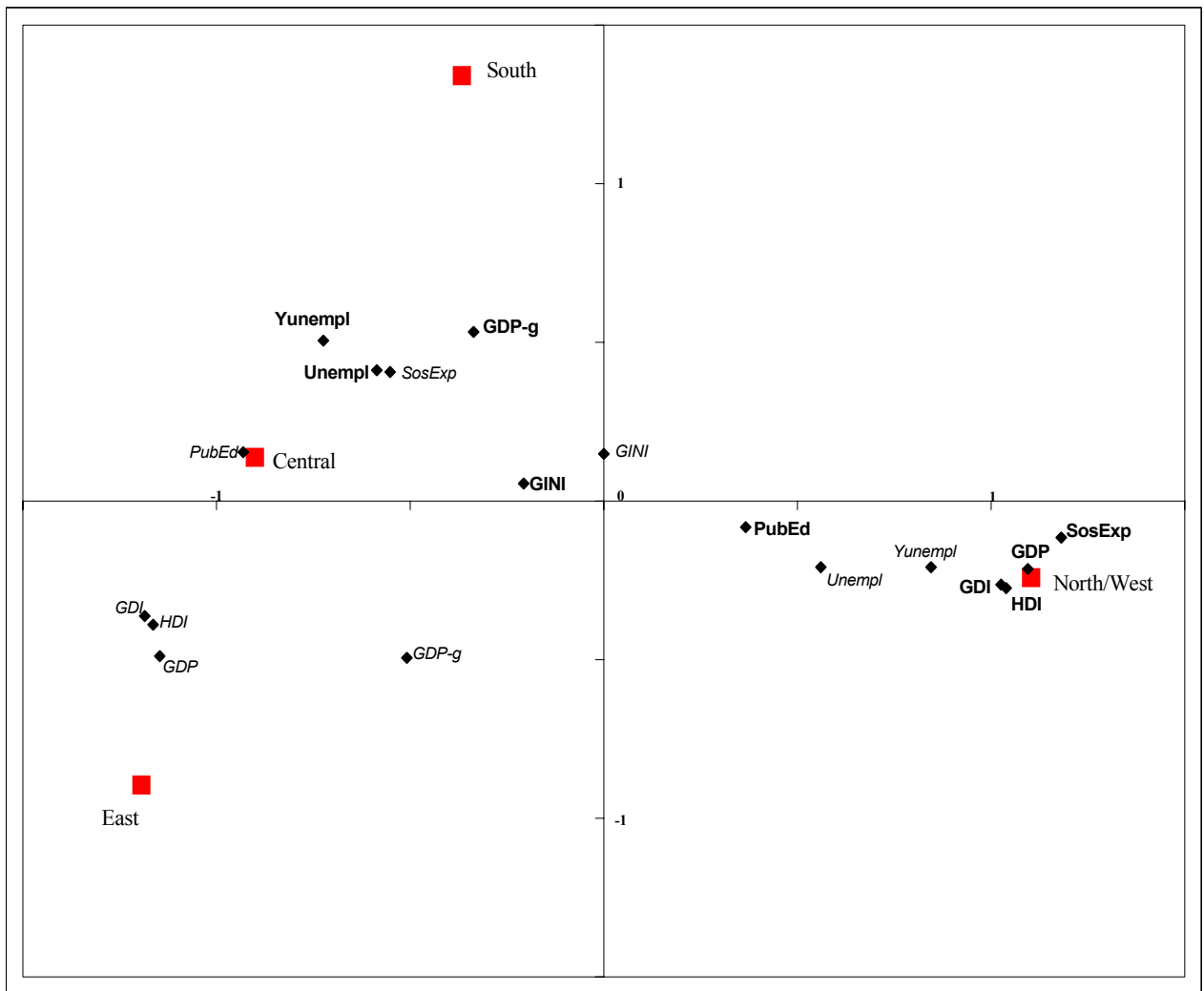
Figure 8.5. The passive variables in the solution space

italic small type   low score on this variable
bold larger type   high score on this variable

The variables *GDI* (Gender related development index), *HDI* (Human development index) and *GDP* (Gross income per capita) are almost identical in the figure (i.e. the high values virtually overlap one another in the bottom right quarter of Figure 8.5, and the low values do the same in the left bottom quarter of Figure 8.5). This means that when looking at countries from a crime and justice perspective these variables can be seen as one variable. High values relate strongly with 'North/West', low values with 'East' and 'Central'. The GDP growth variable is somewhat differently oriented with high values mainly for countries in 'South' and 'Central'.

The *GINI* variable (Income distribution) is very near the origin, no conclusions can be drawn from this. The expenses variables (*PubEd* and *SosExp*) have low values in 'Central' and high values in 'North/West'. Also low unemployment can be seen in 'North/West' whereas high unemployment can be found in 'Central' and possibly 'South'.

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Discussion and interpretation of the results found

Based on Figures 8.4 and 8.5 we can now try to list some characteristics of the four groups of countries. The 'East' countries are characterised by a high number of prisoners, homicides and a large proportion of convictions among suspected offenders. Also, the 'East' countries share with the 'Central' countries a low GDI/HDI/GDP. In the 'Central' countries we find high corruption, a low recorded theft rate (actually, although this was not a variable considered, also a low recorded *total* crime rate) but a high number of suspected offenders per recorded crime and fewer females among the suspects. The 'Central' group also has high unemployment rates, total as well as juvenile. Although the 'South' countries form a clearly distinct group, there are no obvious characteristics that uniquely characterize these countries. Possibly a high number of police, low satisfaction with the police, high level of feelings of unsafety and a low proportion of juvenile offenders may be considered belonging to the 'South' countries, but these characteristics are probably shared with the 'Central' countries. For the 'North/West' countries there are quite a few characteristics: high recorded theft and high victimisation rates contrast with low feelings of unsafety, low corruption and high satisfaction with the police. In the 'North/West'' cluster, the GDI/HDI/GDP are high and (youth) unemployment low.

Now, putting the main theme of this chapter – clustering of countries into meaningful categories – aside and looking only at the variables in Figures 8.4 and 8.5 (and not at the clustering or the country positions in Figure 8.3) we may make the following observations:

• Often objective variables seem to contradict subjective variables. High crime rates (from victim surveys and recorded rates) correlate with low feelings of unsafety. Also, a higher number of police apparently does not contribute to satisfaction with the police or to higher feelings of safety.

• Obviously and not surprisingly there is a strong relation between level of corruption and the level of income of countries.

• Somewhat unexpectedly, a high youth unemployment is correlated with a low proportion of juvenile offenders. This could be an artefact of the way the variables are defined: although the relative number of juvenile offenders is low, the absolute number could be high.

• CATPCA enables to interpret a few components (the x- and y-axes in our case) instead of a large number of variables. Unfortunately, the x- and y-axes are hard to interpret. It is possible that if there are meaningful dimensions they do not follow these axes exactly. One dimension could be a 'serious crime / repressive' to 'less serious crime / tolerant' dimension. In the solution space this would be roughly a line between the two values of the 'homicide' variable. Another dimension could be a 'public attitude' dimension mainly from the upper left to lower right part of the solution space, but closer to the x-axis than to the y-axis. On one side we find generally speaking people feeling unsafe, not satisfied with a possibly corrupt police and therefore hesitant to go to the police to report

a crime where on the other side people are possibly more assertive in their dealings with a police they trust more in the first place.

8.6   Summary and conclusions

In this chapter crime and criminal justice related data from the UN Crime Trend Survey and from some other sources were used to try to organize European countries (with also Canada and the USA included) into larger groups. This was done in such a way that the resulting classification would be supported by the data, but would at the same time be understandable within a conceptual framework.

By analysing two existing classification schemes (one based on membership of the EU and one an adaptation of Esping-Andersen's clustering of countries based on socio-economic arguments) it was found that when looking at crime and criminal justice related data only, there was no empirical justification in having the Scandinavian countries as a separate cluster nor the 'Anglo-Saxon' countries. However there was a clear distinction between Northern and Western European countries on the one hand and Southern European (Mediterranean) countries on the other hand. Eastern European countries were another distinct group. However, empirically it made sense to subdivide them into two groups: the former Soviet states and the 'other', more Central European countries.

This resulted in four clusters: 'North/West' (including Canada and USA), 'South', 'Central' and 'East'.

In the introduction of the chapter, we alluded to the fact that geographical considerations are the most frequently used basis for country clustering, a practical and reasonable approach which appears to find partial support in our analysis. In this context, we have to admit to a certain level of frustration by the labels we assigned to the four resulting categories (North/West, South, Central and East) as they appear to emphasize (too much) the geographical dimension.[12] From our analysis – and also consistent with previous practice – it is evident that additional considerations (such as level of economic development) also play a significant role in distinguishing country clusters (for example, United States and Canada are grouped with many Western and Northern European countries). In future work, we hope to replace the labels (North/West, East, Central and South) with conceptually more meaningful names. From our view (a view shared by many), there is no doubt that classification of countries has important *theoretical* relevance; it is this issue which represents the hardest challenge. Classification schemes are based on explicit or implicit assumptions about within-cluster

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[12] One concern is that there may be some confusion resulting from our distinction between 'East' (i.e. all countries that are former Soviet States) and 'Central' (all other 'countries in transition"). Our use of these labels is not consistent with common practice.

commonalities and between-cluster differences that are useful in comparative analysis of crime and criminal justice. In the preceding discussion of our results, we speculated briefly about the meaning of the dimensions (x and y axes in our analysis) on which the country clusters differ: Is it perhaps related to public attitudes toward crime and crime control? Or is it related to tolerance versus repression? Or does it reflect differences in the seriousness of the crime problem? Articulating and interpreting the conceptual meaning of the dimensions on which the country clusters differ is the most difficult task which we need to tackle in future research.

This chapter represents a first step in a research program which is aimed at questioning what many take for granted in the field of crime and justice research: the use of country clustering. The method we used – although explorative – is also quite complicated and may appear to the uninitiated a needlessly cumbersome way to approach the – all too often taken for granted – clustering of countries. Our method in approaching country clustering is distinct in that we explored the empirical fit of two existing country clusters (EUb and 'L-S') with a large number of crime and justice-related indicators. The results of the analysis presented us with four country clusters – partially overlapping with existing groupings, but with some interesting modifications – which, in turn appear to reflect reasonable patterns with regard to a small set of socio-economic indicators. Substantively, with regard to the observed relationships between crime and justice-related variables and socio-economic variables, our results are not earth-shaking. However, the apparent consistency of our findings with existing knowledge gives us greater confidence in the validity of our approach. The main conclusion of this chapter is that it is indeed possible to arrive at a country clustering that is both supported empirically and is conceptually sound. Our analysis produced fairly minor – yet significant - adjustments in L-S's country clustering; we expect that additional work including other indicators is needed to further refine our quest for identifying the 'best practice' in country clustering in the field of crime and justice. Finally, we expect that this is a never-ending project since the ever-shifting socio-political reality will demand a fluid conception of how to divide the world into meaningful smaller clusters useful for comparative purposes.

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Appendix 8.1.

Data used in Chapter 8

In this chapter not only data from the UN Crime Trend Survey were used, but also data from various other sources for two reasons: firstly, some of the variables are not included in the UN Crime Trends Survey at all and secondly there were quite a few missing values for some countries and for some years.

For the variables that were not included in the UN Crime Trends Survey the following sources were used:

The variables *vict*, *sat* and *unsafe* (see Table 8.2) were taken from the International Crime Victim Survey (ICVS) (Van Dijk, Van Kesteren and Smit, 2008). The data from the last sweep of the ICVS (2004/2005) were used[13]. The values of the variables *corrup* and all passive variables (Table 8.2, nr. 11, 19-27) were taken from various other sources and collected by HEUNI. For all other variables (Table 8.2, 2-8, 12-18) the data were in first instance taken from the 8th and 9th UN Crime Trend Survey. This resulted in a dataset with the years 2000 - 2004, but still with many missing values. However, the majority of the countries were also present in another data collection: the European Sourcebook of Crime and Criminal Justice Statistics (Aebi et al. 2006). With this source a considerably large part of the missing values could be filled in. This was done with some caution: if the figures from the UN Crime Trends Survey were very different from those in the European Sourcebook the source where most years in the period 2000-2004 were not missing was chosen. For the variable *judges* data from a survey from the European Commission for the Efficiency of Justice (CEPEJ), (CEPEJ 2006) were also used. In a last step to minimize the number of missing values we used also some intra- and extrapolation.

This resulted in a dataset with for every (49) country and for every variable a value for the years 2000 - 2004. However, there were still some missing values and also some outliers. Therefore, we decided to exclude from our analysis Vatican City and Monaco as outliers due to the small number of inhabitants and also to exclude Kazakhstan, Armenia and Macedonia, because for these countries the number of missing values was too high.

Next, the actual values for the variables used in the analyses were computed. For the level variables (1-13, 19, 21-27) the year 2003 was taken (the most recent year 2004 had more missing values) and for the growth variables (14-18 and 20) the mean annual growth in the period

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[13] For Turkey the ICVS was carried out only in Istanbul. These results were used after a correction was made to obtain a reasonable estimate for the country as a whole.

2000-2004 was computed if there were at least two years available in this period.

In a final step all variables were categorized into three categories: low (with a value 1), middle (2) and high (3). This was done by ranking the values of the variables from low to high and dividing them into three groups of similar size.

The resulting dataset is shown in Table 8.3. The last column in this table gives the clustering as proposed in this chapter.

Appendix Table 8.3. Data used for analysis and the proposed clustering

Country	vict	theft	homicide	susp/rec	conv/susp	pris	juv	fem	sat	unsafe	corrup	pol	judges	theft-g	viol-g	pris-g	juv-g	pol-g	gdp	gdp-g	unempl	yunempl	hdi	gini	pubed	gdi	sosexp	cluster
Albania	...	1	3	3	3	1	2	1	...	...	1	2	2	3	1	2	1	1	1	3	3	...	1	1	1	1	...	C
Armenia	not used in the analysis																											E
Austria	1	3	1	2	1	2	3	3	3	1	3	2	3	3	1	3	3	1	3	2	1	1	3	2	2	2	3	N/W
Azerbaijan	...	1	2	3	3	3	1	3	...	...	1	3	1	1	1	3	1	2	1	3	1	3	1	1	1	1	...	E
Belarus	...	1	3	3	3	3	2	2	...	...	2	2	1	3	3	1	2	1	1	1	1	...	1	2	3	1	...	E
Belgium	3	3	2	...	...	1	...	...	3	2	3	2	3	1	1	2	...	2	3	2	2	2	3	2	3	3	3	N/W
Canada	2	2	2	1	2	2	3	3	2	1	3	1	1	2	1	1	1	2	3	2	1	3	2	2	3	...	...	N/W
Croatia	...	1	1	2	2	1	2	1	...	...	1	3	3	3	3	2	1	1	1	2	3	3	1	1	1	1	...	S
Cyprus	...	1	2	3	1	1	1	1	...	...	2	3	2	3	3	3	1	3	2	3	1	1	2	...	3	2	1	S
Czech Rep	...	2	2	2	2	3	1	2	...	...	1	3	3	1	3	1	1	2	2	3	2	2	1	2	2	1		C
Denmark	3	3	1	1	3	1	2	3	3	1	3	1	2	1	2	2	3	2	3	1	1	1	3	1	3	3	3	N/W
England&Wales	3	3	1	2	2	2	2	3	3	2	3	1	1	3	3	2	...	3	3	2	1	1	3	3	2	3	2	N/W
Estonia	3	2	3	2	1	3	1	1	1	3	2	1	3	3	1	1	1	1	3	3	2	2	3	2	1	1		E
Finland	1	2	2	3	2	1	2	3	3	1	3	1	2	2	2	3	1	2	2	2	2	3	1	3	3	2		N/W
France	1	3	2	1	2	2	3	2	1	1	2	2	1	2	2	2	2	1	2	1	3	3	3	2	3	3	3	N/W
Georgia	...	1	3	2	3	2	1	1	...	...	1	3	1	3	3	2	...	3	1	1	3	3	1	3	1	...	...	E
Germany	2	3	1	2	1	2	3	3	3	2	3	2	3	2	2	2	2	3	2	1	3	1	2	1	2	2	2	N/W
Greece	2	1	1	3	1	1	1	2	1	3	2	3	3	2	2	3	...	2	2	3	3	3	2	2	1	2	2	S
Holy See (Vatican)	not used in the analysis																											S
Hungary	1	2	2	1	3	3	2	2	2	2	2	2	3	1	2	2	3	3	2	3	2	2	2	1	3	2	1	C
Iceland	3	2	...	2	2	1	2	2	...	1	3	1	2	1	1	3	3	3	3	2	1	1	3	...	3	3	3	N/W
Ireland	3	2	1	2	3	1	3	3	2	2	2	2	1	3	3	1	...	1	3	3	1	1	3	2	1	3	2	N/W
Italy	1	2	1	1	1	2	1	...	1	3	2	3	2	2	3	2	3	2	2	1	2	3	2	3	2	2	2	S
Kazakhstan	not used in the analysis																											E
Kyrgyzstan	...	1	3	3	3	3	1	2	...	...	1	2	1	1	1	1	2	...	1	1	1	1	1	2	1	1	...	E
Latvia	...	2	3	2	2	3	3	1	...	...	1	3	2	2	1	1	2	2	1	3	3	2	1	3	2	1	1	E
Lithuania	...	2	3	1	3	3	3	1	...	...	2	2	3	1	3	1	3	1	1	1	3	3	1	3	2	2	1	E
Luxembourg	2	3	1	2	1	2	2	3	2	3	3	2	3	2	2	3	1	3	3	3	1	2	3	...	...	3	3	N/W
Macedonia, FYR	not used in the analysis																											S
Malta	...	3	...	1	...	1	1	2	...	...	2	3	1	3	3	3	3	1	2	3	2	2	2	...	2	2	1	S
Moldova	...	1	3	3	3	3	3	2	...	...	1	2	1	1	1	1	2	1	1	1	2	2	1	2	2	1	...	E
Monaco	not used in the analysis																											S
Netherlands	3	3	1	1	1	2	3	2	2	1	3	1	2	2	2	3	3	3	3	2	1	1	3	2	2	3	3	N/W
Northern Ireland	3	3	2	1	2	1	...	...	2	2	3	3	1	2	3	2	...	1	3	2	1	1	2	3	2	2	2	N/W
Norway	2	3	1	1	1	1	1	...	2	...	3	1	2	1	2	3	1	...	3	3	1	1	3	1	3	3	3	N/W
Poland	2	1	1	2	3	3	2	1	1	3	1	1	3	3	1	3	2	2	1	3	3	2	2	3	2	1	...	C
Portugal	1	2	2	3	1	2	1	2	1	3	2	3	2	2	1	2	1	2	2	2	2	2	3	3	3	2	2	S
Romania	...	1	2	3	1	3	1	2	...	...	1	1	2	1	1	1	2	1	1	1	2	3	1	2	1	1	...	C
Russia	...	2	3	2	2	3	2	3	...	...	1	3	3	1	3	1	3	...	1	1	2	2	1	3	1	1	...	N/W
Scotland	2	3	2	...	...	2	...	...	3	2	3	2	1	1	1	3	...	3	2	2	1	1	2	3	2	2	2	N/W
Slovakia	...	1	3	3	1	3	1	1	...	...	1	3	3	3	2	3	1	3	2	3	3	3	1	1	1	1	1	C
Slovenia	...	2	1	1	1	1	2	3	...	...	2	2	3	3	1	1	1	3	2	3	2	2	2	1	3	2	1	S
Spain	1	2	1	1	2	2	2	1	1	3	2	1	1	2	2	3	2	...	2	2	3	3	2	3	1	2	2	S
Sweden	2	3	2	1	2	1	3	3	3	1	3	1	2	1	2	3	3	2	2	2	2	3	1	3	3	3		N/W
Switzerland	1	3	2	1	3	1	3	2	3	2	3	1	1	3	3	2	...	3	3	1	1	1	3	2	2	3	3	N/W
Turkey	1	1	3	3	3	2	...	1	1	3	1	3	1	1	3	1	...	3	1	1	2	2	1	3	1	1	...	S
Ukraine	...	1	3	2	3	3	2	1	...	...	1	1	2	3	3	1	2	2	1	2	2	1	1	1	1	...		E
USA	3	3	3	3	1	3	3	3	2	1	2	2	2	2	1	2	3	2	3	2	1	1	3	3	3	3	...	N/W

Appendix 8.2

A short description of CATPCA

CATPCA is the acronym of CATegorical Principal Components Analysis. CATPCA refers both to the technique and to the computer program in SPSS.

CATPCA is a generalization of principal component analysis (PCA). PCA aims to reduce an original set of variables into a smaller set of uncorrelated components which represents the majority of the information from the original variables. By reducing the dimensionality, PCA enables to interpret a few components instead of a large number of variables. PCA assumes linear relationships between numeric variables.

The CATPCA procedure quantifies simultaneously categorical variables and reduces the dimensionality. This yields optimal principal components for transformed variables. In addition, the optimal-scaling approach allows variables to be scaled at different measurement levels (nominal, ordinal, etc.) and no distributional assumptions to the variables are needed.

The object scores (countries in our case) on the components are also a result of the analysis. Although object scores are not used commonly in PCA, in CATPCA there are several reasons to take these into account. In contrast to PCA, for CATPCA not only differences and similarities between variables, but also differences and similarities between objects (i.e. countries) are important. In fact both can be considered in one single analysis. Countries placed nearby the category points are correlated. Countries placed remote from a category point are not related or are independent.

The principles of optimal scaling and several analysis techniques based on optimal scaling, of which CATPCA is an example, are described by Gifi (1990), Van de Geer (1988) and de Heus and van der Leeden (1995).