

Introduction

The latest routine international evaluation for conformation traits took place as scheduled at the Interbull Centre. Data from twenty five (26) countries were included in this evaluation.

International genetic evaluations for calving traits of bulls from Australia, Belgium, Canada, Switzerland, Czech Republic, Germany, Denmark-Finland-Sweden, Spain, France, United Kingdom, Hungary, Ireland, Italy, Japan, Korea, The Netherlands, Norway, New Zealand, Poland, South Africa, Estonia, Slovenia, Portugal, and United States of America were computed. Brown Swiss, Guernsey, Holstein, Jersey and Red Dairy Cattle breed data were included in this evaluation.

The WHFF trait definitions are available on this link http://www.interbull.org/ib/conf_trait_hol_jer

The following is a list of substitute traits as applied by countries:

COU	BRD	TRT_Code	TRT_NAME	Subs_Trt
USA	BSW	ofr	overall frame	sta
USA	BSW	oru	overall rump	rwi
USA	BSW	rle	rump length	rwi
USA	BSW	thp	thurl position	rwi

Changes in national procedures

Changes in the national genetic evaluation of conformation traits are as follows:

FRA (ALL)	Base change
DEU (HOL,RDC)	Base change. New trait definition for ANG trait and new heritability (0,11). Data selection since 01/01/20. Due to correlations to other traits, small changes can be observed in these correlated traits as well.
EST (HOL)	Decrease in number of daughters/EDC-s of some bulls is due to the pedigree correction and deleted incorrect first lactation information of some cows.
SVN (HOL, BSW)	Base change. Decrease in information due to changes in pedigree completeness as well as phenotypic data improvement.
JPN (HOL)	Some decrease in information due to pedigree changes
USA (HOL)	Decrease in information due to parentage checks
ITA (HOL)	One year cut-off of data causing drops in information, base change
ITA (BSW)	Base change
USA (BSW,JER,RDC,GUE)	Drops in information are due to pedigree corrections and herd-year minimum edits
CAN (ALL)	Base change
AUS (ALL)	Decrease in information due to pedigree updates, and status changes of some bulls which then leads to no longer being qualified for the >10 threshold.
NZL (ALL)	Changed pedigree extract so that Holstein and Friesian breed proportions re-balanced for all animals based on a more realistic assumption of Holstein and Friesian ancestry. Specifically, any HF animals from NZ, Australia or the UK in the pedigree which have one or both parents missing, instead of merely assuming the missing parent(s) to have no Holstein genetics, now assumes a mixture of Holstein and Friesian genetics equal to the average of their herd contemporaries. These changes are also carried down to all progeny in the pedigree. Updated days-in-milk to include all data collected up to 305 days of lactation. Excluded any records where a cow has not calved within 365 days of her last parturition.
ITA (JER)	For the feet and legs index (OFL), a new calculation model has been adopted (updates to the weights of the traits used in the calculation). Change in heritability. First time with OUS.
CHE (ALL)	Improvements in recording of pedigree validity and handling of animals with uncertain parentage on the database as well as the recomputation of breed percentages for all animals born after 01.01.1990 led to (great) changes in all pedigrees and in consequences in all genetic evaluation results.
NOR (RDC)	The definition and weights used to construct OUS have been changed. OUS: consists of the following traits: usu, ftp, rtp, fua, ruh, ruw, udb, ude, ftl; plus the two new traits: tth (Teat Thickness) and sut (Supernumerary Teats). Change in heritability.
NLD (ALL)	Model changed with the inclusion of data from the automatic milking systems in the flow. No changes in heritability. For the udder traits there are some decrease in data for some bulls because of the extra data edits on the older conformation scores. Base change
PRT (HOL)	Pedigree updates and corrections in database extraction are causing some drops in information

INTERBULL CHANGES COMPARED TO THE PREVIOUS ROUTINE RUN

Post-processing Windows:

According to the decision taken by ITC in Orlando (2015) to review the post-processing windows every 5 years, during the 2020 the relative working group has been re-activated and new windows have been identified.

As before, the upper bounds have been set to 0.99 as these were judged to have very little effect on evaluations while the lower values have been reduced to the 10th percentile. This reduction would provide post-processed correlations to be closer to the real estimated ones. Over the past five years, in fact, the previous adopted lower value (25th percentile) had been found too high causing estimated and post-processed correlations to differ significantly from each other. The new lower values have been applied to all breeds and traits.

The weight assigned to the magnitude of the changes tested by each country has also been revised. The new weight will allow post-processed correlations to take more in consideration the value of the new estimated ones even when no changes are applied by the countries.

The new weights are as follows:

No changes :: 2
Small changes:: 1
Big changes :: 0

More information can be read on https://interbull.org/ib/rg_procedure

DATA AND METHOD OF ANALYSIS

Data were national genetic evaluations of AI sampled bulls with at least 10 daughters or 10 EDC (for clinical mastitis and maternal calving traits at least 50 daughters or 50 EDC, and for direct calving traits at least 50 calvings or 50 EDC) in at least 10 herds. Table 1 presents the amount of data included in this Interbull evaluation for all breeds.

National proofs were first de-regressed within country and then analysed jointly with a linear model including the effects of evaluation country, genetic group of bull and bull merit. Heritability estimates used in both the de-regression and international evaluation were as in each country's national evaluation.

Table 2 presents the date of evaluation as supplied by each country

Estimated genetic parameters and sire standard deviations are shown in APPENDIX I and the corresponding number of common bulls are listed in APPENDIX II.

SCIENTIFIC LITERATURE

The international genetic evaluation procedure is based on international work described in the following scientific publications:

International genetic evaluation computation:
 Schaeffer. 1994. J. Dairy Sci. 77:2671-2678
 Klei, 1998. Interbull Bulletin 17:3-7

Verification and Genetic trend validation:
 Klei et al., 2002. Interbull Bulletin 29:178-182.
 Boichard et al., 1995. J. Dairy Sci. 78:431-437

Weighting factors:
 Fikse and Banos, 2001. J. Dairy Sci. 84:1759-1767

De-regression:
 Sigurdsson and G. Banos. 1995. Acta Agric. Scand. 45:207-219
 Jairath et al. 1998. J. Dairy Sci. Vol. 81:550-562

Genetic parameter estimation:

Klei and Weigel, 1998, Interbull Bulletin 17:8-14
Sullivan, 1999. Interbull Bulletin 22:146-148

Post-processing of estimated genetic correlations:
Mark et al., 2003, Interbull Bulletin 30:126-135
Jorjani et al., 2003. J. Dairy Sci. 86:677-679
<https://wiki.interbull.org/public/rG%20procedure?action=print>

Time edits
Weigel and Banos. 1997. J. Dairy Sci. 80:3425-3430

International reliability estimation
Harris and Johnson. 1998. Interbull Bulletin 17:31-36

NEXT ROUTINE INTERNATIONAL EVALUATION

Dates for the next routine evaluation can be found on
<http://www.interbull.org/ib/servicecalendar>.

NEXT TEST INTERNATIONAL EVALUATION

Dates for the next test run can be found on
<http://www.interbull.org/ib/servicecalendar>.

PUBLICATION OF INTERBULL ROUTINE RUN

Results were distributed by the Interbull Centre to designated representatives in each country. The international evaluation file comprised international proofs expressed on the base and unit of each country included in the analysis. Such records readily provide more information on bull performance in various countries, thereby minimizing the need to resort to conversions.

At the same time, all recipients of Interbull results are expected to honor the agreed code of practice, decided by the Interbull Steering Committee, and only publish international evaluations on their own country scale. Evaluations expressed on another country scale are confidential and may only be used internally for research and review purposes.

PUBLICATION OF INTERBULL TEST RUN

Test evaluation results are meant for review purposes only and should not be published.

^LTable 1. National evaluation data considered in the Interbull evaluation for conformation traits (April Routine Evaluation 2023).
Number of records for stature by breed

Country	BSW	GUE	HOL	JER	RDC	SIM
AUS		45	3903	756	246	
BEL			1688			
CAN	243	104	12556	822	898	
CHE	2904		3072	50		
CZE			4378			
DEA	3736					
DEU			21273		270	
DFS			12294	2087	6422	
ESP			4300			
EST			862			
FRA	433		17973			
FRM						

GBR	23	217	6406	430	336
HUN			2817		
IRL			1878		
ISR					
ITA	2243		8401	74	
JPN			6145		
KOR			1557		
LTU					
LVA			1322		610
NLD	137		15384	49	57
NOR					2502
NZL			6866	4173	593
POL			9250		
PRT			2532		
SVK					
SVN	243		567		
URY					
USA	921	722	33885	4465	271
ZAF			853	554	
HRV					
CAM					38
=====					
No. Records	10883	1088	180162	13460	12243
Pub. Proofs	8664	923	139015	11725	12875
=====					
0					

^LAPPENDIX I. Sire standard deviations in diagonal and genetic correlations below diagonal

BSW sta

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	6.31								
CHE	0.95	12.48							
FRA	0.98	0.96	0.92						
ITA	0.96	0.95	0.95	13.87					
NLD	0.95	0.95	0.96	0.91	4.34				
USA	0.98	0.95	0.97	0.95	0.94	1.63			
DEA	0.96	0.98	0.97	0.96	0.95	0.96	11.28		
SVN	0.92	0.91	0.89	0.93	0.90	0.90	0.90	17.34	
GBR	0.96	0.92	0.95	0.93	0.93	0.95	0.89	0.90	0.86

BSW cwi

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	7.99								
CHE	0.91	10.22							
FRA	0.88	0.91	0.90						
ITA	0.81	0.85	0.87	21.32					
NLD	0.92	0.84	0.87	0.71	4.78				
USA	0.89	0.90	0.90	0.92	0.86	0.83	0.90		
DEA	0.86	0.82	0.85	0.74	0.78	0.81	11.43		
SVN	0.88	0.91	0.90	0.82	0.84	0.85	0.90	25.02	
GBR	0.91	0.84	0.82	0.71	0.90	0.80	0.83	0.80	1.46

BSW bde

	CAN	CHE	FRA	ITA	NLD	DEA	SVN	GBR	USA
CAN	6.82								
CHE	0.84	10.35							
FRA	0.72	0.88	0.92						
ITA	0.79	0.91	0.91	17.87					
NLD	0.82	0.85	0.85	0.85	4.57				
DEA	0.79	0.90	0.91	0.88	0.79	11.15			
SVN	0.78	0.73	0.80	0.82	0.78	0.71	25.22		
GBR	0.87	0.88	0.81	0.84	0.90	0.87	0.83	1.68	

USA 0.72 0.75 0.86 0.78 0.86 0.80 0.77 0.86 0.83

BSW ang

	CAN	CHE	FRA	NLD	USA	GBR
CAN	8.41					
CHE	0.69	11.02				
FRA	0.86	0.67	0.86			
NLD	0.79	0.68	0.67	3.86		
USA	0.86	0.67	0.76	0.77	1.08	
GBR	0.89	0.77	0.80	0.82	0.90	0.76

BSW ran

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	6.84								
CHE	0.94	10.68							
FRA	0.97	0.96	0.95						
ITA	0.94	0.93	0.94	23.14					
NLD	0.95	0.91	0.96	0.92	4.61				
USA	0.97	0.94	0.96	0.91	0.95	1.36			
DEA	0.97	0.94	0.96	0.94	0.91	0.97	11.85		
SVN	0.91	0.88	0.89	0.89	0.90	0.90	0.88	23.21	
GBR	0.96	0.94	0.97	0.94	0.96	0.96	0.91	0.92	1.98

BSW rwi

	CAN	CHE	FRA	NLD	USA	DEA	GBR	SVN	ITA
CAN	7.27								
CHE	0.89	10.31							
FRA	0.96	0.86	0.99						
NLD	0.93	0.85	0.93	4.07					
USA	0.91	0.85	0.87	0.80	0.97				
DEA	0.91	0.88	0.93	0.78	0.89	13.34			
GBR	0.93	0.85	0.92	0.88	0.92	0.82	1.29		
SVN	0.89	0.80	0.94	0.85	0.82	0.89	0.86	25.79	
ITA	0.88	0.79	0.90	0.79	0.86	0.87	0.87	0.89	19.31

BSW rls

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	7.84								
CHE	0.92	13.07							
FRA	0.91	0.92	1.02						
ITA	0.91	0.86	0.92	23.62					
NLD	0.88	0.85	0.88	0.84	5.15				
USA	0.95	0.93	0.90	0.87	0.86	0.81			
DEA	0.91	0.91	0.92	0.89	0.81	0.90	12.19		
SVN	0.85	0.78	0.88	0.81	0.79	0.83	0.87	22.76	
GBR	0.85	0.86	0.90	0.83	0.86	0.83	0.87	0.80	1.47

BSW fan

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	9.10								
CHE	0.68	14.09							
FRA	0.79	0.72	1.11						
ITA	0.69	0.84	0.80	21.51					
NLD	0.74	0.67	0.83	0.69	5.14				
USA	0.82	0.72	0.84	0.85	0.81	0.85			
DEA	0.62	0.90	0.66	0.89	0.63	0.65	11.56		
SVN	0.71	0.77	0.71	0.79	0.68	0.71	0.83	25.40	
GBR	0.81	0.73	0.89	0.73	0.88	0.83	0.67	0.77	1.31

BSW hde		CAN	CHE	FRA	ITA	NLD	DEA	SVN	USA
CAN		8.30							
CHE		0.86	12.69						
FRA		0.83	0.82	1.18					
ITA		0.79	0.84	0.85	21.22				
NLD		0.76	0.74	0.83	0.73	5.14			
DEA		0.77	0.88	0.86	0.93	0.77	12.10		
SVN		0.80	0.82	0.86	0.89	0.75	0.90	32.41	
USA		0.85	0.73	0.85	0.89	0.81	0.79	0.83	0.85

BSW fua		CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN		6.68								
CHE		0.87	12.23							
FRA		0.89	0.87	0.88						
ITA		0.88	0.85	0.85	19.63					
NLD		0.89	0.84	0.88	0.85	4.70				
USA		0.94	0.86	0.86	0.93	0.87	1.27			
DEA		0.83	0.84	0.93	0.82	0.78	0.83	11.12		
SVN		0.73	0.75	0.82	0.82	0.77	0.73	0.90	22.80	
GBR		0.91	0.84	0.88	0.87	0.91	0.91	0.72	0.62	1.38

BSW ruh		CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN		7.63								
CHE		0.92	12.09							
FRA		0.85	0.82	0.93						
ITA		0.74	0.84	0.85	12.87					
NLD		0.76	0.82	0.87	0.85	4.26				
USA		0.83	0.80	0.87	0.85	0.88	1.07			
DEA		0.82	0.84	0.89	0.92	0.86	0.82	11.73		
SVN		0.80	0.82	0.80	0.86	0.88	0.83	0.87	21.63	
GBR		0.73	0.79	0.86	0.82	0.87	0.91	0.76	0.78	1.76

BSW ruw		CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN
CAN		8.25							
CHE		0.91	12.04						
FRA		0.84	0.86	0.86					
ITA		0.78	0.88	0.79	13.26				
NLD		0.70	0.66	0.80	0.69	4.26			
USA		0.86	0.90	0.85	0.89	0.79	1.01		
DEA		0.85	0.91	0.76	0.95	0.55	0.90	12.19	
SVN		0.83	0.86	0.80	0.80	0.68	0.83	0.80	21.17

BSW usu		CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN		8.44								
CHE		0.90	12.05							
FRA		0.82	0.91	0.90						
ITA		0.88	0.90	0.87	19.04					
NLD		0.82	0.83	0.89	0.81	4.19				
USA		0.83	0.89	0.86	0.87	0.90	0.98			
DEA		0.92	0.93	0.88	0.93	0.78	0.84	11.45		
SVN		0.80	0.78	0.61	0.74	0.63	0.70	0.79	20.95	
GBR		0.80	0.79	0.86	0.85	0.91	0.92	0.73	0.62	2.81

BSW	ude								
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	6.62								
CHE	0.96	12.17							
FRA	0.96	0.95	0.99						
ITA	0.94	0.96	0.96	20.05					
NLD	0.95	0.94	0.95	0.93	4.17				
USA	0.96	0.95	0.96	0.95	0.94	1.23			
DEA	0.92	0.97	0.93	0.97	0.94	0.93	12.06		
SVN	0.92	0.95	0.92	0.96	0.95	0.92	0.96	23.52	
GBR	0.96	0.94	0.96	0.94	0.96	0.96	0.90	0.93	2.10

BSW	ftp								
	CAN	CHE	FRA	NLD	USA	DEA	SVN	GBR	ITA
CAN	7.38								
CHE	0.97	14.00							
FRA	0.97	0.95	0.92						
NLD	0.97	0.95	0.95	5.05					
USA	0.92	0.90	0.88	0.91	1.31				
DEA	0.95	0.98	0.95	0.96	0.90	11.09			
SVN	0.93	0.93	0.92	0.94	0.91	0.94	18.80		
GBR	0.95	0.93	0.89	0.94	0.94	0.92	0.93	1.42	
ITA	0.87	0.86	0.86	0.86	0.87	0.86	0.87	0.87	21.13

BSW	ftl								
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	6.50								
CHE	0.90	14.72							
FRA	0.95	0.95	0.96						
ITA	0.93	0.94	0.95	18.24					
NLD	0.92	0.96	0.92	0.92	4.95				
USA	0.93	0.96	0.95	0.93	0.96	1.75			
DEA	0.90	0.98	0.97	0.96	0.94	0.95	11.09		
SVN	0.90	0.93	0.90	0.91	0.94	0.91	0.92	18.72	
GBR	0.95	0.94	0.93	0.94	0.97	0.96	0.92	0.93	1.51

BSW	rtp								
	CAN	CHE	FRA	ITA	NLD	DEA	SVN	USA	
CAN	6.73								
CHE	0.98	14.54							
FRA	0.97	0.97	0.92						
ITA	0.92	0.95	0.93	20.15					
NLD	0.97	0.96	0.97	0.92	4.58				
DEA	0.97	0.99	0.97	0.96	0.94	11.95			
SVN	0.94	0.93	0.93	0.94	0.95	0.93	18.59		
USA	0.91	0.88	0.91	0.89	0.94	0.87	0.89	1.31	

BSW	ocs								
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	7.69								
CHE	0.81	9.35							
FRA	0.74	0.83	0.93						
ITA	0.77	0.81	0.89	9.03					
NLD	0.73	0.69	0.78	0.69	3.98				
USA	0.80	0.74	0.82	0.81	0.83	0.51			
DEA	0.81	0.90	0.89	0.89	0.59	0.73	10.59		
SVN	0.59	0.61	0.68	0.64	0.62	0.62	0.73	20.49	
GBR	0.75	0.82	0.84	0.79	0.86	0.86	0.70	0.68	1.71

BSW	ous								
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	7.96								
CHE	0.86	13.90							
FRA	0.88	0.90	0.93						
ITA	0.81	0.88	0.92	10.22					
NLD	0.89	0.85	0.90	0.79	4.93				
USA	0.89	0.81	0.83	0.79	0.86	0.79			
DEA	0.85	0.94	0.91	0.91	0.80	0.78	12.34		
SVN	0.75	0.84	0.78	0.82	0.75	0.72	0.92	20.54	
GBR	0.77	0.83	0.75	0.80	0.77	0.86	0.75	0.73	1.64

BSW	ofl								
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	8.50								
CHE	0.82	11.71							
FRA	0.64	0.65	1.24						
ITA	0.61	0.70	0.86	17.42					
NLD	0.65	0.64	0.74	0.64	4.62				
USA	0.59	0.62	0.66	0.67	0.65	0.82			
DEA	0.69	0.85	0.71	0.81	0.58	0.57	11.23		
SVN	0.73	0.85	0.66	0.70	0.64	0.66	0.89	27.12	
GBR	0.66	0.75	0.81	0.66	0.73	0.71	0.65	0.62	1.51

BSW	ofr						
	CAN	CHE	DEA	ITA	SVN	USA	FRA
CAN	6.94						
CHE	0.80	12.04					
DEA	0.81	0.90	11.49				
ITA	0.78	0.91	0.94	17.06			
SVN	0.73	0.78	0.79	0.79	23.30		
USA	0.76	0.83	0.91	0.86	0.74	1.63	
FRA	0.74	0.87	0.93	0.91	0.80	0.89	0.89

BSW	tpl					
	CAN	CHE	DEA	ITA	SVN	FRA
CAN	6.85					
CHE	0.88	12.22				
DEA	0.90	0.90	11.75			
ITA	0.90	0.91	0.92	23.72		
SVN	0.88	0.86	0.84	0.85	24.62	
FRA	0.96	0.92	0.90	0.90	0.86	1.29

BSW	oru						
	CAN	CHE	DEA	ITA	SVN	USA	FRA
CAN	7.38						
CHE	0.76	16.43					
DEA	0.71	0.87	12.58				
ITA	0.92	0.76	0.76	17.39			
SVN	0.82	0.59	0.71	0.76	27.59		
USA	0.89	0.58	0.49	0.83	0.67	0.97	
FRA	0.90	0.88	0.86	0.89	0.75	0.85	1.10

BSW	rle					
	CHE	DEA	ITA	SVN	USA	FRA
CHE	11.78					
DEA	0.95	12.30				
ITA	0.82	0.85	19.34			

SVN	0.79	0.79	0.83	24.80			
USA	0.55	0.51	0.77	0.69	0.97		
FRA	0.92	0.94	0.87	0.79	0.74	1.02	

BSW thp

	CAN	CHE	DEA	ITA	SVN	USA	FRA
CAN	7.30						
CHE	0.83	11.39					
DEA	0.77	0.84	12.06				
ITA	0.88	0.91	0.85	29.98			
SVN	0.79	0.85	0.85	0.88	35.67		
USA	0.87	0.87	0.87	0.71	0.83	1.36	
FRA	0.89	0.84	0.86	0.85	0.82	0.79	1.05

BSW hoq

	CAN	CHE	DEA	ITA	SVN	FRA
CAN	7.02					
CHE	0.92	12.10				
DEA	0.92	0.89	12.54			
ITA	0.91	0.84	0.85	19.60		
SVN	0.94	0.88	0.90	0.91	21.85	
FRA	0.91	0.85	0.88	0.88	0.88	1.02

BSW ful

	CHE	DEA	ITA	SVN	FRA
CHE	11.85				
DEA	0.91	12.26			
ITA	0.92	0.95	12.84		
SVN	0.83	0.91	0.86	21.52	
FRA	0.74	0.82	0.75	0.74	0.92

BSW udb

	CHE	DEA	ITA	SVN	FRA
CHE	12.34				
DEA	0.97	13.30			
ITA	0.93	0.96	26.40		
SVN	0.84	0.86	0.85	25.34	
FRA	0.91	0.87	0.85	0.80	0.96

BSW tdi

	CHE	DEA	ITA	SVN	FRA
CHE	15.82				
DEA	0.96	11.34			
ITA	0.94	0.95	20.58		
SVN	0.91	0.94	0.92	19.01	
FRA	0.96	0.97	0.91	0.92	0.90

BSW tth

	CHE	DEA	ITA	SVN	FRA
CHE	14.50				
DEA	0.98	13.00			
ITA	0.94	0.95	23.24		
SVN	0.88	0.88	0.88	20.93	
FRA	0.93	0.93	0.94	0.88	0.89

GUE sta

	CAN	GBR	USA	AUS
CAN	6.56			
GBR	0.97	1.23		
USA	0.98	0.96	2.77	
AUS	0.90	0.93	0.91	0.84

GUE cwi

	CAN	GBR	USA	AUS
CAN	6.79			
GBR	0.92	1.82		
USA	0.85	0.85	1.52	
AUS	0.72	0.80	0.66	0.34

GUE bde

	CAN	GBR	USA	AUS
CAN	6.38			
GBR	0.87	1.59		
USA	0.75	0.88	1.76	
AUS	0.80	0.77	0.70	0.45

GUE ang

	CAN	GBR	USA	AUS
CAN	7.95			
GBR	0.89	1.72		
USA	0.88	0.91	1.86	
AUS	0.65	0.76	0.68	0.39

GUE ran

	CAN	GBR	USA	AUS
CAN	6.50			
GBR	0.97	1.71		
USA	0.97	0.97	1.99	
AUS	0.90	0.93	0.90	0.76

GUE rwi

	CAN	GBR	USA	AUS
CAN	7.10			
GBR	0.93	1.61		
USA	0.92	0.92	1.71	
AUS	0.85	0.84	0.77	0.64

GUE rls

	CAN	GBR	USA	AUS
CAN	8.68			
GBR	0.82	1.87		
USA	0.93	0.81	0.89	
AUS	0.71	0.79	0.70	0.32

GUE rlr

	CAN	USA	AUS
CAN	7.12		
USA	0.85	0.92	
AUS	0.61	0.54	0.19

GUE fan				
	CAN	GBR	USA	AUS
CAN	8.62			
GBR	0.80	1.75		
USA	0.84	0.76	0.86	
AUS	0.62	0.76	0.65	0.26

GUE fua				
	CAN	GBR	USA	AUS
CAN	7.43			
GBR	0.94	1.44		
USA	0.92	0.91	1.82	
AUS	0.79	0.78	0.77	0.38

GUE ruh				
	CAN	GBR	USA	AUS
CAN	7.07			
GBR	0.73	2.00		
USA	0.80	0.90	1.45	
AUS	0.76	0.77	0.76	0.36

GUE usu				
	CAN	GBR	USA	AUS
CAN	6.81			
GBR	0.79	1.64		
USA	0.80	0.87	1.35	
AUS	0.76	0.78	0.75	0.29

GUE ude				
	CAN	GBR	USA	AUS
CAN	6.28			
GBR	0.97	1.39		
USA	0.95	0.95	1.84	
AUS	0.89	0.89	0.88	0.53

GUE ftp				
	CAN	GBR	USA	AUS
CAN	6.03			
GBR	0.95	1.31		
USA	0.92	0.92	1.61	
AUS	0.92	0.91	0.86	0.40

GUE ftl				
	CAN	GBR	USA	AUS
CAN	4.69			
GBR	0.95	1.90		
USA	0.94	0.97	2.01	
AUS	0.93	0.94	0.93	0.95

GUE rtp				
	CAN	AUS	USA	
CAN	5.48			
AUS	0.89	0.35		

FRA	0.64	0.92	0.84	0.92	0.86	0.83	0.85	1.14																
GBR	0.82	0.85	0.92	0.85	0.90	0.89	0.85	0.82	1.46															
ITA	0.63	0.80	0.75	0.80	0.69	0.66	0.81	0.88	0.69	1.26														
NLD	0.72	0.87	0.92	0.88	0.94	0.91	0.85	0.87	0.91	0.71	5.17													
USA	0.63	0.83	0.84	0.87	0.81	0.79	0.85	0.92	0.79	0.91	0.81	1.25												
HUN	0.64	0.83	0.86	0.84	0.84	0.84	0.83	0.89	0.78	0.81	0.82	0.88	1.14											
POL	0.64	0.89	0.86	0.84	0.86	0.86	0.86	0.84	0.83	0.77	0.84	0.82	0.83	12.41										
NZL	0.77	0.64	0.71	0.66	0.68	0.70	0.71	0.65	0.79	0.63	0.68	0.68	0.63	0.63	0.38									
ZAF	0.67	0.89	0.83	0.86	0.85	0.85	0.85	0.87	0.89	0.73	0.85	0.86	0.83	0.83	0.70	0.83								
JPN	0.63	0.83	0.75	0.83	0.72	0.72	0.81	0.91	0.67	0.92	0.72	0.91	0.84	0.75	0.63	0.77	1.53							
CZE	0.70	0.91	0.91	0.85	0.92	0.91	0.90	0.85	0.88	0.77	0.89	0.85	0.87	0.89	0.69	0.87	0.79	14.14						
EST	0.74	0.75	0.84	0.75	0.77	0.82	0.80	0.68	0.80	0.63	0.83	0.64	0.65	0.72	0.66	0.69	0.64	0.78	23.15					
IRL	0.79	0.77	0.83	0.78	0.85	0.81	0.73	0.76	0.93	0.64	0.84	0.73	0.73	0.73	0.82	0.82	0.63	0.82	0.73	1.32				
KOR	0.63	0.73	0.63	0.64	0.72	0.71	0.70	0.73	0.65	0.66	0.64	0.71	0.73	0.64	0.66	0.67	0.71	0.76	0.63	0.64	2.52			
SVN	0.66	0.83	0.84	0.79	0.88	0.91	0.82	0.81	0.79	0.66	0.88	0.76	0.85	0.79	0.63	0.78	0.70	0.85	0.73	0.70	0.68	23.59		
PRT	0.65	0.82	0.81	0.79	0.86	0.83	0.81	0.83	0.81	0.75	0.84	0.83	0.85	0.83	0.63	0.78	0.76	0.85	0.64	0.74	0.69	0.77	2.03	
LVA	0.63	0.71	0.67	0.75	0.68	0.71	0.63	0.70	0.64	0.63	0.69	0.64	0.63	0.66	0.64	0.63	0.64	0.67	0.70	0.63	0.64	0.69	0.67	0.36

HOL bde

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	PRT	SVN	LVA
AUS	0.53																							
BEL	0.68	1.40																						
CAN	0.82	0.78	5.44																					
CHE	0.72	0.91	0.87	11.30																				
DEU	0.74	0.92	0.92	0.88	0.91	11.57																		
DFS	0.80	0.86	0.92	0.88	0.94	11.77																		
ESP	0.74	0.90	0.89	0.92	0.91	0.90	0.97																	
FRA	0.68	0.92	0.68	0.86	0.83	0.74	0.83	1.06																
GBR	0.77	0.90	0.88	0.91	0.92	0.91	0.92	0.81	1.34															
ITA	0.68	0.88	0.71	0.85	0.86	0.78	0.86	0.90	0.86	1.21														
NLD	0.68	0.88	0.83	0.92	0.91	0.85	0.91	0.87	0.91	0.89	4.83													
USA	0.68	0.92	0.74	0.89	0.89	0.81	0.89	0.92	0.87	0.92	0.91	1.15												
HUN	0.68	0.89	0.81	0.88	0.90	0.86	0.91	0.83	0.89	0.84	0.85	0.89	1.05											
POL	0.75	0.82	0.85	0.84	0.92	0.90	0.87	0.72	0.88	0.81	0.84	0.81	0.87	12.47										
NZL	0.76	0.68	0.68	0.68	0.68	0.69	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.38										
ZAF	0.73	0.87	0.83	0.83	0.87	0.86	0.88	0.75	0.91	0.74	0.82	0.84	0.84	0.86	0.68	0.87								
JPN	0.68	0.94	0.74	0.90	0.91	0.83	0.89	0.95	0.86	0.90	0.91	0.95	0.88	0.80	0.68	0.80	1.37							
CZE	0.79	0.83	0.93	0.84	0.93	0.92	0.88	0.69	0.90	0.77	0.83	0.80	0.88	0.92	0.69	0.86	0.79	15.29						
EST	0.76	0.80	0.92	0.86	0.88	0.90	0.88	0.72	0.87	0.75	0.84	0.80	0.84	0.85	0.64	0.77	0.80	0.89	18.05					
IRL	0.79	0.84	0.84	0.88	0.88	0.89	0.87	0.75	0.94	0.81	0.85	0.82	0.82	0.85	0.74	0.87	0.81	0.86	0.79	1.16				
KOR	0.68	0.82	0.70	0.79	0.84	0.83	0.79	0.77	0.75	0.69	0.72	0.76	0.79	0.73	0.67	0.75	0.81	0.78	0.73	0.74	3.25			
PRT	0.75	0.80	0.80	0.79	0.89	0.86	0.83	0.68	0.86	0.77	0.78	0.79	0.85	0.87	0.71	0.82	0.80	0.87	0.78	0.85	0.71	1.95		
SVN	0.72	0.89	0.85	0.88	0.90	0.88	0.92	0.84	0.87	0.84	0.92	0.86	0.85	0.84	0.66	0.79	0.87	0.84	0.84	0.84	0.77	0.74	19.33	
LVA	0.72	0.70	0.78	0.76	0.79	0.81	0.72	0.67	0.77	0.68	0.70	0.68	0.78	0.78	0.67	0.69	0.68	0.83	0.73	0.77	0.75	0.78	0.68	0.33

HOL ang

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	ZAF	JPN	CZE	EST	IRL	KOR	PRT	SVN	LVA	
AUS	0.43																							
BEL	0.60	1.13																						
CAN	0.65	0.75	6.59																					
CHE	0.60	0.77	0.87	11.41																				
DEU	0.61	0.61	0.60	0.61	8.96																			
DFS	0.68	0.85	0.88	0.81	0.61	10.42																		
ESP	0.63	0.76	0.86	0.78	0.60	0.84	0.73																	
FRA	0.62	0.83	0.87	0.85	0.61	0.85	0.81	0.93																
GBR	0.77	0.75	0.91	0.79	0.61	0.87	0.80	0.80	1.52															
ITA	0.66	0.73	0.88	0.80	0.60	0.83	0.87	0.80	0.83	1.28														
NLD	0.72	0.62	0.82	0.75	0.60	0.72	0.78	0.67	0.82	0.79	4.57													
USA	0.67	0.76	0.92	0.80	0.60	0.90	0.83	0.82	0.90	0.83	0.74	1.37												
HUN	0.60	0.71	0.76	0.71	0.62	0.78	0.70	0.79	0.72	0.73	0.60	0.79	1.02											
POL	0.60	0.67	0.69	0.66	0.61	0.73	0.77	0.69	0.66	0.80	0.65	0.68	0.60	10.09										
ZAF	0.63	0.81	0.71	0.68	0.64	0.79	0.69	0.73	0.85	0.73	0.61	0.76	0.63	0.72										
JPN	0.66	0.80	0.90	0.81	0.61	0.90	0.87	0.83	0.87	0.90	0.78	0.88	0.77	0.77	0.77	1.43								
CZE	0.67	0.78	0.81	0.75	0.61	0.86	0.74	0.75	0.77	0.77	0.64	0.77	0.81	0.63	0.68	0.81	14.07							
EST	0.63	0.80	0.62	0.63	0.64	0.77	0.62	0.67	0.63	0.62	0.61	0.61	0.76	0.62	0.76	0.70	0.70	24.05						

POL	0.61	0.74	0.76	0.73	0.72	0.72	0.72	0.69	0.69	0.74	0.63	0.76	0.74	13.10										
ZAF	0.83	0.78	0.77	0.74	0.83	0.73	0.78	0.85	0.86	0.70	0.74	0.80	0.87	0.64	0.89									
JPN	0.74	0.77	0.74	0.84	0.83	0.76	0.77	0.81	0.76	0.69	0.79	0.78	0.86	0.68	0.76	2.09								
CZE	0.71	0.86	0.84	0.79	0.92	0.84	0.84	0.88	0.86	0.76	0.81	0.83	0.93	0.75	0.81	0.87	15.62							
EST	0.76	0.77	0.76	0.77	0.84	0.79	0.84	0.85	0.83	0.62	0.85	0.76	0.85	0.62	0.75	0.90	0.87	23.72						
IRL	0.69	0.70	0.74	0.64	0.81	0.69	0.74	0.77	0.91	0.69	0.76	0.72	0.71	0.66	0.75	0.61	0.72	0.70	1.59					
KOR	0.62	0.61	0.69	0.61	0.68	0.64	0.76	0.68	0.69	0.61	0.64	0.70	0.71	0.62	0.62	0.61	0.70	0.64	0.61	1.51				
SVN	0.62	0.79	0.83	0.68	0.88	0.84	0.82	0.77	0.78	0.72	0.75	0.82	0.79	0.78	0.72	0.77	0.88	0.79	0.78	0.62	24.62			
PRT	0.61	0.61	0.60	0.61	0.74	0.60	0.72	0.74	0.66	0.64	0.68	0.73	0.63	0.60	0.65	0.65	0.70	0.70	0.61	0.70	0.70	2.01		
LVA	0.61	0.66	0.61	0.63	0.66	0.68	0.63	0.72	0.67	0.61	0.65	0.68	0.69	0.60	0.61	0.61	0.72	0.74	0.61	0.61	0.67	0.60	0.28	

HOL fua

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT	LVA	
AUS	0.37																								
BEL	0.73	1.46																							
CAN	0.77	0.78	5.15																						
CHE	0.83	0.81	0.93	12.00																					
DEU	0.75	0.84	0.93	0.87	12.28																				
DFS	0.76	0.85	0.91	0.89	0.88	11.86																			
ESP	0.77	0.79	0.88	0.86	0.85	0.84	0.86																		
FRA	0.79	0.90	0.90	0.89	0.90	0.92	0.85	1.06																	
GBR	0.78	0.79	0.94	0.88	0.96	0.87	0.87	0.90	1.29																
ITA	0.70	0.65	0.88	0.83	0.86	0.76	0.85	0.81	0.90	1.28															
NLD	0.74	0.85	0.92	0.90	0.95	0.88	0.86	0.91	0.93	0.83	4.76														
USA	0.75	0.71	0.94	0.87	0.90	0.88	0.89	0.85	0.94	0.93	0.89	1.41													
HUN	0.77	0.74	0.89	0.87	0.86	0.87	0.82	0.85	0.87	0.79	0.84	0.82	1.03												
POL	0.71	0.81	0.85	0.85	0.90	0.88	0.81	0.88	0.88	0.79	0.86	0.81	0.85	11.74											
NZL	0.77	0.78	0.84	0.80	0.84	0.81	0.80	0.86	0.87	0.76	0.84	0.85	0.73	0.75	0.41										
ZAF	0.75	0.77	0.86	0.82	0.87	0.86	0.81	0.84	0.89	0.71	0.84	0.82	0.82	0.76	0.80	0.85									
JPN	0.75	0.76	0.95	0.91	0.90	0.91	0.85	0.88	0.91	0.86	0.88	0.91	0.88	0.85	0.81	0.81	1.44								
CZE	0.73	0.86	0.87	0.85	0.93	0.90	0.79	0.89	0.90	0.75	0.88	0.79	0.91	0.89	0.76	0.89	0.86	14.26							
EST	0.63	0.74	0.79	0.75	0.79	0.84	0.65	0.81	0.76	0.61	0.80	0.70	0.79	0.77	0.67	0.72	0.70	0.79	18.50						
IRL	0.77	0.74	0.83	0.81	0.83	0.73	0.86	0.81	0.92	0.85	0.83	0.88	0.69	0.78	0.84	0.78	0.78	0.74	0.64	1.17					
KOR	0.68	0.75	0.68	0.74	0.69	0.77	0.74	0.75	0.69	0.58	0.68	0.64	0.77	0.73	0.67	0.80	0.72	0.81	0.63	0.68	3.23				
SVN	0.50	0.77	0.51	0.58	0.69	0.57	0.64	0.64	0.55	0.53	0.68	0.52	0.54	0.65	0.54	0.51	0.59	0.66	0.46	0.52	0.65	19.19			
PRT	0.58	0.72	0.65	0.63	0.62	0.68	0.71	0.65	0.62	0.55	0.64	0.63	0.56	0.62	0.71	0.65	0.68	0.61	0.56	0.65	0.67	0.59	1.38		
LVA	0.65	0.84	0.77	0.73	0.78	0.79	0.68	0.80	0.73	0.61	0.78	0.70	0.79	0.76	0.74	0.69	0.75	0.83	0.71	0.63	0.74	0.62	0.61	0.34	

HOL ruh

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT	LVA	
AUS	0.40																								
BEL	0.83	1.24																							
CAN	0.77	0.91	5.47																						
CHE	0.81	0.91	0.93	11.24																					
DEU	0.80	0.89	0.88	0.89	13.08																				
DFS	0.77	0.91	0.86	0.91	0.95	11.58																			
ESP	0.81	0.87	0.84	0.86	0.91	0.91	0.81																		
FRA	0.77	0.89	0.84	0.88	0.90	0.93	0.89	1.07																	
GBR	0.77	0.83	0.73	0.81	0.85	0.90	0.86	0.88	1.38																
ITA	0.70	0.74	0.70	0.71	0.81	0.85	0.87	0.83	0.83	1.24															
NLD	0.74	0.83	0.75	0.83	0.92	0.92	0.89	0.88	0.88	0.83	4.15														
USA	0.76	0.84	0.81	0.85	0.90	0.93	0.89	0.87	0.92	0.88	0.86	1.49													
HUN	0.80	0.79	0.79	0.79	0.86	0.82	0.87	0.82	0.80	0.81	0.81	0.81	0.98												
POL	0.70	0.81	0.70	0.76	0.82	0.85	0.86	0.84	0.81	0.83	0.83	0.79	0.79	10.30											
NZL	0.79	0.81	0.74	0.83	0.83	0.87	0.84	0.85	0.91	0.79	0.83	0.90	0.82	0.77	0.39										
ZAF	0.70	0.75	0.70	0.78	0.75	0.83	0.79	0.75	0.86	0.77	0.77	0.81	0.73	0.70	0.81	0.79									
JPN	0.81	0.92	0.92	0.92	0.91	0.92	0.93	0.90	0.82	0.82	0.86	0.87	0.86	0.85	0.82	0.78	1.46								
CZE	0.79	0.88	0.88	0.85	0.89	0.85	0.81	0.83	0.73	0.72	0.76	0.78	0.85	0.71	0.76	0.78	0.86	14.47							
EST	0.73	0.77	0.77	0.77	0.82	0.83	0.84	0.83	0.78	0.79	0.78	0.83	0.83	0.80	0.80	0.72	0.85	0.80	17.08						
IRL	0.71	0.75	0.70	0.73	0.78	0.83	0.83	0.79	0.91	0.85	0.82	0.89	0.77	0.76	0.83	0.78	0.76	0.70	0.78	1.03					
KOR	0.73	0.82	0.84	0.78	0.73	0.71	0.76	0.70	0.69	0.70	0.70	0.70	0.71	0.70	0.70	0.70	0.83	0.79	0.73	0.70	3.39				
SVN	0.74	0.91	0.86	0.83	0.89	0.89	0.87	0.87	0.76	0.81	0.83	0.81	0.76	0.79	0.72	0.72	0.88	0.87	0.81	0.74	0.79	16.31			
PRT	0.71	0.78	0.69	0.70	0.79	0.83	0.83	0.80	0.86	0.82	0.81	0.81	0.76	0.80	0.76	0.75	0.78	0.70	0.71	0.79	0.70	0.79	1.20		
LVA	0.70	0.74	0.71	0.71	0.77	0.74	0.73	0.70	0.70	0.69	0.73	0.71	0.69	0.69	0.70	0.70	0.74	0.71	0.70	0.70	0.70	0.77	0.69	0.43	

GBR	0.92	0.90	0.95	0.93	0.94	0.91	0.96	0.89	1.35															
ITA	0.86	0.86	0.87	0.86	0.86	0.86	0.86	0.86	0.86	1.14														
NLD	0.93	0.97	0.98	0.97	0.98	0.96	0.95	0.96	0.94	0.86	5.00													
USA	0.86	0.87	0.92	0.88	0.91	0.91	0.92	0.86	0.95	0.86	0.90	1.38												
HUN	0.95	0.94	0.95	0.95	0.95	0.91	0.95	0.92	0.92	0.86	0.93	0.88	0.93											
POL	0.87	0.88	0.93	0.89	0.92	0.89	0.92	0.88	0.92	0.86	0.92	0.88	0.91	11.76										
NZL	0.91	0.89	0.92	0.91	0.90	0.86	0.89	0.90	0.91	0.86	0.91	0.87	0.90	0.87	0.31									
ZAF	0.90	0.91	0.94	0.93	0.91	0.89	0.93	0.91	0.93	0.86	0.92	0.88	0.92	0.87	0.91	0.82								
JPN	0.93	0.99	0.97	0.97	0.95	0.95	0.93	0.98	0.90	0.86	0.96	0.86	0.93	0.90	0.89	0.92	1.49							
CZE	0.94	0.95	0.96	0.96	0.95	0.92	0.94	0.94	0.91	0.86	0.95	0.87	0.95	0.91	0.90	0.92	0.95	13.16						
EST	0.94	0.95	0.96	0.95	0.94	0.92	0.93	0.94	0.91	0.86	0.96	0.86	0.93	0.90	0.88	0.89	0.95	0.96	19.16					
IRL	0.89	0.87	0.92	0.90	0.92	0.88	0.91	0.86	0.96	0.86	0.90	0.89	0.87	0.86	0.87	0.90	0.87	0.87	0.89	1.30				
KOR	0.88	0.91	0.90	0.91	0.88	0.89	0.90	0.90	0.86	0.86	0.89	0.86	0.90	0.86	0.88	0.89	0.92	0.90	0.90	0.86	3.12			
SVN	0.94	0.95	0.96	0.96	0.98	0.95	0.97	0.94	0.94	0.86	0.97	0.90	0.94	0.89	0.88	0.88	0.94	0.94	0.93	0.91	0.89	16.19		
PRT	0.89	0.90	0.92	0.90	0.93	0.88	0.93	0.88	0.92	0.86	0.91	0.87	0.92	0.91	0.86	0.87	0.90	0.92	0.91	0.87	0.86	0.94	1.48	
LVA	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.38

HOL ftl

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT	LVA	NZL
AUS	0.78																							
BEL	0.93	1.40																						
CAN	0.95	0.92	5.12																					
CHE	0.93	0.97	0.91	11.30																				
DEU	0.94	0.98	0.95	0.97	13.56																			
DFS	0.93	0.97	0.92	0.98	0.98	10.82																		
ESP	0.93	0.98	0.92	0.96	0.98	0.97	1.08																	
FRA	0.94	0.90	0.98	0.89	0.93	0.91	0.90	1.07																
GBR	0.95	0.97	0.95	0.95	0.98	0.95	0.97	0.94	1.31															
ITA	0.89	0.92	0.93	0.90	0.94	0.92	0.92	0.92	0.94	1.38														
NLD	0.93	0.98	0.93	0.97	0.98	0.97	0.98	0.91	0.97	0.92	4.91													
USA	0.94	0.94	0.96	0.94	0.96	0.95	0.95	0.94	0.97	0.93	0.95	1.44												
HUN	0.89	0.96	0.89	0.96	0.95	0.95	0.95	0.89	0.92	0.89	0.95	0.90	1.12											
POL	0.92	0.96	0.90	0.96	0.97	0.97	0.96	0.89	0.95	0.92	0.96	0.94	0.96	11.20										
ZAF	0.92	0.93	0.89	0.91	0.91	0.92	0.94	0.89	0.92	0.89	0.92	0.91	0.91	0.93	0.87									
JPN	0.94	0.98	0.93	0.98	0.98	0.98	0.98	0.92	0.97	0.92	0.98	0.97	0.95	0.98	0.94	1.40								
CZE	0.93	0.96	0.92	0.97	0.98	0.97	0.97	0.90	0.96	0.91	0.97	0.95	0.95	0.98	0.92	0.98	14.35							
EST	0.91	0.94	0.89	0.94	0.96	0.96	0.94	0.89	0.92	0.91	0.94	0.91	0.94	0.97	0.88	0.95	0.96	16.41						
IRL	0.92	0.94	0.94	0.91	0.94	0.92	0.93	0.93	0.97	0.92	0.93	0.94	0.89	0.91	0.89	0.93	0.93	0.90	1.73					
KOR	0.89	0.92	0.89	0.92	0.92	0.93	0.94	0.89	0.92	0.89	0.93	0.91	0.92	0.93	0.90	0.94	0.92	0.90	0.89	4.25				
SVN	0.89	0.94	0.89	0.94	0.95	0.93	0.95	0.89	0.95	0.92	0.95	0.91	0.93	0.94	0.89	0.95	0.94	0.92	0.91	0.89	18.52			
PRT	0.89	0.95	0.91	0.93	0.95	0.95	0.93	0.89	0.93	0.92	0.95	0.93	0.91	0.94	0.89	0.95	0.95	0.93	0.92	0.89	0.92	1.89		
LVA	0.89	0.89	0.90	0.89	0.89	0.89	0.89	0.90	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.46	
NZL	0.95	0.91	0.95	0.90	0.93	0.91	0.92	0.94	0.94	0.90	0.93	0.92	0.89	0.90	0.88	0.92	0.90	0.89	0.91	0.89	0.88	0.89	0.88	0.54

HOL rtp

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	POL	NZL	JPN	CZE	EST	IRL	KOR	SVN	PRT	ZAF	HUN	LVA
AUS	0.43																							
BEL	0.92	1.42																						
CAN	0.89	0.97	6.11																					
CHE	0.91	0.97	0.98	11.86																				
DEU	0.89	0.96	0.97	0.97	14.09																			
DFS	0.87	0.94	0.95	0.94	0.96	11.05																		
ESP	0.89	0.96	0.97	0.96	0.97	0.96	0.88																	
FRA	0.90	0.97	0.98	0.98	0.97	0.95	0.97	1.05																
GBR	0.90	0.96	0.97	0.96	0.97	0.95	0.97	0.97	1.44															
ITA	0.86	0.89	0.89	0.88	0.92	0.91	0.91	0.91	0.90	1.28														
NLD	0.90	0.96	0.98	0.97	0.98	0.97	0.98	0.98	0.97	0.91	4.88													
USA	0.88	0.94	0.95	0.93	0.95	0.97	0.96	0.94	0.97	0.90	0.96	1.58												
POL	0.87	0.93	0.94	0.92	0.96	0.93	0.95	0.93	0.93	0.90	0.94	0.91	11.21											
NZL	0.91	0.95	0.95	0.94	0.94	0.89	0.93	0.95	0.95	0.86	0.94	0.90	0.92	0.47										
JPN	0.91	0.97	0.98	0.97	0.96	0.96	0.97	0.97	0.96	0.90	0.98	0.96	0.94	0.93	1.56									
CZE	0.89	0.97	0.95	0.95	0.96	0.94	0.94	0.95	0.95	0.90	0.95	0.94	0.95	0.92	0.95	14.38								
EST	0.92	0.95	0.94	0.95	0.96	0.92	0.94	0.95	0.94	0.89	0.96	0.92	0.93	0.92	0.94	0.94	16.31							
IRL	0.87	0.93	0.92	0.91	0.92	0.89	0.91	0.93	0.93	0.86	0.91	0.89	0.89	0.92	0.91	0.88	0.88	1.25						
KOR	0.87	0.92	0.94	0.94	0.94	0.94	0.96	0.94	0.91	0.91	0.95	0.92	0.91	0.90	0.95	0.89	0.90	0.88	2.14					

ESP	0.42	0.70	0.73	0.76	0.71	0.82	0.97														
FRA	0.53	0.80	0.67	0.75	0.76	0.60	0.75	1.05													
GBR	0.50	0.73	0.66	0.79	0.73	0.72	0.79	0.84	1.57												
ITA	0.49	0.72	0.58	0.70	0.72	0.59	0.71	0.79	0.67	1.59											
NLD	0.42	0.83	0.67	0.70	0.76	0.65	0.66	0.81	0.73	0.67	5.10										
USA	0.50	0.70	0.60	0.78	0.73	0.67	0.74	0.71	0.73	0.78	0.67	1.50									
HUN	0.57	0.77	0.56	0.62	0.70	0.58	0.58	0.76	0.64	0.71	0.69	0.70	1.19								
POL	0.46	0.70	0.56	0.66	0.67	0.57	0.58	0.65	0.57	0.70	0.57	0.73	0.72	13.68							
JPN	0.45	0.63	0.64	0.78	0.78	0.73	0.70	0.59	0.60	0.72	0.59	0.85	0.61	0.74	0.54						
CZE	0.48	0.75	0.61	0.72	0.78	0.63	0.65	0.68	0.64	0.78	0.62	0.83	0.80	0.82	0.80	17.25					
EST	0.43	0.60	0.58	0.60	0.64	0.58	0.58	0.65	0.58	0.58	0.72	0.57	0.68	0.58	0.59	0.68	19.89				
IRL	0.57	0.72	0.60	0.78	0.68	0.65	0.69	0.68	0.79	0.67	0.62	0.66	0.66	0.59	0.68	0.63	0.43	1.35			
SVN	0.45	0.80	0.57	0.66	0.67	0.62	0.57	0.71	0.58	0.67	0.70	0.70	0.84	0.77	0.73	0.78	0.72	0.62	23.06		
PRT	0.35	0.57	0.56	0.57	0.59	0.57	0.61	0.68	0.62	0.66	0.63	0.60	0.64	0.57	0.57	0.61	0.68	0.47	0.63	0.18	

HOL loc

BEL	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	CZE	IRL	KOR	SVN	PRT	EST	HUN	POL
BEL	1.79																		
CAN	0.85	6.72																	
CHE	0.56	0.62	12.40																
DEU	0.67	0.74	0.69	11.50															
DFS	0.88	0.91	0.51	0.69	13.23														
ESP	0.63	0.74	0.68	0.74	0.75	0.96													
FRA	0.80	0.79	0.73	0.83	0.70	0.77	1.05												
GBR	0.67	0.69	0.89	0.82	0.65	0.79	0.86	1.52											
ITA	0.61	0.69	0.64	0.74	0.60	0.76	0.78	0.73	1.91										
NLD	0.85	0.82	0.69	0.82	0.78	0.70	0.82	0.78	0.64	4.68									
USA	0.67	0.78	0.50	0.78	0.75	0.74	0.76	0.69	0.75	0.68	1.57								
CZE	0.51	0.61	0.55	0.63	0.61	0.64	0.63	0.66	0.69	0.50	0.62	20.62							
IRL	0.58	0.56	0.51	0.63	0.52	0.63	0.68	0.72	0.62	0.61	0.56	0.51	1.65						
KOR	0.56	0.59	0.52	0.51	0.53	0.60	0.64	0.52	0.53	0.52	0.51	0.53	10.12						
SVN	0.74	0.70	0.57	0.72	0.71	0.70	0.79	0.65	0.68	0.65	0.67	0.67	0.53	0.55	27.76				
PRT	0.50	0.50	0.54	0.60	0.50	0.59	0.53	0.60	0.58	0.52	0.50	0.63	0.50	0.51	0.67	1.99			
EST	0.54	0.52	0.53	0.52	0.52	0.52	0.53	0.52	0.52	0.51	0.51	0.55	0.53	0.67	0.67	0.53	22.44		
HUN	0.69	0.70	0.51	0.67	0.73	0.62	0.75	0.68	0.64	0.65	0.66	0.82	0.51	0.62	0.78	0.55	0.62	1.18	
POL	0.51	0.55	0.52	0.64	0.50	0.55	0.64	0.54	0.62	0.50	0.67	0.71	0.51	0.51	0.75	0.50	0.53	0.67	15.68

HOL bcs

BEL	BEL	CHE	DEU	DFS	FRA	GBR	ITA	NLD	USA	CZE	JPN	IRL	KOR	CAN	PRT	ESP	SVN	EST	HUN	NZL	POL
BEL	0.97																				
CHE	0.72	11.77																			
DEU	0.72	0.90	14.11																		
DFS	0.77	0.90	0.95	12.18																	
FRA	0.73	0.93	0.95	0.95	0.99																
GBR	0.76	0.91	0.90	0.90	0.93	1.61															
ITA	0.72	0.91	0.95	0.95	0.96	0.89	6.62														
NLD	0.72	0.94	0.96	0.95	0.95	0.91	0.94	5.07													
USA	0.77	0.72	0.81	0.80	0.81	0.76	0.78	0.77	1.37												
CZE	0.74	0.87	0.96	0.95	0.92	0.89	0.94	0.93	0.77	13.82											
JPN	0.80	0.92	0.97	0.97	0.97	0.92	0.96	0.95	0.84	0.95	1.69										
IRL	0.72	0.87	0.79	0.85	0.88	0.93	0.83	0.85	0.72	0.77	0.86	0.99									
KOR	0.72	0.75	0.85	0.86	0.86	0.82	0.85	0.80	0.75	0.86	0.88	0.72	2.42								
CAN	0.74	0.93	0.96	0.94	0.95	0.95	0.94	0.95	0.82	0.94	0.98	0.87	0.84	5.91							
PRT	0.71	0.86	0.87	0.86	0.89	0.87	0.85	0.85	0.71	0.83	0.87	0.79	0.83	0.89	1.79						
ESP	0.73	0.88	0.92	0.92	0.95	0.93	0.92	0.91	0.76	0.91	0.94	0.82	0.87	0.94	0.88	1.03					
SVN	0.72	0.88	0.91	0.91	0.89	0.80	0.89	0.91	0.72	0.90	0.89	0.74	0.79	0.85	0.74	0.85	21.24				
EST	0.73	0.83	0.90	0.87	0.88	0.77	0.87	0.91	0.82	0.87	0.88	0.72	0.73	0.87	0.76	0.80	0.87	16.62			
HUN	0.72	0.87	0.94	0.92	0.92	0.87	0.94	0.90	0.75	0.95	0.93	0.76	0.85	0.93	0.84	0.91	0.86	0.83	0.99		
NZL	0.71	0.90	0.92	0.91	0.93	0.92	0.92	0.88	0.74	0.89	0.92	0.88	0.81	0.92	0.85	0.87	0.84	0.81	0.89	0.16	
POL	0.73	0.86	0.91	0.89	0.91	0.89	0.90	0.87	0.75	0.91	0.92	0.80	0.79	0.91	0.86	0.88	0.83	0.79	0.91	0.85	11.21

JER sta

AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
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AUS	0.54									
CAN	0.89	6.71								
DFS	0.90	0.96	11.75							
GBR	0.91	0.96	0.94	1.10						
ITA	0.88	0.95	0.93	0.95	1.56					
NZL	0.87	0.84	0.85	0.90	0.87	0.36				
USA	0.90	0.97	0.95	0.96	0.94	0.89	1.66			
ZAF	0.87	0.85	0.84	0.92	0.87	0.90	0.86	8.79		
NLD	0.89	0.95	0.97	0.94	0.92	0.85	0.93	0.87	5.17	
CHE	0.90	0.96	0.96	0.95	0.93	0.85	0.94	0.87	0.97	11.54

JER	cwi									
	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.30									
CAN	0.74	6.53								
DFS	0.72	0.81	15.59							
GBR	0.81	0.91	0.85	1.82						
ITA	0.65	0.78	0.69	0.74	1.66					
NZL	0.81	0.73	0.66	0.76	0.66	0.37				
USA	0.74	0.89	0.81	0.85	0.91	0.67	1.01			
ZAF	0.69	0.78	0.72	0.80	0.73	0.76	0.77	8.56		
NLD	0.73	0.91	0.89	0.90	0.72	0.69	0.84	0.80	4.45	
CHE	0.67	0.86	0.86	0.83	0.82	0.68	0.86	0.72	0.87	12.05

JER	bde									
	AUS	CAN	DFS	GBR	ITA	NZL	ZAF	NLD	USA	CHE
AUS	0.33									
CAN	0.76	5.67								
DFS	0.75	0.86	13.63							
GBR	0.74	0.86	0.85	1.51						
ITA	0.70	0.74	0.78	0.85	1.63					
NZL	0.78	0.69	0.70	0.69	0.70	0.37				
ZAF	0.79	0.72	0.82	0.80	0.71	0.75	8.73			
NLD	0.70	0.83	0.84	0.89	0.88	0.70	0.78	4.66		
USA	0.69	0.70	0.73	0.77	0.91	0.69	0.71	0.87	1.01	
CHE	0.75	0.87	0.91	0.89	0.84	0.71	0.80	0.90	0.83	12.87

JER	ang									
	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE	
AUS	0.33									
CAN	0.67	7.67								
DFS	0.71	0.83	13.22							
GBR	0.80	0.83	0.87	1.27						
ITA	0.73	0.85	0.82	0.85	1.54					
USA	0.70	0.83	0.86	0.83	0.80	1.01				
ZAF	0.62	0.63	0.66	0.80	0.82	0.67	8.65			
NLD	0.72	0.82	0.73	0.82	0.79	0.73	0.65	6.22		
CHE	0.63	0.79	0.71	0.72	0.74	0.72	0.65	0.74	9.66	

JER	ran									
	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.36									
CAN	0.88	5.79								
DFS	0.89	0.97	11.56							
GBR	0.94	0.95	0.96	1.23						
ITA	0.88	0.95	0.94	0.95	1.68					
NZL	0.90	0.88	0.88	0.92	0.89	0.30				
USA	0.89	0.95	0.96	0.97	0.94	0.91	1.23			
ZAF	0.89	0.88	0.89	0.89	0.88	0.88	0.88	8.97		
NLD	0.90	0.96	0.95	0.96	0.94	0.89	0.95	0.91	4.84	
CHE	0.91	0.96	0.95	0.95	0.94	0.89	0.94	0.89	0.95	12.83

JER	rwi									
	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.32									
CAN	0.80	6.31								
DFS	0.81	0.91	12.07							
GBR	0.80	0.92	0.86	1.40						
ITA	0.77	0.85	0.82	0.85	1.43					
NZL	0.88	0.82	0.82	0.80	0.80	0.30				
USA	0.77	0.82	0.81	0.84	0.87	0.78	0.99			
ZAF	0.77	0.78	0.79	0.80	0.78	0.77	0.78	9.19		
NLD	0.85	0.94	0.91	0.88	0.80	0.84	0.81	0.79	5.01	
CHE	0.83	0.92	0.83	0.87	0.80	0.80	0.79	0.78	0.92	12.85

JER	rls									
	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.18									
CAN	0.67	6.15								
DFS	0.68	0.91	12.63							
GBR	0.71	0.84	0.75	1.71						
ITA	0.67	0.86	0.81	0.80	1.91					
NZL	0.66	0.67	0.67	0.68	0.68	0.12				
USA	0.67	0.94	0.88	0.87	0.85	0.66	0.87			
ZAF	0.71	0.68	0.68	0.75	0.68	0.83	0.71	11.86		
NLD	0.72	0.92	0.91	0.85	0.85	0.67	0.86	0.73	3.67	
CHE	0.75	0.92	0.85	0.82	0.81	0.69	0.86	0.71	0.90	9.17

JER	rlr									
	AUS	CAN	DFS	ITA	ZAF	NLD	USA	CHE		
AUS	0.21									
CAN	0.52	6.41								
DFS	0.54	0.78	13.72							
ITA	0.56	0.82	0.71	1.50						
ZAF	0.51	0.53	0.52	0.55	12.39					
NLD	0.58	0.86	0.89	0.74	0.62	5.05				
USA	0.50	0.72	0.63	0.83	0.52	0.73	0.87			
CHE	0.64	0.68	0.62	0.62	0.55	0.70	0.58	12.05		

JER	fan									
	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE	
AUS	0.22									
CAN	0.61	6.42								
DFS	0.63	0.87	12.77							
GBR	0.71	0.79	0.77	1.50						
ITA	0.62	0.74	0.69	0.71	1.46					
USA	0.62	0.88	0.81	0.85	0.79	0.87				
ZAF	0.65	0.65	0.67	0.83	0.66	0.74	9.63			
NLD	0.68	0.75	0.78	0.86	0.71	0.77	0.70	4.14		
CHE	0.65	0.81	0.81	0.71	0.70	0.74	0.67	0.73	11.99	

JER	fua									
	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.37									
CAN	0.73	5.77								
DFS	0.69	0.85	12.83							
GBR	0.75	0.94	0.86	1.64						
ITA	0.68	0.86	0.74	0.87	1.52					
NZL	0.80	0.71	0.73	0.81	0.69	0.42				
USA	0.74	0.94	0.86	0.92	0.90	0.71	1.46			

ZAF	0.70	0.91	0.87	0.93	0.77	0.74	0.89	11.90		
NLD	0.74	0.91	0.87	0.92	0.84	0.81	0.87	0.85	4.68	
CHE	0.78	0.92	0.85	0.87	0.79	0.71	0.86	0.88	0.89	11.93

JER ruh

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.35									
CAN	0.72	6.85								
DFS	0.74	0.84	10.66							
GBR	0.80	0.79	0.83	1.36						
ITA	0.73	0.72	0.80	0.83	1.35					
NZL	0.72	0.71	0.76	0.77	0.81	0.41				
USA	0.77	0.83	0.90	0.91	0.83	0.74	1.24			
ZAF	0.81	0.71	0.78	0.86	0.84	0.78	0.84	9.14		
NLD	0.74	0.76	0.91	0.88	0.82	0.81	0.87	0.77	4.22	
CHE	0.78	0.92	0.85	0.83	0.71	0.76	0.85	0.75	0.83	12.80

JER usu

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.38									
CAN	0.74	6.40								
DFS	0.71	0.84	13.47							
GBR	0.79	0.86	0.85	1.72						
ITA	0.65	0.76	0.76	0.84	1.75					
NZL	0.58	0.59	0.59	0.63	0.64	0.40				
USA	0.73	0.82	0.89	0.84	0.82	0.60	0.97			
ZAF	0.76	0.77	0.72	0.80	0.66	0.59	0.76	10.02		
NLD	0.81	0.82	0.88	0.91	0.79	0.60	0.88	0.79	4.69	
CHE	0.75	0.90	0.86	0.81	0.80	0.61	0.83	0.78	0.85	10.31

JER ude

	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE	
AUS	0.35									
CAN	0.90	5.48								
DFS	0.89	0.93	12.16							
GBR	0.89	0.97	0.93	1.43						
ITA	0.91	0.95	0.94	0.94	1.68					
USA	0.88	0.96	0.95	0.94	0.96	1.75				
ZAF	0.88	0.89	0.89	0.90	0.88	0.89	10.40			
NLD	0.90	0.96	0.96	0.96	0.95	0.95	0.91	4.34		
CHE	0.93	0.95	0.93	0.92	0.95	0.95	0.89	0.96	9.89	

JER ftp

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.46									
CAN	0.89	6.38								
DFS	0.88	0.91	12.78							
GBR	0.90	0.94	0.88	1.34						
ITA	0.87	0.87	0.86	0.86	1.68					
NZL	0.87	0.92	0.87	0.88	0.87	0.30				
USA	0.86	0.95	0.91	0.93	0.86	0.88	1.31			
ZAF	0.87	0.93	0.87	0.92	0.87	0.90	0.90	10.13		
NLD	0.92	0.97	0.94	0.93	0.86	0.90	0.90	0.90	5.36	
CHE	0.92	0.95	0.93	0.91	0.87	0.88	0.90	0.88	0.96	9.99

JER ftl

	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE	NZL
AUS	0.33									
CAN	0.91	5.61								

DEU	0.89	0.97	13.36								
DFS	0.87	0.96	0.97	8.65							
GBR	0.92	0.96	0.96	0.93	1.29						
NOR	0.87	0.93	0.94	0.97	0.92	13.62					
NZL	0.89	0.89	0.86	0.89	0.92	0.91	0.49				
USA	0.90	0.97	0.96	0.94	0.97	0.91	0.89	2.34			
NLD	0.87	0.95	0.97	0.97	0.94	0.96	0.84	0.93	4.90		
CAM	0.92	0.90	0.91	0.91	0.91	0.91	0.91	0.90	0.90	6.05	
LVA	0.86	0.85	0.86	0.92	0.84	0.90	0.86	0.84	0.86	0.90	0.64

RDC	cwi										
	AUS	CAN	DEU	DFS	GBR	NZL	USA	NLD	CAM	NOR	LVA
AUS	0.41										
CAN	0.73	6.95									
DEU	0.72	0.88	11.51								
DFS	0.77	0.81	0.89	13.70							
GBR	0.82	0.88	0.90	0.88	1.61						
NZL	0.79	0.69	0.71	0.68	0.80	0.35					
USA	0.66	0.84	0.81	0.83	0.83	0.71	1.28				
NLD	0.72	0.92	0.92	0.89	0.91	0.68	0.81	5.20			
CAM	0.77	0.79	0.79	0.79	0.79	0.79	0.79	0.79	6.50		
NOR	0.82	0.79	0.81	0.88	0.81	0.81	0.81	0.86	0.79	14.32	
LVA	0.68	0.72	0.68	0.66	0.67	0.70	0.65	0.71	0.79	0.80	0.30

RDC	bde										
	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM	LVA
AUS	0.49										
CAN	0.80	5.90									
DEU	0.76	0.87	10.06								
DFS	0.78	0.83	0.92	11.86							
GBR	0.78	0.86	0.92	0.90	1.57						
NOR	0.78	0.81	0.81	0.89	0.83	15.01					
NZL	0.77	0.70	0.72	0.74	0.75	0.82	0.35				
USA	0.71	0.76	0.89	0.83	0.89	0.83	0.73	1.28			
NLD	0.69	0.83	0.90	0.85	0.91	0.87	0.69	0.90	4.71		
CAM	0.84	0.82	0.84	0.83	0.83	0.83	0.85	0.83	0.83	5.14	
LVA	0.73	0.77	0.80	0.81	0.78	0.84	0.75	0.69	0.74	0.83	0.34

RDC	ang										
	AUS	CAN	DEU	DFS	GBR	USA	NLD	CAM	NOR	LVA	
AUS	0.47										
CAN	0.65	6.85									
DEU	0.64	0.61	7.29								
DFS	0.71	0.75	0.66	9.10							
GBR	0.77	0.82	0.62	0.82	1.36						
USA	0.69	0.86	0.61	0.81	0.85	1.19					
NLD	0.73	0.81	0.61	0.75	0.82	0.74	5.38				
CAM	0.81	0.78	0.79	0.79	0.79	0.79	0.79	7.33			
NOR	0.72	0.76	0.79	0.63	0.77	0.78	0.70	0.77	16.13		
LVA	0.66	0.63	0.63	0.62	0.63	0.62	0.64	0.77	0.77	0.30	

RDC	ran										
	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM	LVA
AUS	0.42										
CAN	0.90	5.75									
DEU	0.91	0.97	9.03								
DFS	0.90	0.95	0.96	10.03							
GBR	0.93	0.97	0.97	0.95	1.57						
NOR	0.90	0.94	0.90	0.91	0.93	12.10					
NZL	0.92	0.91	0.89	0.88	0.92	0.93	0.28				
USA	0.90	0.98	0.96	0.94	0.97	0.93	0.91	1.63			

NLD	0.90	0.97	0.98	0.96	0.97	0.95	0.89	0.96	5.79		
CAM	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	5.35	
LVA	0.89	0.92	0.92	0.91	0.91	0.89	0.89	0.90	0.91	0.92	0.42

RDC	rwi										

	AUS	CAN	DEU	DFS	GBR	NZL	USA	NLD	CAM	NOR	LVA
AUS	0.47										
CAN	0.85	6.12									
DEU	0.81	0.95	9.86								
DFS	0.80	0.93	0.93	10.50							
GBR	0.84	0.92	0.90	0.88	1.44						
NZL	0.82	0.89	0.82	0.88	0.90	0.33					
USA	0.77	0.91	0.86	0.89	0.94	0.87	1.42				
NLD	0.84	0.94	0.96	0.93	0.89	0.83	0.81	6.29			
CAM	0.87	0.87	0.87	0.88	0.87	0.88	0.87	0.87	6.30		
NOR	0.83	0.87	0.85	0.94	0.87	0.88	0.87	0.88	0.87	13.88	
LVA	0.79	0.82	0.82	0.85	0.78	0.81	0.77	0.82	0.86	0.87	0.41

RDC	rls										

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM	LVA
AUS	0.23										
CAN	0.70	6.47									
DEU	0.72	0.94	9.21								
DFS	0.69	0.97	0.94	9.28							
GBR	0.79	0.77	0.85	0.78	1.58						
NOR	0.72	0.86	0.85	0.93	0.80	11.80					
NZL	0.68	0.67	0.68	0.67	0.70	0.74	0.12				
USA	0.69	0.92	0.93	0.93	0.82	0.83	0.67	0.89			
NLD	0.72	0.92	0.93	0.89	0.86	0.80	0.66	0.90	5.25		
CAM	0.83	0.80	0.80	0.80	0.80	0.80	0.79	0.80	0.80	6.70	
LVA	0.70	0.78	0.83	0.74	0.75	0.71	0.72	0.77	0.81	0.80	0.28

RDC	rlr										

	AUS	CAN	DEU	DFS	NOR	NLD	USA	CAM	LVA		
AUS	0.20										
CAN	0.58	6.60									
DEU	0.62	0.87	10.36								
DFS	0.55	0.82	0.90	10.92							
NOR	0.59	0.77	0.80	0.83	13.27						
NLD	0.58	0.87	0.90	0.87	0.82	5.15					
USA	0.55	0.72	0.77	0.67	0.71	0.80	0.89				
CAM	0.72	0.72	0.73	0.73	0.71	0.72	0.71	6.94			
LVA	0.62	0.72	0.76	0.79	0.64	0.69	0.71	0.73	0.24		

RDC	fan										

	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM	LVA	
AUS	0.29										
CAN	0.65	6.40									
DEU	0.69	0.81	13.77								
DFS	0.63	0.69	0.80	9.34							
GBR	0.74	0.79	0.91	0.74	1.61						
NOR	0.68	0.73	0.84	0.62	0.77	12.86					
USA	0.68	0.85	0.83	0.71	0.83	0.77	1.06				
NLD	0.68	0.75	0.88	0.79	0.88	0.68	0.80	5.20			
CAM	0.76	0.78	0.77	0.77	0.77	0.77	0.78	0.78	7.59		
LVA	0.70	0.64	0.67	0.63	0.68	0.70	0.68	0.67	0.78	0.27	

RDC	fua										

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM	LVA

AUS	0.38										
CAN	0.77	5.58									
DEU	0.74	0.90	12.51								
DFS	0.72	0.80	0.84	11.68							
GBR	0.77	0.88	0.95	0.86	1.54						
NOR	0.72	0.82	0.77	0.85	0.80	12.06					
NZL	0.77	0.82	0.81	0.70	0.78	0.73	0.36				
USA	0.75	0.93	0.90	0.85	0.92	0.80	0.85	1.46			
NLD	0.75	0.91	0.93	0.87	0.93	0.88	0.84	0.89	3.87		
CAM	0.83	0.81	0.79	0.80	0.79	0.80	0.79	0.80	0.81	6.57	
LVA	0.68	0.75	0.76	0.80	0.75	0.75	0.74	0.70	0.75	0.78	0.36

RDC	ruh										
	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM	LVA
AUS	0.48										
CAN	0.78	5.70									
DEU	0.79	0.87	14.54								
DFS	0.78	0.87	0.90	10.72							
GBR	0.79	0.75	0.85	0.85	1.44						
NOR	0.75	0.84	0.88	0.88	0.82	12.26					
NZL	0.83	0.74	0.81	0.77	0.92	0.77	0.33				
USA	0.77	0.84	0.90	0.93	0.90	0.84	0.84	1.33			
NLD	0.74	0.75	0.91	0.91	0.88	0.91	0.83	0.86	4.04		
CAM	0.84	0.83	0.82	0.84	0.83	0.82	0.84	0.83	0.82	6.28	
LVA	0.75	0.73	0.76	0.84	0.72	0.74	0.74	0.72	0.75	0.82	0.39

RDC	usu										
	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM	LVA
AUS	0.34										
CAN	0.75	5.87									
DEU	0.72	0.90	12.50								
DFS	0.66	0.76	0.79	13.06							
GBR	0.80	0.80	0.80	0.75	1.84						
NOR	0.66	0.71	0.67	0.73	0.76	12.07					
NZL	0.67	0.71	0.62	0.60	0.68	0.69	0.32				
USA	0.77	0.82	0.75	0.85	0.89	0.77	0.70	1.17			
NLD	0.78	0.82	0.79	0.89	0.92	0.75	0.58	0.91	4.54		
CAM	0.80	0.78	0.76	0.76	0.78	0.76	0.77	0.78	0.78	6.23	
LVA	0.63	0.65	0.62	0.60	0.74	0.67	0.68	0.69	0.68	0.76	0.32

RDC	ude										
	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM	LVA	
AUS	0.53										
CAN	0.88	5.67									
DEU	0.90	0.97	12.71								
DFS	0.88	0.96	0.94	10.66							
GBR	0.89	0.96	0.96	0.96	1.82						
NOR	0.90	0.91	0.90	0.88	0.92	14.22					
USA	0.88	0.96	0.96	0.95	0.96	0.92	1.29				
NLD	0.89	0.97	0.97	0.95	0.97	0.89	0.96	4.23			
CAM	0.93	0.93	0.93	0.93	0.93	0.92	0.93	0.93	4.44		
LVA	0.89	0.89	0.88	0.91	0.88	0.89	0.88	0.89	0.92	0.42	

RDC	ftp										
	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM	LVA
AUS	0.54										
CAN	0.92	5.78									
DEU	0.93	0.97	13.01								
DFS	0.89	0.94	0.93	11.93							
GBR	0.91	0.93	0.94	0.89	1.50						
NOR	0.88	0.92	0.89	0.94	0.91	14.19					

NZL	0.92	0.90	0.90	0.87	0.89	0.89	0.26				
USA	0.86	0.92	0.91	0.92	0.93	0.91	0.87	1.43			
NLD	0.93	0.98	0.97	0.95	0.94	0.89	0.91	0.90	4.69		
CAM	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	6.73	
LVA	0.88	0.87	0.87	0.87	0.87	0.89	0.88	0.86	0.87	0.91	0.39

RDC	ft1										
	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM	LVA	NZL
AUS	0.57										
CAN	0.93	4.93									
DEU	0.93	0.94	14.02								
DFS	0.92	0.90	0.97	10.59							
GBR	0.95	0.93	0.98	0.93	1.42						
NOR	0.91	0.92	0.92	0.94	0.93	12.50					
USA	0.94	0.93	0.95	0.92	0.97	0.93	1.64				
NLD	0.93	0.93	0.98	0.97	0.97	0.95	0.95	5.20			
CAM	0.94	0.93	0.94	0.93	0.93	0.93	0.94	0.93	7.31		
LVA	0.90	0.91	0.90	0.90	0.90	0.94	0.89	0.90	0.93	0.48	
NZL	0.94	0.94	0.93	0.92	0.93	0.93	0.93	0.93	0.94	0.91	0.36

RDC	rtp										
	AUS	CAN	DEU	DFS	NOR	NZL	NLD	USA	CAM	LVA	
AUS	0.39										
CAN	0.89	5.82									
DEU	0.89	0.96	13.98								
DFS	0.87	0.93	0.96	12.29							
NOR	0.89	0.90	0.89	0.87	13.13						
NZL	0.92	0.95	0.93	0.88	0.89	0.35					
NLD	0.90	0.97	0.97	0.96	0.88	0.94	5.34				
USA	0.88	0.91	0.95	0.92	0.91	0.89	0.96	1.43			
CAM	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	6.24		
LVA	0.91	0.91	0.89	0.88	0.88	0.90	0.92	0.88	0.91	0.38	

RDC	ocs										
	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM	
AUS	1.11										
CAN	0.63	4.79									
DEU	0.55	0.75	20.65								
DFS	0.64	0.61	0.75	10.51							
GBR	0.65	0.74	0.88	0.75	1.66						
NOR	0.56	0.69	0.69	0.76	0.75	16.27					
NZL	0.73	0.56	0.61	0.51	0.65	0.63	0.27				
USA	0.62	0.77	0.84	0.72	0.88	0.75	0.70	0.56			
NLD	0.59	0.72	0.87	0.81	0.88	0.71	0.64	0.86	3.50		
CAM	0.72	0.76	0.76	0.76	0.76	0.76	0.73	0.78	0.78	6.26	

RDC	ous										
	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM	
AUS	1.45										
CAN	0.71	5.43									
DEU	0.75	0.88	17.19								
DFS	0.67	0.79	0.81	10.79							
GBR	0.83	0.79	0.83	0.72	1.62						
NOR	0.72	0.80	0.79	0.79	0.82	13.08					
NZL	0.83	0.81	0.79	0.74	0.81	0.75	0.36				
USA	0.75	0.88	0.85	0.85	0.86	0.82	0.88	0.97			
NLD	0.70	0.89	0.90	0.86	0.78	0.81	0.82	0.85	4.25		
CAM	0.85	0.83	0.83	0.82	0.84	0.82	0.85	0.84	0.84	6.59	

RDC of1

	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM
AUS	0.64								
CAN	0.38	4.44							
DEU	0.41	0.74	16.33						
DFS	0.38	0.80	0.81	13.69					
GBR	0.50	0.68	0.73	0.67	1.45				
NOR	0.48	0.71	0.69	0.58	0.76	12.98			
USA	0.53	0.60	0.73	0.63	0.69	0.75	1.32		
NLD	0.44	0.67	0.76	0.64	0.73	0.64	0.67	7.22	
CAM	0.62	0.75	0.75	0.75	0.75	0.75	0.76	0.75	6.86

^LAPPENDIX II. Number of common bulls

BSW

common bulls below diagonal									
common three quarter sib group above diagonal									
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	133	85	135	42	152	117	24	20
CHE	117	0	181	495	71	276	542	53	18
FRA	78	142	0	210	63	101	206	38	14
ITA	117	436	173	0	94	216	601	71	19
NLD	34	68	51	74	0	61	86	28	12
USA	143	245	77	157	47	0	230	25	20
DEA	99	445	161	516	76	185	0	63	15
SVN	22	50	39	65	28	22	60	0	6
GBR	17	16	13	17	10	18	13	4	0

BSW

common bulls below diagonal									
common three quarter sib group above diagonal									
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	125	51	135	35	152	115	24	20
CHE	110	0	113	440	66	247	479	54	18
FRA	46	83	0	125	43	62	135	38	10
ITA	117	382	102	0	86	216	565	71	19
NLD	30	65	38	70	0	47	80	28	12
USA	143	212	44	157	38	0	212	25	20
DEA	98	386	102	479	74	160	0	63	14
SVN	22	50	39	65	28	22	60	0	6
GBR	17	16	9	17	10	18	13	4	0

BSW

common bulls below diagonal									
common three quarter sib group above diagonal									
	CAN	CHE	FRA	ITA	NLD	DEA	SVN	GBR	USA
CAN	0	133	85	135	35	117	23	20	152
CHE	117	0	181	495	70	542	49	18	276
FRA	78	142	0	210	57	206	37	14	101
ITA	117	436	173	0	86	601	67	19	216
NLD	30	68	48	70	0	81	27	12	47
DEA	99	445	161	516	75	0	60	15	230
SVN	21	46	38	61	27	56	0	6	22
GBR	17	16	13	17	10	13	4	0	20
USA	143	245	77	157	38	185	20	18	0

BSW

common bulls below diagonal						
common three quarter sib group above diagonal						
	CAN	CHE	FRA	NLD	USA	GBR
CAN	0					
CHE	117	0				
FRA	78	142	0			
NLD	30	68	48	70	0	
USA	143	245	77	157	38	
GBR	17	16	13	17	10	

CAN	0	132	84	23	151	20
CHE	117	0	175	47	274	18
FRA	77	138	0	39	100	14
NLD	20	48	34	0	32	9
USA	142	245	76	27	0	20
GBR	17	16	13	7	18	0

BSW

common bulls below diagonal

common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	133	85	135	42	152	117	24	20
CHE	117	0	181	495	71	276	542	53	18
FRA	78	142	0	210	63	101	206	38	14
ITA	117	436	173	0	94	216	601	71	19
NLD	34	68	51	74	0	61	86	28	12
USA	143	245	77	157	47	0	230	25	20
DEA	99	445	161	516	76	185	0	63	15
SVN	22	50	39	65	28	22	60	0	6
GBR	17	16	13	17	10	18	13	4	0

BSW

common bulls below diagonal

common three quarter sib group above diagonal

	CAN	CHE	FRA	NLD	USA	DEA	GBR	SVN	ITA
CAN	0	133	51	42	152	117	20	23	131
CHE	117	0	113	71	276	542	18	49	488
FRA	46	83	0	43	62	135	10	37	125
NLD	34	68	38	0	61	86	12	27	92
USA	143	245	44	47	0	230	20	22	202
DEA	99	445	103	76	185	0	15	60	595
GBR	17	16	9	10	18	13	0	6	19
SVN	21	46	38	27	20	56	4	0	67
ITA	114	430	102	73	143	508	17	61	0

BSW

common bulls below diagonal

common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	133	85	135	42	152	117	24	20
CHE	117	0	181	495	71	276	542	53	18
FRA	78	142	0	210	63	101	206	38	14
ITA	117	436	173	0	94	216	601	71	19
NLD	34	68	51	74	0	61	86	28	12
USA	143	245	77	157	47	0	230	25	20
DEA	99	445	161	516	76	185	0	63	15
SVN	22	50	39	65	28	22	60	0	6
GBR	17	16	13	17	10	18	13	4	0

BSW

common bulls below diagonal

common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	133	85	135	34	152	117	24	20
CHE	117	0	181	495	69	276	542	53	18
FRA	78	142	0	210	57	101	206	38	14
ITA	117	436	173	0	85	216	601	71	19
NLD	29	67	48	69	0	46	80	28	12
USA	143	245	77	157	36	0	230	25	20
DEA	99	445	161	516	74	185	0	63	15
SVN	22	50	39	65	28	22	60	0	6

GBR 17 16 13 17 10 18 13 4 0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	DEA	SVN	USA
CAN	0	133	85	131	34	117	24	152
CHE	117	0	181	489	69	542	53	276
FRA	78	142	0	209	57	206	38	101
ITA	114	431	173	0	84	595	71	202
NLD	29	67	48	68	0	80	28	46
DEA	99	445	161	508	74	0	63	230
SVN	22	50	39	65	28	60	0	25
USA	143	245	77	143	36	185	22	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	133	51	92	32	152	84	24	20
CHE	117	0	113	324	67	275	348	54	18
FRA	46	83	0	117	41	62	125	38	10
ITA	82	275	95	0	61	118	318	65	16
NLD	27	65	36	55	0	43	65	26	12
USA	143	245	44	84	34	0	133	25	20
DEA	73	279	95	282	60	96	0	62	12
SVN	22	50	39	60	26	22	59	0	6
GBR	17	16	9	14	10	18	11	4	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	133	85	135	33	152	117	24	20
CHE	117	0	181	495	67	276	542	54	18
FRA	78	142	0	210	56	101	206	38	14
ITA	117	436	173	0	82	216	601	71	19
NLD	28	65	47	67	0	44	78	26	12
USA	143	245	77	157	35	0	230	25	20
DEA	99	445	161	516	72	185	0	63	15
SVN	22	50	39	65	26	22	60	0	6
GBR	17	16	13	17	10	18	13	4	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN
CAN	0	133	85	135	33	152	117	24
CHE	117	0	181	495	67	276	542	54
FRA	78	142	0	210	56	101	206	38
ITA	117	436	173	0	82	216	601	71
NLD	28	65	47	67	0	44	78	26
USA	143	245	77	157	35	0	230	25
DEA	99	445	161	516	72	185	0	63
SVN	22	50	39	65	26	22	60	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
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CAN	0	133	85	135	40	152	117	24	20
CHE	117	0	181	495	68	276	542	54	18
FRA	78	142	0	210	62	101	206	38	14
ITA	117	436	173	0	90	216	601	71	19
NLD	32	65	50	71	0	58	83	26	12
USA	143	245	77	157	44	0	230	25	20
DEA	99	445	161	516	73	185	0	63	15
SVN	22	50	39	65	26	22	60	0	6
GBR	17	16	13	17	10	18	13	4	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	133	85	135	41	150	117	24	20
CHE	117	0	181	495	69	276	542	54	18
FRA	78	142	0	210	63	101	206	38	14
ITA	117	436	173	0	92	216	601	71	19
NLD	33	66	51	73	0	59	84	27	12
USA	142	245	77	157	45	0	230	25	20
DEA	99	445	161	516	74	185	0	63	15
SVN	22	50	39	65	27	22	60	0	6
GBR	17	16	13	17	10	18	13	4	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	CHE	FRA	NLD	USA	DEA	SVN	GBR	ITA
CAN	0	133	85	41	152	106	24	20	123
CHE	117	0	181	69	276	510	54	18	453
FRA	78	142	0	63	101	193	38	14	193
NLD	33	66	51	0	59	78	27	12	82
USA	143	245	77	45	0	205	25	20	172
DEA	91	414	151	72	157	0	63	14	507
SVN	22	50	39	27	22	60	0	6	70
GBR	17	16	13	10	18	13	4	0	19
ITA	107	399	159	68	124	443	64	17	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	133	85	135	40	152	117	24	20
CHE	117	0	181	495	68	276	542	54	18
FRA	78	142	0	210	62	101	206	38	14
ITA	117	436	173	0	90	214	601	71	19
NLD	32	65	50	71	0	58	83	26	12
USA	143	245	77	156	44	0	230	25	20
DEA	99	445	161	516	73	185	0	63	15
SVN	22	50	39	65	26	22	60	0	6
GBR	17	16	13	17	10	18	13	4	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	DEA	SVN	USA
CAN	0	133	85	92	29	84	24	152
CHE	117	0	178	324	64	348	54	275
FRA	78	139	0	141	54	146	38	101
ITA	82	275	115	0	62	318	65	118

NLD	25	64	46	57	0	65	27	39
DEA	73	279	108	282	61	0	62	133
SVN	22	50	39	60	27	59	0	25
USA	143	245	77	84	31	96	22	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	125	74	135	42	152	84	24	20
CHE	110	0	143	439	66	247	343	52	18
FRA	69	110	0	170	53	84	137	37	14
ITA	117	380	142	0	92	213	354	69	19
NLD	34	65	46	74	0	61	68	28	12
USA	143	212	64	157	47	0	133	25	20
DEA	73	275	105	317	63	96	0	61	12
SVN	22	49	38	63	28	22	58	0	6
GBR	17	16	13	17	10	18	11	4	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	125	74	135	40	151	117	24	20
CHE	110	0	143	440	63	247	487	53	18
FRA	69	110	0	171	52	84	172	38	14
ITA	117	382	142	0	90	216	594	70	19
NLD	32	62	45	71	0	58	83	26	12
USA	142	212	64	157	44	0	228	25	20
DEA	98	396	134	512	73	181	0	63	15
SVN	22	49	39	64	26	22	60	0	6
GBR	17	16	13	17	10	18	13	4	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	125	74	131	42	152	117	24	20
CHE	110	0	143	439	66	247	487	53	18
FRA	69	110	0	170	53	84	172	38	14
ITA	114	381	142	0	92	202	589	71	19
NLD	34	65	46	73	0	61	86	28	12
USA	143	212	64	143	47	0	228	25	20
DEA	98	396	134	505	76	181	0	63	15
SVN	22	50	39	65	28	22	60	0	6
GBR	17	16	13	17	10	18	13	4	0

BSW

BSW

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	CHE	DEA	ITA	SVN	USA	FRA
CAN	0	124	116	93	23	153	52
CHE	109	0	481	324	53	246	113
DEA	99	393	0	359	62	224	135
ITA	83	274	307	0	64	118	117
SVN	22	50	59	59	0	25	37
USA	143	212	180	84	22	0	62

FRA 47 83 103 95 38 44 0

BSW

common bulls below diagonal
common three quarter sib group above diagonal
CAN CHE DEA ITA SVN FRA

CAN 0 131 118 136 24 86
CHE 116 0 542 495 53 181
DEA 99 445 0 599 63 205
ITA 118 436 515 0 70 208
SVN 22 50 60 65 0 38
FRA 79 142 161 172 39 0

BSW

common bulls below diagonal
common three quarter sib group above diagonal
CAN CHE DEA ITA SVN USA FRA

CAN 0 124 94 93 23 153 52
CHE 109 0 378 324 53 246 113
DEA 83 306 0 325 61 161 127
ITA 83 274 289 0 64 118 117
SVN 22 50 58 59 0 25 37
USA 143 212 120 84 22 0 62
FRA 47 83 97 95 38 44 0

BSW

common bulls below diagonal
common three quarter sib group above diagonal
CHE DEA ITA SVN USA FRA

CHE 0 524 324 49 275 179
DEA 430 0 358 59 215 200
ITA 275 306 0 60 118 141
SVN 46 55 55 0 22 36
USA 245 169 84 20 0 100
FRA 141 158 115 37 77 0

BSW

common bulls below diagonal
common three quarter sib group above diagonal
CAN CHE DEA ITA SVN USA FRA

CAN 0 81 68 74 22 85 40
CHE 70 0 378 324 49 246 113
DEA 57 306 0 325 58 161 127
ITA 66 274 289 0 57 118 117
SVN 21 46 55 52 0 21 37
USA 76 212 120 84 19 0 62
FRA 35 83 97 95 38 44 0

BSW

common bulls below diagonal
common three quarter sib group above diagonal
CAN CHE DEA ITA SVN FRA

CAN 0 131 118 132 24 86
CHE 116 0 542 489 52 181
DEA 99 445 0 593 63 205
ITA 115 431 507 0 70 207
SVN 22 50 60 65 0 38
FRA 79 142 161 172 39 0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CHE	DEA	ITA	SVN	FRA
CHE	0	541	492	53	177
DEA	444	0	599	63	203
ITA	433	515	0	70	205
SVN	50	60	65	0	38
FRA	139	160	171	39	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CHE	DEA	ITA	SVN	FRA
CHE	0	314	299	53	126
DEA	264	0	316	62	145
ITA	259	282	0	65	138
SVN	50	59	60	0	38
FRA	98	107	113	39	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CHE	DEA	ITA	SVN	FRA
CHE	0	541	486	52	177
DEA	444	0	593	63	203
ITA	428	507	0	69	204
SVN	49	60	64	0	38
FRA	139	160	171	39	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CHE	DEA	ITA	SVN	FRA
CHE	0	347	322	53	108
DEA	278	0	317	62	123
ITA	273	282	0	65	115
SVN	50	59	60	0	38
FRA	81	94	93	39	0

GUE

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	GBR	USA	AUS
CAN	0	25	66	19
GBR	22	0	77	11
USA	56	76	0	22
AUS	19	9	19	0

GUE

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	GBR	USA	AUS
CAN	0	25	66	19
GBR	22	0	77	11
USA	56	76	0	22
AUS	19	9	19	0

GUE

common bulls below diagonal
common three quarter sib group above diagonal
CAN GBR USA AUS

CAN 0 25 66 19
GBR 22 0 77 11
USA 56 76 0 22
AUS 19 9 19 0

GUE

common bulls below diagonal
common three quarter sib group above diagonal
CAN GBR USA AUS

CAN 0 25 66 19
GBR 22 0 77 11
USA 56 76 0 22
AUS 19 9 19 0

GUE

common bulls below diagonal
common three quarter sib group above diagonal
CAN GBR USA AUS

CAN 0 25 66 19
GBR 22 0 77 11
USA 56 76 0 22
AUS 19 9 19 0

GUE

common bulls below diagonal
common three quarter sib group above diagonal
CAN GBR USA AUS

CAN 0 25 66 19
GBR 22 0 77 11
USA 56 76 0 22
AUS 19 9 19 0

GUE

common bulls below diagonal
common three quarter sib group above diagonal
CAN GBR USA AUS

CAN 0 25 66 19
GBR 22 0 77 11
USA 56 76 0 22
AUS 19 9 19 0

GUE

common bulls below diagonal
common three quarter sib group above diagonal
CAN USA AUS

CAN 0 39 19
USA 37 0 6
AUS 19 4 0

GUE

common bulls below diagonal

common three quarter sib group above diagonal
CAN GBR USA AUS

CAN 0 25 66 19
GBR 22 0 77 11
USA 56 76 0 22
AUS 19 9 19 0

GUE

common bulls below diagonal
common three quarter sib group above diagonal
CAN GBR USA AUS

CAN 0 25 66 19
GBR 22 0 77 11
USA 56 76 0 22
AUS 19 9 19 0

GUE

common bulls below diagonal
common three quarter sib group above diagonal
CAN GBR USA AUS

CAN 0 25 66 19
GBR 22 0 77 11
USA 56 76 0 22
AUS 19 9 19 0

GUE

common bulls below diagonal
common three quarter sib group above diagonal
CAN GBR USA AUS

CAN 0 25 66 19
GBR 22 0 77 11
USA 56 76 0 22
AUS 19 9 19 0

GUE

common bulls below diagonal
common three quarter sib group above diagonal
CAN GBR USA AUS

CAN 0 25 64 18
GBR 22 0 77 11
USA 55 76 0 22
AUS 18 9 19 0

GUE

common bulls below diagonal
common three quarter sib group above diagonal
CAN GBR USA AUS

CAN 0 25 66 19
GBR 22 0 77 11
USA 56 76 0 22
AUS 19 9 19 0

GUE

common bulls below diagonal
common three quarter sib group above diagonal
CAN GBR USA AUS

CAN	0	25	66	19
GBR	22	0	77	11
USA	56	76	0	22
AUS	19	9	19	0

GUE

common bulls below diagonal
common three quarter sib group above diagonal
CAN AUS USA

CAN	0	19	66
AUS	19	0	22
USA	56	19	0

GUE

common bulls below diagonal
common three quarter sib group above diagonal
CAN GBR USA AUS

CAN	0	11	66	19
GBR	9	0	32	9
USA	56	31	0	21
AUS	19	8	18	0

GUE

common bulls below diagonal
common three quarter sib group above diagonal
CAN GBR USA AUS

CAN	0	22	64	18
GBR	20	0	74	10
USA	55	74	0	22
AUS	18	8	19	0

GUE

common bulls below diagonal
common three quarter sib group above diagonal
CAN GBR USA AUS

CAN	0	22	66	19
GBR	20	0	74	10
USA	56	74	0	22
AUS	19	8	19	0

GUE

GUE

HOL

common bulls below diagonal
common three quarter sib group above diagonal
AUS BEL CAN CHE DEU DFS ESP FRA GBR ITA NLD USA HUN POL NZL ZAF JPN CZE EST IRL KOR SVN PRT LVA

AUS	0	500	901	460	867	767	633	867	900	652	903	1087	470	579	498	306	567	542	95	426	336	102	548	248
BEL	428	0	671	533	901	678	599	857	745	661	1044	781	419	590	283	247	431	538	98	404	275	129	564	246
CAN	815	637	0	841	2061	1176	1316	1465	1629	1786	1379	3265	898	1180	376	376	1177	1110	169	454	718	185	1035	507
CHE	411	532	740	0	986	586	565	686	718	719	833	911	374	545	247	218	391	488	86	361	280	112	486	243
DEU	582	840	1250	837	0	2081	1442	2326	1852	2268	2574	2841	1025	1759	449	372	1182	1651	246	591	579	294	1107	717
DFS	504	593	863	530	1198	0	964	1579	1356	1240	1665	1675	735	1153	462	384	809	1074	186	548	460	193	836	429
ESP	484	579	842	465	801	689	0	1245	1094	1257	1099	1542	718	934	323	368	855	875	144	420	510	163	843	392
FRA	594	846	992	632	1217	865	946	0	1555	1513	1990	2413	853	1519	513	390	1139	1248	168	572	549	189	927	444
GBR	756	745	1647	716	1234	938	888	1042	0	1498	1690	2154	792	1168	485	395	900	1048	169	747	525	188	953	456
ITA	546	662	1568	659	1480	991	933	1005	1287	0	1511	2370	869	1355	308	325	951	1196	201	467	615	236	1014	559
NLD	742	1145	1232	816	1867	1221	937	1269	1417	1306	0	2234	806	1370	620	383	916	1392	215	676	498	216	1001	487

USA	902	668	3292	839	1566	1040	1021	1321	1969	1965	1791	0	1164	1627	546	467	1710	1593	219	586	881	208	1303	701
HUN	331	340	794	315	686	527	553	573	639	741	611	1053	0	745	276	300	607	840	119	335	445	127	653	333
POL	375	470	892	394	1143	753	603	944	891	1055	1055	1364	576	0	315	291	760	1132	194	412	517	213	884	512
NZL	400	219	323	207	311	297	264	298	381	262	553	460	206	194	0	204	321	333	48	338	187	57	304	137
ZAF	281	212	350	192	293	302	340	319	368	288	346	496	257	217	186	0	308	303	54	237	232	56	323	137
JPN	293	239	419	230	341	317	322	329	359	374	349	482	247	255	153	197	0	747	113	336	521	121	611	319
CZE	345	402	768	355	1096	621	600	806	745	908	1178	1202	712	791	218	226	233	0	152	406	495	193	780	433
EST	46	57	83	42	139	110	63	78	87	109	135	145	68	109	22	23	30	84	0	72	81	53	124	117
IRL	382	388	427	361	478	438	404	502	801	438	619	544	280	302	277	226	194	303	39	0	210	80	393	177
KOR	235	195	662	200	347	310	364	328	396	524	344	997	346	375	126	178	250	344	34	147	0	100	475	261
SVN	71	98	138	81	273	149	112	141	137	207	183	163	91	166	42	38	52	138	27	65	62	0	141	104
PRT	420	565	1055	439	899	729	813	820	879	1016	997	1354	614	819	239	307	301	640	73	337	410	110	0	422
LVA	110	139	300	124	541	243	196	219	260	371	301	594	228	346	71	82	93	271	61	102	153	61	327	0

HOL

common bulls below diagonal																								
common three quarter sib group above diagonal																								
	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT	LVA
AUS	0	493	901	460	866	766	644	740	900	652	848	1087	470	577	498	256	566	542	94	426	334	102	551	226
BEL	427	0	665	530	895	671	612	790	738	659	990	764	416	586	279	216	421	536	98	401	273	129	565	227
CAN	815	637	0	841	2059	1176	1325	1304	1629	1786	1305	3265	898	1179	376	323	1174	1110	169	454	713	185	1038	481
CHE	411	531	740	0	985	586	574	658	718	719	815	911	374	544	247	197	390	488	86	361	277	112	487	224
DEU	582	840	1250	837	0	2080	1467	2194	1850	2267	2531	2840	1024	1752	448	334	1179	1650	245	590	574	294	1107	689
DFS	504	592	863	530	1199	0	987	1410	1354	1240	1587	1674	734	1148	461	330	808	1074	185	546	457	193	840	403
ESP	493	604	851	476	838	714	0	1187	1117	1272	1091	1561	728	954	334	323	859	895	148	435	512	167	862	378
FRA	557	801	937	608	1147	838	953	0	1413	1489	1650	1990	811	1431	430	306	985	1194	163	526	509	189	894	413
GBR	756	746	1647	716	1234	938	919	999	0	1498	1624	2152	792	1166	485	339	898	1048	169	744	522	188	955	428
ITA	546	662	1568	659	1480	991	952	997	1287	0	1501	2370	869	1355	308	315	949	1196	201	467	610	236	1016	546
NLD	710	1085	1175	793	1838	1198	939	1126	1364	1296	0	1998	785	1346	594	320	844	1373	212	662	477	216	986	453
USA	902	667	3292	839	1566	1039	1038	1125	1969	1965	1547	0	1164	1625	546	398	1707	1593	219	584	873	208	1307	670
HUN	331	340	794	315	686	527	563	561	639	741	594	1053	0	744	276	272	607	840	119	335	441	127	657	316
POL	375	470	892	394	1143	753	626	899	890	1055	1044	1364	576	0	315	265	759	1132	193	412	514	213	887	491
NZL	400	219	323	207	311	297	272	274	381	262	532	460	206	194	0	167	321	333	48	338	186	57	305	119
ZAF	241	195	308	176	273	278	301	272	317	283	287	411	240	209	149	0	261	282	53	200	212	56	307	122
JPN	289	235	414	227	338	314	321	319	353	372	340	475	246	253	152	182	0	746	113	336	517	121	613	301
CZE	345	402	768	355	1096	621	623	775	745	908	1161	1202	712	791	218	214	232	0	152	406	494	193	782	418
EST	46	57	83	42	139	110	67	77	87	109	134	145	68	109	22	23	30	84	0	72	80	53	124	111
IRL	382	388	427	361	478	438	423	483	799	438	605	544	280	302	277	195	193	303	39	0	207	80	394	163
KOR	235	195	660	200	346	310	368	320	395	523	333	989	344	374	126	161	247	344	34	147	0	99	474	251
SVN	71	98	138	81	273	149	117	141	137	207	183	163	91	166	42	38	52	138	27	65	62	0	141	104
PRT	421	567	1057	439	899	731	835	810	882	1017	985	1355	619	823	239	297	297	642	73	338	409	110	0	405
LVA	100	128	286	114	519	229	192	206	242	364	279	573	215	334	61	74	88	263	56	92	151	61	315	0

HOL

common bulls below diagonal																								
common three quarter sib group above diagonal																								
	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	PRT	SVN	LVA
AUS	0	500	901	460	867	766	635	867	900	652	877	1087	470	579	498	306	567	542	95	426	334	551	102	248
BEL	428	0	671	533	901	677	602	857	745	661	1020	781	419	590	283	247	431	538	98	404	273	566	129	246
CAN	815	637	0	841	2061	1176	1319	1465	1629	1786	1348	3265	898	1180	376	376	1176	1110	169	454	714	1038	185	507
CHE	411	532	740	0	986	586	566	687	718	719	827	911	374	545	247	218	391	488	86	361	277	487	111	243
DEU	582	840	1250	837	0	2081	1447	2327	1852	2268	2561	2841	1025	1759	449	372	1182	1651	246	591	576	1108	293	717
DFS	504	593	863	530	1198	0	967	1578	1355	1240	1623	1674	734	1152	461	384	809	1074	186	547	457	841	192	429
ESP	485	582	843	467	808	692	0	1250	1096	1261	1088	1545	719	938	325	368	855	879	146	421	507	848	163	394
FRA	594	846	992	633	1218	865	951	0	1555	1513	1875	2413	853	1519	513	390	1139	1248	168	572	544	933	188	444
GBR	756	745	1647	716	1234	938	891	1042	0	1498	1661	2153	792	1168	485	395	900	1048	169	745	523	957	187	456
ITA	546	662	1568	659	1480	991	936	1005	1287	0	1507	2370	869	1355	308	325	951	1196	201	467	612	1016	235	559
NLD	738	1121	1225	815	1865	1220	939	1247	1405	1305	0	2106	797	1361	607	373	882	1387	214	669	490	999	214	482
USA	902	668	3292	839	1566	1039	1023	1321	1969	1965	1749	0	1164	1627	546	467	1709	1593	219	585	875	1307	207	701
HUN	331	340	794	315	686	527	554	573	639	741	611	1053	0	745	276	300	607	840	119	335	443	657	127	333
POL	375	470	892	394	1143	753	606	944	891	1055	1054	1364	576	0	315	291	760	1132	194	412	515	887	212	512
NZL	400	219	323	207	311	297	265	298	381	262	551	460	206	194	0	204	321	333	48	338	186	305	57	137
ZAF	281	212	350	192	293	302	341	319	368	288	344	496	257	217	186	0	308	303	54	237	231	323	55	137
JPN	290	237	416	228	339	315	320	326	356	373	345	478	246	253	152	196	0	747	113	336	518	614	121	319
CZE	345	402	768	355	1096	621	603	806	745	908	1177	1202	712	791	218	226	232	0	152	406	495	783	192	433

EST	46	57	83	42	139	110	64	78	87	109	135	145	68	109	22	23	30	84	0	72	80	124	53	117
IRL	382	388	427	361	478	438	405	502	799	438	616	544	280	302	277	226	193	303	39	0	208	394	80	177
KOR	235	195	661	200	346	310	364	328	396	524	341	991	346	375	126	177	248	344	34	147	0	475	99	261
PRT	421	566	1057	439	899	731	818	824	881	1017	997	1355	618	823	239	307	299	642	73	338	410	0	141	422
SVN	71	98	138	81	273	149	112	140	137	206	181	163	91	166	42	38	52	138	27	65	62	110	0	104
LVA	110	139	300	124	541	243	198	219	260	371	300	594	228	346	71	82	92	271	61	102	153	327	61	0

HOL

 common bulls below diagonal

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	ZAF	JPN	CZE	EST	IRL	KOR	PRT	SVN	LVA
AUS	0	482	901	444	147	765	647	737	897	651	485	1084	467	571	302	565	542	93	424	334	542	95	248
BEL	425	0	649	501	169	652	604	776	719	648	636	742	406	565	235	412	527	95	392	268	550	120	242
CAN	815	632	0	804	395	1166	1327	1299	1627	1784	924	3265	894	1164	371	1173	1110	165	452	713	1022	169	507
CHE	407	506	710	0	220	570	566	647	704	701	568	855	364	520	214	387	463	82	357	275	469	101	238
DEU	115	158	359	186	0	292	248	342	333	487	482	431	149	342	26	133	235	64	88	95	170	114	186
DFS	504	589	863	520	254	0	986	1392	1338	1220	957	1654	724	1123	380	797	1065	182	542	454	815	178	427
ESP	496	607	853	474	153	723	0	1192	1119	1276	741	1565	728	950	370	861	898	149	436	512	853	155	401
FRA	556	798	937	600	284	832	966	0	1410	1480	1007	1980	806	1410	342	981	1193	157	524	508	873	174	431
GBR	756	737	1647	706	275	936	926	997	0	1497	986	2146	786	1149	389	896	1047	166	735	522	935	174	455
ITA	546	658	1568	648	435	985	959	994	1285	0	1172	2365	866	1330	321	947	1194	194	465	610	999	218	558
NLD	457	694	939	543	485	890	663	853	944	1104	0	1138	500	986	207	472	963	173	383	337	677	196	375
USA	901	659	3292	786	367	1038	1040	1123	1967	1964	1036	0	1158	1604	461	1706	1592	217	581	872	1281	191	701
HUN	331	337	794	310	96	526	567	560	638	740	400	1051	0	734	296	605	838	118	331	440	645	120	332
POL	375	459	892	374	273	748	634	895	885	1042	868	1363	573	0	286	750	1117	187	405	510	862	192	507
ZAF	278	209	347	188	18	299	340	295	365	284	186	491	255	214	0	304	298	51	234	228	316	50	135
JPN	287	233	412	225	70	312	319	317	351	370	265	473	245	253	192	0	746	112	334	516	607	113	319
CZE	345	402	768	343	169	621	627	775	745	908	930	1202	712	791	222	231	0	149	404	494	769	181	433
EST	46	56	83	42	33	110	69	77	87	108	117	145	67	107	23	30	84	0	70	80	118	53	116
IRL	382	385	427	357	70	438	427	483	792	436	383	544	280	300	224	192	303	39	0	207	384	75	177
KOR	235	195	660	199	69	310	368	320	395	523	257	988	344	374	176	246	344	34	147	0	473	92	261
PRT	421	559	1057	429	148	725	836	810	879	1009	696	1353	617	812	303	295	642	71	337	409	0	134	416
SVN	68	97	135	80	105	145	115	137	135	200	178	160	91	160	34	51	138	27	63	62	108	0	97
LVA	110	139	300	122	134	243	213	216	260	371	241	594	228	346	81	92	271	61	102	153	327	60	0

HOL

 common bulls below diagonal

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT	LVA
AUS	0	500	901	460	867	767	632	867	900	652	903	1087	470	579	498	306	567	542	95	426	336	103	551	248
BEL	428	0	671	533	901	678	595	857	745	661	1044	781	419	590	283	247	431	538	98	404	275	130	566	246
CAN	815	637	0	841	2061	1176	1313	1465	1629	1786	1379	3265	898	1180	376	376	1176	1110	169	454	718	186	1037	507
CHE	411	532	740	0	986	586	564	686	718	719	833	911	374	545	247	218	391	488	86	361	280	113	487	243
DEU	582	840	1250	837	0	2081	1433	2326	1852	2268	2574	2841	1025	1759	449	372	1182	1651	246	591	579	295	1107	717
DFS	504	593	863	530	1198	0	958	1579	1356	1240	1665	1675	735	1153	462	384	809	1074	186	548	460	194	840	429
ESP	483	575	839	463	792	683	0	1239	1088	1251	1093	1535	717	931	321	368	851	873	144	419	509	164	844	391
FRA	594	846	992	632	1217	864	939	0	1555	1513	1990	2413	853	1519	513	390	1139	1248	168	572	549	190	932	444
GBR	756	745	1647	716	1234	938	881	1042	0	1498	1690	2154	792	1168	485	395	900	1048	169	747	525	189	957	456
ITA	546	662	1568	659	1480	991	926	1005	1287	0	1511	2370	869	1355	308	325	951	1196	201	467	615	237	1015	559
NLD	742	1145	1232	816	1867	1221	930	1269	1417	1306	0	2234	806	1370	620	383	916	1392	215	676	498	217	1003	487
USA	902	668	3292	839	1566	1039	1015	1321	1969	1965	1791	0	1164	1627	546	467	1709	1593	219	586	881	209	1306	701
HUN	331	340	794	315	686	527	553	573	639	741	611	1053	0	745	276	300	607	840	119	335	445	128	656	333
POL	375	470	892	394	1143	753	599	944	891	1055	1055	1364	576	0	315	291	760	1132	194	412	517	214	886	512
NZL	400	219	323	207	311	297	262	298	381	262	553	460	206	194	0	204	321	333	48	338	187	57	305	137
ZAF	281	212	350	192	293	302	340	319	368	288	346	496	257	217	186	0	308	303	54	237	232	57	323	137
JPN	292	238	417	229	340	316	321	328	358	374	348	480	246	254	152	196	0	747	113	336	520	122	613	319
CZE	345	402	768	355	1096	621	598	806	745	908	1178	1202	712	791	218	226	233	0	152	406	495	194	783	433
EST	46	57	83	42	139	110	63	78	87	109	135	145	68	109	22	23	30	84	0	72	81	54	124	117
IRL	382	388	427	361	478	438	403	502	801	438	619	544	280	302	277	226	193	303	39	0	210	81	394	177
KOR	235	195	662	200	347	310	362	328	396	524	344	997	346	375	126	178	249	344	34	147	0	101	475	261
SVN	72	99	139	82	274	150	113	142	138	208	184	164	92	167	42	38	53	139	27	66	63	0	142	105
PRT	421	566	1057	439	899	731	812	824	881	1016	999	1354	617	822	239	307	300	642	73	338	410	110	0	422
LVA	110	139	300	124	541	243	194	219	260	371	301	594	228	346	71	82	92	271	61	102	153	61	327	0

HOL

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	PRT	SVN	LVA
AUS	0	475	901	460	867	767	632	867	900	652	901	1087	470	579	498	306	372	542	95	426	334	551	102	248
BEL	425	0	651	526	879	657	579	810	714	657	955	734	404	578	268	235	321	524	98	389	265	558	129	245
CAN	815	627	0	841	2061	1176	1315	1465	1629	1786	1376	3265	898	1180	376	376	874	1110	169	454	714	1037	185	507
CHE	411	528	740	0	986	586	564	687	718	719	833	911	374	545	247	218	328	488	86	361	277	487	111	243
DEU	582	834	1250	837	0	2081	1436	2327	1852	2268	2572	2841	1025	1759	449	372	943	1651	246	591	576	1107	293	717
DFS	504	588	863	530	1198	0	961	1579	1356	1240	1657	1675	735	1153	462	384	581	1074	186	548	457	840	192	429
ESP	483	570	842	463	796	686	0	1241	1091	1254	1092	1538	718	932	322	368	672	874	144	419	507	845	163	391
FRA	594	833	992	633	1218	865	943	0	1555	1513	1979	2413	853	1519	513	390	796	1248	168	572	545	932	188	444
GBR	756	728	1647	716	1234	938	885	1042	0	1498	1687	2154	792	1168	485	395	659	1048	169	747	523	957	187	456
ITA	546	662	1568	659	1480	991	930	1005	1287	0	1511	2370	869	1355	308	325	855	1196	201	467	612	1015	235	559
NLD	742	1048	1232	816	1866	1221	932	1270	1416	1306	0	2227	806	1369	619	383	670	1392	214	675	493	1003	214	486
USA	902	653	3292	839	1566	1039	1019	1321	1969	1965	1788	0	1164	1627	546	467	1188	1593	219	586	874	1306	207	701
HUN	331	336	794	315	686	527	553	573	639	741	611	1053	0	745	276	300	489	840	119	335	443	656	127	333
POL	375	467	892	394	1143	753	601	944	891	1055	1055	1364	576	0	315	291	656	1132	194	412	515	886	212	512
NZL	400	213	323	207	311	297	264	298	381	262	553	460	206	194	0	204	208	333	48	338	185	305	57	137
ZAF	280	209	349	191	292	301	339	318	367	287	345	495	256	216	186	0	210	303	54	237	230	323	55	137
JPN	252	210	377	210	312	286	278	291	309	355	305	421	218	244	128	151	0	604	101	248	433	497	118	279
CZE	345	399	768	355	1096	621	599	806	745	908	1178	1202	712	791	218	226	214	0	152	406	494	783	192	433
EST	46	57	83	42	139	110	63	78	87	109	135	145	68	109	22	23	30	84	0	72	81	124	53	117
IRL	382	382	427	361	478	438	403	502	801	438	619	544	280	302	277	225	169	303	39	0	208	394	80	177
KOR	235	195	661	200	347	310	364	328	396	524	344	992	346	375	126	177	233	344	34	147	0	474	100	260
PRT	421	563	1057	439	899	731	814	824	881	1016	999	1354	617	822	239	306	270	642	73	338	410	0	141	422
SVN	71	98	138	81	273	149	112	140	137	206	181	163	91	166	42	38	52	138	27	65	62	110	0	104
LVA	110	139	300	124	541	243	194	219	260	371	301	594	228	346	71	82	88	271	61	102	153	327	61	0

HOL

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT	LVA
AUS	0	500	901	460	867	767	636	867	900	652	903	1087	470	579	498	306	565	542	95	426	334	103	551	248
BEL	428	0	671	533	901	678	602	857	745	661	1044	781	419	590	283	247	428	538	98	404	273	130	567	246
CAN	815	637	0	841	2061	1176	1319	1465	1629	1786	1379	3265	898	1180	376	376	1173	1110	169	454	711	186	1039	507
CHE	411	532	740	0	986	586	566	686	718	719	833	911	374	545	247	218	389	488	86	361	277	113	488	243
DEU	582	840	1250	837	0	2081	1449	2326	1852	2268	2574	2841	1025	1759	449	372	1179	1651	246	591	575	295	1108	717
DFS	504	593	863	530	1198	0	970	1579	1356	1240	1665	1675	735	1153	462	384	807	1074	186	548	457	194	841	429
ESP	486	583	843	468	811	694	0	1252	1098	1261	1104	1545	719	939	326	369	853	880	146	422	506	164	849	395
FRA	594	846	992	632	1217	865	954	0	1555	1513	1990	2413	853	1519	513	390	1136	1248	168	572	541	190	934	444
GBR	756	745	1647	716	1234	938	893	1042	0	1498	1690	2154	792	1168	485	395	897	1048	169	747	521	189	957	456
ITA	546	662	1568	659	1480	991	937	1005	1287	0	1511	2370	869	1355	308	325	948	1196	201	467	609	237	1016	559
NLD	742	1145	1232	816	1867	1221	943	1269	1417	1306	0	2234	806	1370	620	383	913	1392	215	676	492	217	1005	487
USA	902	668	3292	839	1566	1040	1024	1321	1969	1965	1791	0	1164	1627	546	467	1706	1593	219	586	870	209	1308	701
HUN	331	340	794	315	686	527	555	573	639	741	611	1053	0	745	276	300	606	840	119	335	440	128	657	333
POL	375	470	892	394	1143	753	607	944	891	1055	1055	1364	576	0	315	291	759	1132	194	412	513	214	887	512
NZL	400	219	323	207	311	297	266	298	381	262	553	460	206	194	0	204	320	333	48	338	186	57	305	137
ZAF	281	212	350	192	293	302	342	319	368	288	346	496	257	217	186	0	307	303	54	237	231	57	323	137
JPN	287	233	412	225	336	312	316	321	351	370	341	473	245	253	150	193	0	746	113	336	516	122	612	319
CZE	345	402	768	355	1096	621	605	806	745	908	1178	1202	712	791	218	226	231	0	152	406	493	194	783	433
EST	46	57	83	42	139	110	64	78	87	109	135	145	68	109	22	23	30	84	0	72	80	54	124	117
IRL	382	388	427	361	478	438	406	502	801	438	619	544	280	302	277	226	192	303	39	0	207	81	394	177
KOR	235	195	658	200	346	310	362	325	394	522	342	986	343	373	126	177	246	343	34	147	0	100	472	260
SVN	72	99	139	82	274	150	113	142	138	208	184	164	92	167	42	38	53	139	27	66	63	0	142	105
PRT	421	568	1058	440	899	731	821	826	883	1018	1002	1358	620	823	239	307	295	643	73	338	409	110	0	422
LVA	110	139	300	124	541	243	199	219	260	371	301	594	228	346	71	82	92	271	61	102	152	61	328	0

HOL

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT	LVA
AUS	0	455	819	460	864	766	634	617	897	652	810	1086	468	540	258	527	426	94	411	250	102	548	226
BEL	419	0	622	515	852	628	570	703	685	651	898	703	394	546	207	385	447	95	366	218	129	549	225

CAN	762	616	0	818	1996	1080	1252	1163	1535	1778	1241	3071	876	1129	313	1051	976	166	424	608	185	1019	479
CHE	411	518	725	0	985	585	569	629	718	719	806	911	372	527	198	382	421	86	354	230	111	484	224
DEU	582	816	1247	837	0	2079	1452	1993	1848	2267	2508	2838	1020	1720	336	1150	1446	245	573	501	293	1105	690
DFS	504	579	860	530	1198	0	967	1201	1350	1240	1550	1673	730	1100	332	764	884	185	521	370	192	835	403
ESP	488	571	833	470	819	700	0	1060	1099	1266	1055	1546	721	911	324	819	776	145	412	429	164	853	376
FRA	495	716	866	570	1104	774	840	0	1205	1432	1458	1646	739	1357	272	834	1013	155	446	427	188	822	397
GBR	755	709	1574	715	1233	936	902	866	0	1498	1575	2146	789	1122	341	850	892	168	702	434	187	951	429
ITA	546	659	1568	659	1480	991	941	976	1287	0	1500	2370	869	1343	317	943	1142	201	463	554	235	1016	546
NLD	683	988	1155	788	1843	1193	908	1049	1340	1299	0	1903	768	1296	316	811	1221	212	613	405	214	976	453
USA	902	643	3179	839	1566	1039	1028	959	1968	1965	1514	0	1161	1575	401	1574	1384	219	558	739	207	1301	670
HUN	331	327	788	315	686	527	558	513	638	741	597	1053	0	718	273	591	724	119	321	385	127	656	316
POL	361	453	871	381	1126	730	585	884	868	1049	1020	1334	558	0	252	723	1028	192	375	467	212	865	492
ZAF	244	194	307	177	274	279	302	244	320	284	288	414	241	201	0	254	241	53	197	166	55	307	122
JPN	282	231	409	224	335	310	311	301	346	369	334	465	243	246	181	0	635	111	309	429	121	604	299
CZE	293	346	692	299	979	541	509	649	633	870	1066	1050	603	735	178	215	0	145	325	423	190	708	404
EST	46	56	83	42	139	110	64	74	87	109	134	145	68	108	23	30	79	0	70	75	53	124	111
IRL	380	373	424	358	476	436	409	414	767	438	589	538	278	289	196	191	248	39	0	153	80	380	159
KOR	175	170	569	173	308	266	299	288	318	476	285	834	295	352	119	212	299	32	113	0	98	415	236
SVN	71	98	138	81	273	149	113	140	137	206	181	163	91	166	38	52	137	27	65	62	0	141	104
PRT	418	558	1037	437	899	729	825	766	880	1018	980	1354	619	811	297	293	582	73	335	363	110	0	405
LVA	100	128	286	114	520	229	188	204	242	364	280	573	215	334	74	88	258	56	92	142	61	315	0

HOL

common bulls below diagonal																							
common three quarter sib group above diagonal																							
	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT	LVA
AUS	0	473	901	460	607	766	644	863	900	652	867	1087	469	578	306	565	542	95	425	333	102	556	248
BEL	425	0	649	525	704	653	596	804	713	656	949	733	404	577	235	406	524	98	388	265	129	562	244
CAN	815	627	0	841	1677	1176	1325	1449	1629	1786	1334	3265	897	1178	376	1173	1110	169	454	712	185	1042	507
CHE	411	528	740	0	825	586	574	683	718	718	823	911	374	543	218	389	487	86	361	277	111	491	243
DEU	476	684	1128	695	0	1481	1194	1700	1402	2065	1969	2135	790	1486	251	866	1285	220	429	479	287	899	657
DFS	504	588	863	530	1015	0	987	1551	1354	1239	1610	1673	733	1150	384	807	1074	186	547	457	192	846	429
ESP	493	596	851	476	668	713	0	1261	1117	1272	1104	1561	727	952	373	857	894	149	435	511	167	867	399
FRA	594	829	992	632	993	863	987	0	1541	1513	1822	2373	850	1509	389	1122	1243	166	566	537	188	937	443
GBR	756	729	1647	716	1024	938	919	1043	0	1498	1646	2151	791	1164	394	896	1048	169	741	522	187	961	456
ITA	546	662	1568	659	1371	991	951	1005	1287	0	1502	2370	869	1354	325	948	1196	201	467	609	235	1016	559
NLD	733	1046	1219	814	1559	1218	963	1225	1397	1304	0	2063	790	1347	371	872	1382	214	662	486	214	999	481
USA	902	653	3292	839	1307	1039	1038	1286	1969	1965	1733	0	1163	1623	467	1705	1593	219	584	870	207	1310	701
HUN	331	336	794	315	536	526	563	573	639	741	609	1053	0	744	299	606	839	119	334	439	127	658	333
POL	375	467	892	393	1028	752	623	944	890	1055	1047	1364	575	0	290	759	1129	192	410	512	211	888	511
ZAF	281	210	350	192	201	302	344	319	368	288	340	496	257	217	0	306	303	54	237	231	55	329	137
JPN	287	232	411	224	291	311	317	319	349	369	337	471	244	252	192	0	746	113	336	515	121	617	319
CZE	345	399	768	355	896	621	622	806	745	908	1176	1202	712	791	226	230	0	151	406	493	192	784	433
EST	46	57	83	42	125	110	67	78	87	109	135	145	68	108	23	30	84	0	72	80	53	123	117
IRL	382	382	427	361	370	438	423	502	795	438	615	544	280	302	226	192	303	39	0	207	80	395	177
KOR	234	195	659	200	306	310	365	324	395	522	338	981	343	373	177	244	343	34	147	0	98	475	260
SVN	71	98	138	81	273	149	116	140	137	206	181	163	91	166	38	52	138	27	65	61	0	141	104
PRT	423	568	1060	443	768	735	840	829	889	1018	1000	1361	623	826	308	294	646	72	339	410	110	0	422
LVA	110	139	300	124	512	243	206	219	260	371	300	594	228	346	82	92	271	61	102	152	61	328	0

HOL

common bulls below diagonal																								
common three quarter sib group above diagonal																								
	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT	LVA
AUS	0	493	901	460	867	766	644	821	900	652	846	1087	470	578	498	306	566	542	95	426	335	98	551	248
BEL	427	0	667	532	897	673	614	838	740	660	992	766	416	587	279	245	422	536	98	402	274	126	566	246
CAN	815	637	0	841	2060	1176	1325	1393	1629	1786	1285	3265	898	1180	376	376	1174	1110	169	454	716	181	1038	507
CHE	411	531	740	0	986	586	574	684	718	719	807	911	374	545	247	218	390	488	86	361	278	108	487	243
DEU	582	840	1250	837	0	2081	1468	2308	1852	2268	2513	2841	1025	1758	449	372	1180	1651	246	591	578	290	1108	717
DFS	504	592	863	530	1199	0	987	1505	1355	1240	1580	1674	734	1152	461	384	808	1074	186	547	459	190	841	429
ESP	493	604	851	476	837	713	0	1241	1118	1272	1090	1561	728	954	334	373	859	894	149	435	514	164	862	399
FRA	593	843	987	631	1216	862	984	0	1506	1508	1786	2221	840	1509	485	377	1064	1237	166	558	532	186	925	439
GBR	756	746	1647	716	1234	938	919	1035	0	1498	1610	2153	792	1168	485	395	898	1048	169	745	524	185	957	456
ITA	546	662	1568	659	1480	991	951	1004	1287	0	1476	2370	869	1355	308	325	949	1196	201	467	614	232	1016	559
NLD	709	1084	1154	784	1815	1191	936	1201	1349	1268	0	1975	785	1341	592	364	844	1366	209	661	479	211	984	476

USA	902	667	3292	839	1566	1040	1038	1251	1969	1965	1524	0	1164	1627	546	467	1707	1593	219	585	877	204	1307	701
HUN	331	340	794	315	686	527	563	571	639	741	594	1053	0	745	276	300	607	840	119	335	445	126	657	333
POL	375	470	892	394	1143	753	624	943	891	1055	1038	1364	576	0	315	291	760	1132	194	412	517	211	887	512
NZL	400	219	323	207	311	297	272	297	381	262	530	460	206	194	0	204	321	333	48	338	186	56	305	137
ZAF	281	212	350	192	293	302	344	318	368	288	326	496	257	217	186	0	307	303	54	237	231	55	323	137
JPN	288	234	413	226	337	313	320	322	352	371	339	474	245	253	151	193	0	746	113	336	518	119	613	319
CZE	345	402	768	355	1096	621	622	803	745	908	1157	1202	712	791	218	226	231	0	152	406	495	192	783	433
EST	46	57	83	42	139	110	67	78	87	109	131	145	68	109	22	23	30	84	0	72	81	53	124	117
IRL	382	388	427	361	478	438	423	498	799	438	603	544	280	302	277	226	192	303	39	0	209	78	394	177
KOR	235	195	661	200	347	310	368	328	396	524	333	992	346	375	126	177	247	344	34	147	0	99	475	261
SVN	68	97	135	80	270	148	114	140	135	204	180	160	91	166	41	37	51	138	27	64	62	0	139	102
PRT	421	567	1057	439	899	731	834	822	882	1017	984	1355	619	823	239	307	296	642	73	338	410	109	0	422
LVA	110	139	300	124	541	243	206	219	260	371	297	594	228	346	71	82	92	271	61	102	153	60	327	0

HOL

common bulls below diagonal
common three quarter sib group above diagonal

AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT	LVA	
AUS	0	493	901	460	867	720	637	863	900	652	875	1087	470	579	498	306	567	542	95	426	335	102	550	248
BEL	427	0	667	532	897	662	601	843	739	660	1005	766	416	587	279	245	423	536	98	402	274	129	565	246
CAN	815	637	0	841	2061	1098	1320	1450	1629	1786	1328	3265	898	1180	376	376	1175	1110	169	454	716	185	1036	507
CHE	411	531	740	0	986	582	568	686	718	719	819	911	374	545	247	218	390	488	86	361	278	112	487	243
DEU	582	840	1250	837	0	2027	1451	2322	1852	2268	2541	2841	1025	1759	449	372	1181	1651	246	591	578	294	1106	717
DFS	504	592	863	530	1198	0	929	1468	1297	1237	1582	1581	718	1132	434	357	755	1040	184	530	446	193	831	425
ESP	486	584	844	469	812	695	0	1242	1100	1262	1090	1547	720	941	327	371	856	881	146	423	510	163	848	396
FRA	594	845	992	632	1216	864	957	0	1542	1513	1865	2374	851	1516	509	389	1125	1243	167	567	543	189	929	443
GBR	756	744	1646	716	1233	937	892	1040	0	1498	1646	2153	792	1168	485	395	899	1048	169	745	524	188	955	456
ITA	546	662	1568	659	1480	990	938	1005	1286	0	1482	2370	869	1355	308	325	950	1196	201	467	614	236	1015	559
NLD	737	1114	1203	806	1842	1214	941	1244	1388	1277	0	2081	797	1354	605	373	881	1380	211	668	491	215	996	481
USA	902	667	3292	839	1566	1039	1025	1286	1969	1965	1726	0	1164	1627	546	467	1708	1593	219	585	878	208	1305	701
HUN	331	340	794	315	686	527	556	573	639	741	611	1053	0	745	276	300	607	840	119	335	445	127	657	333
POL	375	470	892	394	1143	753	609	944	891	1055	1046	1364	576	0	315	291	760	1132	194	412	517	213	885	512
NZL	400	219	323	207	311	297	266	298	381	262	549	460	206	194	0	204	321	333	48	338	186	57	305	137
ZAF	281	212	350	192	293	302	343	319	368	288	344	496	257	217	186	0	308	303	54	237	231	56	322	137
JPN	289	236	415	227	339	315	320	324	354	373	343	476	246	253	152	195	0	747	113	336	519	121	614	319
CZE	345	402	768	355	1096	621	606	806	745	908	1173	1202	712	791	218	226	232	0	152	406	495	193	782	433
EST	46	57	83	42	139	110	64	78	87	109	132	145	68	109	22	23	30	84	0	72	81	53	123	117
IRL	382	388	427	361	478	438	407	502	799	438	615	544	280	302	277	226	193	303	39	0	209	80	394	177
KOR	235	195	661	200	347	310	365	328	396	524	340	993	346	375	126	178	248	344	34	147	0	100	475	261
SVN	71	98	138	81	273	149	112	141	137	207	182	163	91	166	42	38	52	138	27	65	62	0	141	104
PRT	421	566	1057	439	899	728	820	824	881	1017	996	1355	618	823	239	307	298	642	73	338	410	110	0	422
LVA	110	139	300	124	541	243	200	219	260	371	300	594	228	346	71	82	92	271	61	102	153	61	327	0

HOL

common bulls below diagonal
common three quarter sib group above diagonal

AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT	LVA	
AUS	0	493	901	460	867	767	647	867	900	652	901	1087	470	579	498	306	565	542	95	426	334	103	551	248
BEL	427	0	667	532	897	674	616	847	740	660	1014	766	416	587	279	245	421	536	98	402	273	130	567	246
CAN	815	637	0	841	2061	1176	1327	1465	1629	1786	1359	3265	898	1180	376	376	1173	1110	169	454	711	186	1039	507
CHE	411	531	740	0	986	586	574	686	718	719	825	911	374	545	247	218	389	488	86	361	277	113	488	243
DEU	582	840	1250	837	0	2081	1476	2326	1852	2268	2554	2841	1025	1759	449	372	1179	1651	246	591	575	295	1108	717
DFS	504	592	864	530	1199	0	993	1579	1356	1240	1658	1675	735	1153	462	384	807	1074	186	548	457	194	841	429
ESP	495	608	853	477	853	722	0	1280	1122	1277	1135	1566	730	961	336	373	861	898	150	437	511	168	866	401
FRA	594	846	992	632	1217	865	1003	0	1556	1513	1988	2413	853	1519	513	390	1136	1248	168	572	541	190	934	444
GBR	756	746	1647	716	1234	938	926	1043	0	1498	1676	2154	792	1168	485	395	897	1048	169	747	521	189	957	456
ITA	546	662	1568	659	1480	991	959	1005	1287	0	1486	2370	869	1355	308	325	948	1196	201	467	609	237	1016	559
NLD	741	1122	1210	807	1844	1215	981	1269	1402	1278	0	2209	806	1363	618	383	913	1385	212	675	491	216	1003	486
USA	902	667	3292	839	1566	1041	1040	1321	1969	1965	1768	0	1164	1627	546	467	1706	1593	219	586	869	209	1308	701
HUN	331	340	794	315	686	528	566	573	639	741	611	1053	0	745	276	300	606	840	119	335	440	128	657	333
POL	375	470	892	394	1143	753	633	944	891	1055	1047	1364	576	0	315	291	759	1132	194	412	513	214	887	512
NZL	400	219	323	207	311	297	273	298	381	262	551	460	206	194	0	204	320	333	48	338	186	57	305	137
ZAF	281	212	350	192	293	303	344	319	368	288	346	496	257	217	186	0	307	303	54	237	231	57	323	137
JPN	287	233	412	225	336	312	319	321	351	370	341	473	245	253	150	193	0	746	113	336	516	122	612	319
CZE	345	402	768	355	1096	621	625	806	745	908	1174	1202	712	791	218	226	231	0	152	406	493	194	783	433

EST	46	57	83	42	139	110	68	78	87	109	132	145	68	109	22	23	30	84	0	72	80	54	124	117
IRL	382	388	427	361	478	438	426	502	801	438	618	544	280	302	277	226	192	303	39	0	207	81	394	177
KOR	235	195	658	200	346	310	366	325	394	522	341	985	343	373	126	177	246	343	34	147	0	100	472	260
SVN	72	99	139	82	274	150	118	142	138	208	183	164	92	167	42	38	53	139	27	66	63	0	142	105
PRT	421	568	1058	440	899	731	838	826	883	1018	1001	1358	620	823	239	307	295	643	73	338	409	110	0	422
LVA	110	139	300	124	541	243	213	219	260	371	301	594	228	346	71	82	92	271	61	102	152	61	328	0

HOL

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT	LVA
AUS	0	496	901	460	867	767	634	867	900	652	903	1087	470	579	306	567	542	95	425	335	103	551	248
BEL	426	0	667	531	895	673	599	850	739	661	1037	775	416	587	244	427	536	98	399	271	130	565	246
CAN	815	633	0	841	2061	1176	1318	1465	1629	1786	1373	3265	898	1180	376	1176	1110	169	454	715	186	1037	507
CHE	411	530	740	0	986	586	565	686	718	719	826	911	374	545	218	391	488	86	361	278	113	487	243
DEU	582	839	1250	837	0	2081	1442	2326	1852	2268	2566	2841	1025	1759	372	1182	1651	246	591	577	295	1107	717
DFS	504	592	864	530	1198	0	966	1579	1356	1240	1664	1675	735	1153	384	809	1074	186	548	458	194	840	429
ESP	484	578	842	465	803	690	0	1247	1096	1259	1104	1541	719	937	368	855	878	146	421	508	164	848	394
FRA	594	844	992	632	1217	865	947	0	1555	1513	1993	2413	853	1519	390	1139	1248	168	572	546	190	932	444
GBR	756	741	1647	716	1234	938	889	1042	0	1498	1682	2154	792	1168	395	900	1048	169	744	524	189	957	456
ITA	546	662	1568	659	1480	991	933	1005	1287	0	1498	2370	869	1355	325	951	1196	201	467	613	237	1015	559
NLD	744	1133	1226	810	1860	1218	938	1270	1410	1295	0	2221	807	1371	383	918	1392	214	676	494	217	1005	488
USA	902	664	3292	839	1566	1041	1021	1321	1969	1965	1782	0	1164	1627	467	1709	1593	219	586	876	209	1306	701
HUN	331	339	794	315	686	528	554	573	639	741	613	1053	0	745	300	607	840	119	335	444	128	656	333
POL	375	470	892	394	1143	753	605	944	891	1055	1056	1364	577	0	291	760	1132	194	412	516	214	886	512
ZAF	281	212	350	192	293	303	340	319	368	288	347	496	257	217	0	308	303	54	237	231	57	323	137
JPN	292	238	417	229	340	316	321	328	358	374	349	480	246	254	196	0	747	113	336	519	122	613	319
CZE	345	402	768	355	1096	621	602	806	745	908	1177	1202	712	791	226	233	0	152	406	495	194	783	433
EST	46	57	83	42	139	110	64	78	87	109	134	145	68	109	23	30	84	0	72	81	54	124	117
IRL	382	387	427	361	478	438	404	502	798	438	619	544	280	302	226	193	303	39	0	209	81	394	177
KOR	235	195	661	200	347	310	364	328	396	524	345	993	346	375	178	249	344	34	147	0	101	475	261
SVN	72	99	139	82	274	150	113	142	138	208	184	164	92	167	38	53	139	27	66	63	0	142	105
PRT	421	565	1057	439	899	731	817	824	881	1016	1001	1354	617	822	307	300	642	73	338	410	110	0	422
LVA	110	139	300	124	541	243	197	219	260	371	302	594	228	346	82	92	271	61	102	153	61	327	0

HOL

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT	LVA
AUS	0	493	901	460	867	767	637	867	900	652	903	1087	470	579	498	306	567	542	94	426	335	99	551	226
BEL	427	0	667	532	897	674	601	846	739	660	1014	766	416	587	279	245	424	536	98	402	274	127	566	227
CAN	815	637	0	841	2061	1176	1319	1465	1629	1786	1373	3265	898	1180	376	376	1176	1110	169	454	716	181	1037	481
CHE	411	531	740	0	986	586	567	686	718	719	826	911	374	545	247	218	391	488	86	361	278	108	487	224
DEU	582	840	1250	837	0	2081	1450	2326	1852	2268	2566	2841	1025	1759	449	372	1182	1651	245	591	578	290	1107	689
DFS	504	592	864	530	1198	0	970	1579	1356	1240	1664	1675	735	1153	462	384	809	1074	185	548	459	190	840	403
ESP	486	584	843	468	811	694	0	1253	1099	1261	1108	1546	719	940	327	370	855	880	145	422	509	161	849	374
FRA	594	845	992	632	1217	865	955	0	1555	1513	1993	2413	853	1519	513	390	1139	1248	167	572	547	186	932	419
GBR	756	745	1647	716	1234	938	893	1042	0	1498	1682	2154	792	1168	485	395	900	1048	169	747	524	185	957	428
ITA	546	662	1568	659	1480	991	937	1005	1287	0	1498	2370	869	1355	308	325	951	1196	201	467	614	233	1015	546
NLD	744	1121	1226	810	1860	1218	943	1270	1410	1295	0	2221	807	1371	618	383	918	1392	213	676	496	212	1005	455
USA	902	667	3292	839	1566	1040	1024	1321	1969	1965	1782	0	1164	1627	546	467	1709	1593	219	586	878	204	1306	670
HUN	331	340	794	315	686	528	555	573	639	741	613	1053	0	745	276	300	607	840	119	335	445	127	656	316
POL	375	470	892	394	1143	753	608	944	891	1055	1056	1364	577	0	315	291	760	1132	193	412	517	212	886	491
NZL	400	219	323	207	311	297	266	298	381	262	551	460	206	194	0	204	321	333	48	338	186	56	305	119
ZAF	281	212	350	192	293	303	342	319	368	288	347	496	257	217	186	0	308	303	54	237	231	56	323	124
JPN	291	238	417	229	340	316	321	327	357	374	348	479	246	254	152	196	0	747	113	336	519	120	613	301
CZE	345	402	768	355	1096	621	605	806	745	908	1177	1202	712	791	218	226	232	0	152	406	495	192	783	418
EST	46	57	83	42	139	110	64	78	87	109	134	145	68	109	22	23	30	84	0	72	81	54	124	111
IRL	382	388	427	361	478	438	406	502	801	438	619	544	280	302	277	226	193	303	39	0	209	79	394	163
KOR	235	195	661	200	347	310	364	328	396	524	345	993	346	375	126	178	249	344	34	147	0	100	475	251
SVN	69	98	136	81	270	148	111	140	136	205	182	161	92	167	41	37	52	139	27	65	63	0	140	103
PRT	421	566	1057	439	899	731	819	824	881	1016	1001	1354	617	822	239	307	300	642	73	338	410	109	0	405
LVA	100	128	286	114	519	229	186	208	242	364	281	573	215	334	61	74	88	263	56	92	151	60	315	0

HOL

common bulls below diagonal																											
common three quarter																				sib		group		above		diagonal	
AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT	LVA	NZL				
AUS	0	500	901	460	867	767	634	867	900	652	901	1087	458	579	306	559	542	95	425	336	99	551	248	52			
BEL	428	0	671	533	901	678	602	857	745	661	1044	781	412	590	247	430	538	98	404	275	127	566	246	40			
CAN	815	637	0	841	2061	1176	1319	1465	1629	1786	1359	3265	884	1180	376	1169	1110	169	454	718	181	1037	507	61			
CHE	411	532	740	0	986	586	566	686	718	719	825	911	370	545	218	391	488	86	361	280	108	487	243	44			
DEU	582	840	1250	837	0	2081	1444	2326	1852	2268	2554	2841	1016	1759	372	1180	1651	246	591	579	290	1107	717	67			
DFS	504	593	864	530	1198	0	967	1579	1356	1240	1658	1675	721	1153	384	803	1074	186	548	460	190	840	429	49			
ESP	484	581	843	466	805	691	0	1248	1096	1260	1101	1543	710	938	368	845	879	146	421	510	161	848	394	50			
FRA	594	846	992	632	1217	865	948	0	1555	1513	1987	2413	835	1519	390	1126	1248	168	572	549	186	932	444	48			
GBR	756	745	1647	716	1234	938	890	1042	0	1498	1675	2154	778	1168	395	895	1048	169	744	525	185	957	456	58			
ITA	546	662	1568	659	1480	991	935	1005	1287	0	1486	2370	868	1355	325	951	1196	201	467	615	233	1015	559	60			
NLD	741	1144	1210	807	1844	1215	939	1268	1401	1278	0	2209	789	1363	383	910	1385	212	675	497	211	1001	486	82			
USA	902	668	3292	839	1566	1041	1022	1321	1969	1965	1768	0	1135	1627	467	1698	1593	219	586	881	204	1306	701	61			
HUN	319	331	780	311	679	519	540	562	623	738	598	1027	0	740	292	598	828	119	329	444	127	654	333	38			
POL	375	470	892	394	1143	753	606	944	891	1055	1047	1364	572	0	291	758	1132	194	412	517	212	886	512	45			
ZAF	281	212	350	192	293	303	340	319	368	288	346	496	246	217	0	305	303	54	237	232	56	323	137	19			
JPN	291	238	417	229	340	316	321	327	357	374	347	479	240	254	196	0	746	112	334	520	120	613	319	44			
CZE	345	402	768	355	1096	621	603	806	745	908	1174	1202	701	791	226	232	0	152	406	495	192	783	433	46			
EST	46	57	83	42	139	110	64	78	87	109	132	145	68	109	23	30	84	0	72	81	54	124	117	14			
IRL	382	388	427	361	478	438	405	502	798	438	618	544	272	302	226	193	303	39	0	210	79	394	177	38			
KOR	235	195	662	200	347	310	364	328	396	524	343	997	344	375	178	249	344	34	147	0	100	475	261	38			
SVN	69	98	136	81	270	148	111	140	136	205	181	161	92	167	37	52	139	27	65	63	0	140	103	22			
PRT	421	566	1057	439	899	731	818	824	881	1016	998	1354	614	822	307	300	642	73	338	410	109	0	422	45			
LVA	110	139	300	124	541	243	198	219	260	371	301	594	228	346	82	92	271	61	102	153	60	327	0	26			
NZL	57	37	64	39	64	45	47	47	56	57	80	64	25	31	20	40	37	4	34	33	13	45	13	0			

HOL

common bulls below diagonal																											
common three quarter																				sib		group		above		diagonal	
AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	POL	NZL	JPN	CZE	EST	IRL	KOR	SVN	PRT	ZAF	HUN	LVA				
AUS	0	486	900	443	862	642	639	865	764	651	749	807	476	491	371	425	94	359	215	99	465	165	315	248			
BEL	426	0	659	506	885	618	603	830	659	658	901	662	502	274	322	452	98	342	192	127	494	144	304	246			
CAN	814	632	0	804	2053	1019	1321	1464	1450	1784	1222	2852	1076	371	874	980	168	389	537	181	918	227	728	507			
CHE	407	507	710	0	897	543	562	667	672	701	707	823	470	242	327	407	85	318	205	107	421	133	291	238			
DEU	581	838	1249	781	0	1931	1453	2297	1690	2265	2416	2515	1622	439	942	1443	245	518	440	290	991	223	797	717			
DFS	468	554	833	489	1152	0	867	1342	1111	1214	1445	1279	996	373	568	859	179	434	312	190	716	212	530	416			
ESP	487	589	846	467	817	648	0	1261	991	1265	1013	1376	844	328	674	775	145	354	379	162	753	219	560	397			
FRA	594	840	992	617	1201	807	968	0	1266	1511	1584	1712	1351	504	796	1060	166	456	394	186	801	215	642	443			
GBR	670	680	1491	660	1174	834	786	911	0	1464	1384	1780	1022	377	644	866	157	553	373	184	812	221	578	439			
ITA	546	662	1568	648	1479	973	941	1005	1271	0	1472	2295	1306	306	855	1142	200	443	488	233	952	236	773	559			
NLD	653	979	1111	700	1794	1111	867	1123	1179	1279	0	1611	1211	494	663	1204	207	539	349	212	854	212	593	471			
USA	732	628	3021	760	1484	940	919	1030	1748	1950	1336	0	1433	373	1149	1334	209	460	637	204	1098	258	865	679			
POL	320	406	834	330	1047	674	518	842	797	1014	948	1243	0	237	634	996	181	328	418	210	784	188	602	486			
NZL	397	217	321	204	310	266	268	297	313	262	453	332	150	0	206	243	47	273	115	56	237	100	156	136			
JPN	251	209	376	209	311	284	278	290	308	354	305	420	230	128	0	577	100	231	362	117	475	164	434	279			
CZE	293	346	692	290	978	537	509	663	626	870	1059	1034	715	168	210	0	144	312	367	190	672	203	640	411			
EST	46	57	83	42	139	107	64	78	84	109	130	142	100	22	30	79	0	65	72	54	116	46	107	117			
IRL	336	349	386	324	446	377	355	423	571	423	523	469	250	234	169	246	39	0	128	79	322	125	225	169			
KOR	161	150	506	155	276	231	260	257	275	422	251	731	318	84	191	257	31	96	0	99	350	128	319	213			
SVN	69	98	136	81	270	148	112	140	136	205	182	161	167	41	52	138	27	65	63	0	140	54	124	103			
PRT	362	489	913	374	810	619	699	704	737	954	843	1146	735	187	256	552	68	279	312	109	0	212	506	399			
ZAF	158	132	212	111	182	187	192	189	197	207	186	263	160	92	124	155	21	119	88	36	202	0	171	104			
HUN	238	246	657	242	533	400	403	431	462	648	452	801	483	115	194	543	61	195	244	91	483	151	0	298			
LVA	110	139	300	122	541	242	202	218	256	371	296	583	331	71	88	261	61	102	128	60	309	64	201	0			

HOL

common bulls below diagonal																											
common three quarter																				sib		group		above		diagonal	
AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	JPN	CZE	EST	IRL	KOR	SVN	PRT						
AUS	0	500	901	460	865	767	634	744	900	652	903	1084	470	578	498	567	542	94	426	336	101	551					
BEL	428	0	669	531	899	676	605	796	744	660	1043	776	419	589	283	430	538	98	403	275	128	565					

CAN	815	637	0	841	2060	1176	1311	1309	1629	1786	1379	3246	898	1179	376	1176	1110	169	454	720	183	1037
CHE	411	532	740	0	985	586	569	663	718	719	833	906	374	544	247	391	488	86	361	280	109	487
DEU	582	839	1250	837	0	2080	1453	2200	1851	2267	2573	2831	1024	1754	448	1181	1650	245	590	578	290	1106
DFS	504	593	864	530	1198	0	970	1415	1356	1240	1665	1672	735	1150	462	809	1074	185	547	461	190	840
ESP	488	591	846	470	819	700	0	1180	1103	1266	1114	1543	724	946	332	852	886	145	428	513	163	857
FRA	564	805	947	617	1154	840	940	0	1419	1490	1700	1993	813	1434	432	991	1195	163	529	517	186	894
GBR	756	746	1647	716	1234	938	903	1010	0	1498	1691	2148	792	1167	485	900	1048	169	746	525	186	955
ITA	546	662	1568	659	1480	991	941	998	1287	0	1511	2365	869	1355	308	951	1196	201	467	616	233	1016
NLD	742	1146	1232	816	1867	1221	954	1164	1418	1306	0	2227	806	1368	620	916	1392	214	676	498	211	1004
USA	898	666	3263	833	1558	1036	1025	1141	1961	1957	1783	0	1161	1622	545	1705	1587	218	583	883	204	1304
HUN	331	340	794	315	686	528	558	565	639	741	611	1051	0	744	276	607	840	119	335	445	127	656
POL	375	470	892	394	1143	753	613	900	891	1055	1055	1360	576	0	315	759	1132	193	412	517	212	887
NZL	400	219	323	207	311	297	269	279	381	262	553	458	206	194	0	321	333	48	338	188	57	305
JPN	291	237	416	229	340	316	321	325	357	374	347	479	246	254	152	0	747	113	336	521	121	614
CZE	345	402	768	355	1096	621	611	779	745	908	1178	1196	712	791	218	233	0	152	406	495	190	782
EST	46	57	83	42	139	110	64	77	87	109	135	145	68	109	22	30	84	0	72	81	53	124
IRL	382	388	427	361	478	438	413	487	801	438	619	543	280	302	277	193	303	39	0	210	80	394
KOR	235	195	662	200	347	310	367	321	396	524	344	996	346	375	126	249	344	34	147	0	100	475
SVN	70	97	137	80	270	147	112	138	137	204	179	161	91	166	42	52	137	27	65	62	0	141
PRT	421	567	1057	439	899	731	827	810	882	1017	1001	1347	619	823	239	299	642	73	338	410	110	0

HOL

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	JPN	CZE	EST	IRL	SVN	PRT
AUS	0	500	901	460	866	767	640	867	900	652	901	1087	470	579	498	567	542	94	413	99	551
BEL	428	0	671	533	901	678	609	858	746	661	1045	781	419	590	283	431	538	98	392	126	566
CAN	815	637	0	841	2061	1176	1322	1465	1629	1786	1359	3265	898	1180	376	1176	1110	169	440	181	1037
CHE	411	532	740	0	986	586	570	686	718	719	825	911	374	545	247	391	488	86	354	108	487
DEU	582	840	1250	837	0	2081	1457	2326	1852	2268	2554	2841	1025	1759	449	1182	1651	245	575	289	1107
DFS	504	593	864	530	1198	0	977	1579	1356	1240	1658	1675	735	1153	462	809	1074	185	524	189	841
ESP	488	591	846	470	819	700	0	1263	1109	1266	1116	1554	724	948	333	858	887	145	415	162	857
FRA	594	847	992	632	1217	865	968	0	1556	1513	1988	2413	853	1519	513	1139	1248	167	543	185	933
GBR	756	744	1646	716	1232	937	900	1041	0	1498	1676	2154	792	1168	485	900	1048	169	709	185	957
ITA	546	662	1568	659	1480	991	941	1005	1285	0	1486	2370	869	1355	308	951	1196	201	463	232	1016
NLD	741	1145	1210	807	1844	1215	953	1269	1400	1278	0	2209	806	1363	618	916	1385	211	639	209	1002
USA	902	668	3292	839	1566	1041	1031	1321	1969	1965	1768	0	1164	1627	546	1709	1593	219	560	203	1307
HUN	331	340	794	315	686	528	558	573	639	741	611	1053	0	745	276	607	840	119	324	127	656
POL	375	470	892	394	1143	753	613	944	891	1055	1047	1364	576	0	315	760	1132	193	401	212	887
NZL	400	219	323	207	311	297	270	298	381	262	551	460	206	194	0	321	333	48	324	56	305
JPN	290	236	415	228	339	315	320	326	356	373	346	478	246	253	152	0	747	113	322	120	614
CZE	345	402	768	355	1096	621	611	806	744	908	1174	1202	712	791	218	233	0	152	391	191	783
EST	46	57	83	42	139	110	64	78	87	109	132	145	68	109	22	30	84	0	71	54	124
IRL	380	387	426	359	476	437	410	495	777	438	610	538	278	302	273	193	302	39	0	79	383
SVN	69	97	136	81	269	147	112	139	136	204	179	160	92	167	41	52	138	27	65	0	140
PRT	421	567	1057	439	899	731	827	824	881	1017	1000	1355	619	823	239	298	642	73	338	109	0

HOL

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	JPN	CZE	EST	IRL	SVN	PRT
AUS	0	492	901	460	865	767	642	740	900	652	883	1085	458	577	557	542	94	412	101	557
BEL	427	0	664	528	893	671	607	790	737	659	997	759	408	584	416	535	98	389	128	569
CAN	815	636	0	841	2060	1176	1324	1304	1629	1786	1348	3257	884	1179	1159	1110	169	440	183	1045
CHE	411	529	740	0	985	586	572	658	718	719	824	909	370	544	388	488	86	354	109	493
DEU	582	839	1250	837	0	2080	1460	2194	1851	2267	2548	2840	1015	1753	1175	1650	245	574	290	1114
DFS	504	591	864	530	1198	0	981	1411	1356	1240	1637	1661	721	1150	797	1074	185	524	190	849
ESP	489	598	848	473	825	705	0	1178	1111	1269	1103	1552	716	950	846	889	147	416	164	867
FRA	557	801	937	608	1147	838	938	0	1414	1489	1674	1983	804	1432	978	1194	163	516	186	900
GBR	756	743	1646	716	1232	937	906	997	0	1498	1666	2147	778	1167	887	1048	169	706	186	963
ITA	546	662	1568	659	1480	991	946	997	1285	0	1506	2369	868	1355	948	1196	201	463	233	1017
NLD	717	1088	1185	795	1840	1199	932	1130	1378	1297	0	2124	782	1357	877	1381	213	634	211	1001
USA	898	663	3292	839	1565	1041	1032	1125	1968	1965	1581	0	1135	1625	1655	1591	219	558	204	1315
HUN	319	331	780	311	679	519	546	552	623	738	582	1027	0	739	596	828	119	319	127	657
POL	375	469	892	394	1143	753	616	899	891	1055	1047	1364	572	0	756	1132	193	401	212	892

JPN	287	234	413	225	337	313	319	318	352	371	340	474	239	253	0	744	112	318	121	618
CZE	345	401	768	355	1096	621	614	775	744	908	1161	1201	701	791	231	0	152	391	190	786
EST	46	57	83	42	139	110	66	77	87	109	134	145	68	109	30	84	0	71	53	124
IRL	380	387	426	359	476	437	412	481	774	438	601	538	271	302	192	302	39	0	80	386
SVN	70	97	137	80	270	147	113	138	137	204	179	161	91	166	52	137	27	65	0	141
PRT	423	572	1062	444	905	737	837	816	890	1018	993	1361	620	827	296	646	73	339	110	0

HOL

common bulls below diagonal
common three quarter sib group above diagonal

	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	CZE	IRL	KOR	SVN	PRT	EST	HUN	POL
BEL	0	619	440	729	624	546	745	681	580	842	701	439	364	179	103	482	66	302	352
CAN	616	0	729	1736	1080	1210	1272	1534	1635	1160	3069	961	424	478	154	902	119	727	747
CHE	441	634	0	784	496	479	578	616	628	640	766	383	293	187	88	397	61	283	321
DEU	700	1135	660	0	1627	1233	1787	1494	1867	2045	2280	1308	459	385	223	882	174	761	1052
DFS	575	861	443	1050	0	887	1407	1345	1041	1406	1655	867	521	283	151	710	131	535	685
ESP	545	781	378	683	657	0	1113	1007	1118	960	1423	762	378	341	136	734	102	556	609
FRA	774	933	515	996	837	884	0	1411	1260	1456	1981	1026	515	352	146	781	113	640	940
GBR	707	1573	587	1043	935	801	998	0	1317	1400	2138	876	701	333	155	817	119	585	720
ITA	603	1468	578	1288	883	846	912	1165	0	1267	2062	1012	395	429	187	862	148	724	886
NLD	918	1085	617	1579	1119	806	1047	1186	1158	0	1647	1169	553	316	169	823	150	584	813
USA	643	3178	681	1339	1040	896	1125	1966	1804	1317	0	1354	557	561	174	1115	143	878	992
CZE	343	681	272	909	528	507	646	619	786	1032	1025	0	315	317	160	652	101	636	712
IRL	373	423	285	386	437	371	481	768	388	531	538	240	0	117	66	319	46	227	240
KOR	142	464	144	256	215	242	238	252	378	234	651	224	90	0	83	311	48	284	300
SVN	82	116	66	208	121	98	111	120	166	149	138	118	55	55	0	122	40	105	160
PRT	480	907	352	753	612	683	694	727	863	812	1142	533	275	281	94	0	79	500	555
EST	38	62	29	93	82	43	53	67	78	94	83	57	27	20	17	46	0	79	120
HUN	244	651	234	518	400	398	428	457	619	445	795	535	193	216	76	476	44	0	463
POL	274	572	222	657	458	370	552	557	681	598	774	476	192	210	131	505	60	367	0

HOL

common bulls below diagonal
common three quarter sib group above diagonal

	BEL	CHE	DEU	DFS	FRA	GBR	ITA	NLD	USA	CZE	JPN	IRL	KOR	CAN	PRT	ESP	SVN	EST	HUN	NZL	POL
BEL	0	490	711	302	596	679	596	894	694	401	261	335	185	513	365	554	126	79	259	207	429
CHE	495	0	863	247	564	689	689	779	880	389	279	314	203	708	329	539	111	74	257	197	419
DEU	682	729	0	802	1596	1501	2011	2105	2294	1242	752	411	426	1586	742	1241	289	206	676	272	1374
DFS	241	201	368	0	494	626	532	788	686	437	220	276	133	322	268	418	82	61	225	194	421
FRA	603	506	968	259	0	1000	1260	1205	1380	849	605	339	361	993	584	949	185	133	549	219	1100
GBR	703	678	1058	352	759	0	1406	1550	2103	808	535	637	372	1231	623	1040	187	142	517	346	911
ITA	612	627	1323	365	894	1216	0	1380	2226	1039	725	393	483	1585	744	1188	231	174	681	243	1156
NLD	975	763	1625	503	929	1309	1219	0	1859	1129	528	543	347	1017	637	1012	214	179	512	441	1058
USA	625	809	1355	343	860	1956	1877	1461	0	1258	953	512	634	2439	878	1477	207	173	791	345	1304
CZE	313	277	883	231	571	577	798	997	970	0	478	263	360	830	517	706	189	123	553	192	878
JPN	171	178	272	107	251	265	314	263	367	186	0	168	340	687	358	576	112	80	371	140	531
IRL	345	319	359	206	331	701	381	520	500	200	127	0	115	316	205	362	74	51	178	231	252
KOR	142	155	275	78	255	274	417	249	731	253	190	88	0	503	324	374	98	65	305	110	405
CAN	533	643	1130	247	789	1318	1453	1034	2751	635	329	337	489	0	693	1022	182	134	627	217	921
PRT	360	290	640	197	546	558	744	615	938	423	213	178	286	717	0	567	137	96	414	160	640
ESP	560	441	680	275	761	852	884	868	975	461	242	366	258	721	518	0	164	122	501	233	736
SVN	95	81	273	55	139	137	204	181	163	137	51	59	62	138	104	113	0	51	122	56	204
EST	48	36	117	26	67	77	96	117	109	70	28	31	31	76	61	57	27	0	94	35	161
HUN	208	207	467	148	383	411	572	390	724	468	168	149	236	602	403	359	89	55	0	125	538
NZL	174	174	230	127	184	289	220	407	299	142	104	195	84	222	138	201	41	18	96	0	161
POL	350	302	943	255	737	732	917	849	1169	640	208	204	311	801	615	461	163	93	445	123	0

JER

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0	151	89	91	35	152	255	132	17	15
CAN	157	0	95	115	37	76	446	143	13	22

DFS	66	83	0	100	47	92	154	126	22	34
GBR	90	121	95	0	43	70	141	100	15	30
ITA	35	35	46	41	0	33	47	47	10	16
NZL	154	77	71	72	30	0	149	104	17	19
USA	249	447	122	147	50	156	0	251	34	35
ZAF	136	143	109	99	48	100	258	0	26	25
NLD	13	8	16	13	7	14	34	21	0	4
CHE	13	20	33	28	17	17	35	25	3	0

JER

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0	151	89	91	35	152	255	125	17	22
CAN	157	0	95	115	37	76	446	132	13	27
DFS	66	83	0	100	47	92	154	117	22	43
GBR	90	121	95	0	43	70	141	95	15	37
ITA	35	35	46	41	0	33	47	47	10	22
NZL	154	77	71	72	30	0	149	95	17	25
USA	249	447	122	147	50	156	0	231	34	42
ZAF	130	134	103	95	48	92	240	0	26	36
NLD	13	8	16	13	7	14	34	21	0	8
CHE	20	26	42	36	24	23	43	36	6	0

JER

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	NZL	ZAF	NLD	USA	CHE
AUS	0	151	89	91	35	152	125	17	255	26
CAN	157	0	95	115	37	76	132	13	446	31
DFS	66	83	0	100	47	92	117	22	154	46
GBR	90	121	95	0	43	70	95	15	141	40
ITA	35	35	46	41	0	33	47	10	47	25
NZL	154	77	71	72	30	0	95	17	149	29
ZAF	130	134	103	95	48	92	0	26	231	40
NLD	13	8	16	13	7	14	21	0	34	10
USA	249	447	122	147	50	156	240	34	0	46
CHE	23	28	45	39	26	27	39	7	47	0

JER

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE
AUS	0	151	86	90	35	255	131	5	26
CAN	157	0	95	115	37	446	143	5	31
DFS	63	82	0	98	47	154	125	11	46
GBR	89	121	93	0	43	141	100	9	40
ITA	35	35	46	41	0	47	47	5	25
USA	249	447	121	147	50	0	250	17	46
ZAF	135	143	108	99	48	257	0	11	40
NLD	2	3	10	8	4	15	9	0	5
CHE	23	28	45	39	26	47	39	5	0

JER

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0	151	89	91	35	152	255	132	17	26
CAN	157	0	95	115	37	76	446	143	13	31
DFS	66	83	0	100	47	92	154	126	22	46
GBR	90	121	95	0	43	70	141	100	15	40

ITA	35	35	46	41	0	33	47	47	10	25
NZL	154	77	71	72	30	0	149	104	17	29
USA	249	447	122	147	50	156	0	251	34	46
ZAF	136	143	109	99	48	100	258	0	26	40
NLD	13	8	16	13	7	14	34	21	0	10
CHE	23	28	45	39	26	27	47	39	7	0

JER

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0	151	84	91	35	152	255	132	17	26
CAN	157	0	85	115	37	76	446	143	13	31
DFS	58	70	0	96	44	85	144	119	20	45
GBR	90	121	88	0	43	70	141	100	15	40
ITA	35	35	41	41	0	33	47	47	10	25
NZL	154	77	63	72	30	0	149	104	17	29
USA	249	447	110	147	50	156	0	251	34	46
ZAF	136	143	99	99	48	100	258	0	26	40
NLD	13	8	14	13	7	14	34	21	0	10
CHE	23	28	44	39	26	27	47	39	7	0

JER

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0	151	89	91	35	152	255	132	17	26
CAN	157	0	95	115	37	76	446	143	13	31
DFS	66	83	0	100	47	92	154	126	22	46
GBR	90	121	95	0	43	70	141	100	15	40
ITA	35	35	46	41	0	33	47	47	10	25
NZL	154	77	71	72	30	0	149	104	17	29
USA	249	447	122	147	50	156	0	251	34	46
ZAF	136	143	109	99	48	100	258	0	26	40
NLD	13	8	16	13	7	14	34	21	0	10
CHE	23	28	45	39	26	27	47	39	7	0

JER

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	CAN	DFS	ITA	ZAF	NLD	USA	CHE
AUS	0	151	81	35	104	17	255	26
CAN	157	0	85	37	118	13	446	31
DFS	56	70	0	44	89	20	144	45
ITA	35	35	41	0	44	10	47	25
ZAF	105	114	75	44	0	23	197	40
NLD	13	8	14	7	16	0	34	10
USA	249	447	110	50	194	34	0	46
CHE	23	28	44	26	39	7	47	0

JER

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE
AUS	0	151	86	90	35	255	131	17	26
CAN	157	0	95	115	37	446	143	13	31
DFS	64	83	0	98	47	154	125	22	46
GBR	89	121	93	0	43	141	100	15	40
ITA	35	35	46	41	0	47	47	10	25
USA	249	447	122	147	50	0	250	34	46
ZAF	135	143	108	99	48	257	0	26	40

NLD	13	8	16	13	7	34	21	0	10
CHE	23	28	45	39	26	47	39	7	0

JER

common bulls below diagonal

common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0	151	89	91	35	152	255	132	17	26
CAN	157	0	95	115	37	76	446	143	13	31
DFS	66	83	0	100	47	92	154	126	21	46
GBR	90	121	95	0	43	70	141	100	15	40
ITA	35	35	46	41	0	33	47	47	10	25
NZL	154	77	71	72	30	0	149	104	16	29
USA	249	447	122	147	50	156	0	251	33	46
ZAF	136	143	109	99	48	100	258	0	26	40
NLD	13	8	15	13	7	13	34	21	0	10
CHE	23	28	45	39	26	27	47	39	7	0

JER

common bulls below diagonal

common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0	151	81	91	35	152	255	132	17	26
CAN	157	0	79	115	37	76	446	143	13	31
DFS	56	68	0	87	44	78	137	114	19	45
GBR	90	121	84	0	43	70	141	100	15	40
ITA	35	35	41	41	0	33	47	47	10	25
NZL	154	77	58	72	30	0	149	104	16	29
USA	249	447	105	147	50	156	0	251	33	46
ZAF	136	143	97	99	48	100	258	0	26	40
NLD	13	8	13	13	7	13	34	21	0	10
CHE	23	28	44	39	26	27	47	39	7	0

JER

common bulls below diagonal

common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0	151	89	91	35	152	255	132	17	26
CAN	157	0	95	115	37	76	446	143	13	31
DFS	66	83	0	100	47	92	154	126	21	46
GBR	90	121	95	0	43	70	141	100	15	40
ITA	35	35	46	41	0	33	47	47	10	25
NZL	154	77	71	72	30	0	149	104	16	29
USA	249	447	122	147	50	156	0	251	33	46
ZAF	136	143	109	99	48	100	258	0	26	40
NLD	13	8	15	13	7	13	34	21	0	10
CHE	23	28	45	39	26	27	47	39	7	0

JER

common bulls below diagonal

common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE
AUS	0	151	87	90	35	255	132	17	26
CAN	157	0	95	115	37	443	143	13	31
DFS	65	83	0	98	47	154	126	23	46
GBR	89	120	93	0	43	141	100	15	40
ITA	35	35	46	41	0	47	47	10	25
USA	249	445	122	147	50	0	250	34	46
ZAF	136	143	109	99	48	257	0	27	40
NLD	13	8	17	13	7	35	22	0	10
CHE	23	28	45	39	26	47	39	7	0

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JER
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common bulls below diagonal
common three quarter sib group above diagonal
  AUS  CAN  DFS  GBR  ITA  NZL  USA  ZAF  NLD  CHE
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AUS   0  151  89   91   35  152  255  132  17  26
CAN  157   0  95  115   37   76  446  143  13  31
DFS   66  83   0  100   46   92  154  126  23  46
GBR   90 121  95   0   43   70  141  100  15  40
ITA   35  35  45   41   0   33   46   47  10  25
NZL  154  77  71   72   30   0  149  104  17  29
USA  249 447 122  147  49  156   0  251  34  46
ZAF  136 143 109  99  48  100  258   0  27  40
NLD   13   8  17  13   7  14  35  22   0  10
CHE   23  28  45  39  26  27  47  39   7   0
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JER
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common bulls below diagonal
common three quarter sib group above diagonal
  AUS  CAN  DFS  GBR  ITA  USA  ZAF  NLD  CHE  NZL
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AUS   0  151  86   90   35  255  124  17  26  18
CAN  157   0  95  115   37  446  132  13  31  11
DFS   64  83   0  98  47  154  116  21  46  14
GBR   89 121  93   0  43  141  95  15  40   6
ITA   35  35  46  41   0  47  47  10  25   2
USA  249 447 122  147  50   0  231  33  46  14
ZAF  129 134 102  95  48  240   0  26  40  13
NLD   13   8  15  13   7  34  21   0  10   1
CHE   23  28  45  39  26  47  39   7   0   4
NZL   18  11  13   5   1  14  12   0   4   0
-----

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JER
-----
common bulls below diagonal
common three quarter sib group above diagonal
  AUS  CAN  DFS  NZL  ZAF  NLD  USA  CHE
-----
AUS   0  151  73  152  122  17  255  26
CAN  157   0  74  76  129  13  446  31
DFS   51  65   0  71  101  21  130  45
NZL  154  77  53   0  91  17  149  29
ZAF  125 128  85  84   0  27  226  40
NLD   13   8  15  14  22   0  34  10
USA  249 447 100 156 227  35   0  46
CHE   23  28  44  27  39   7  47   0
-----

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JER
-----
common bulls below diagonal
common three quarter sib group above diagonal
  AUS  CAN  DFS  GBR  ITA  NZL  USA  NLD  CHE
-----
AUS   0  151  89  35  35  152  255  17  22
CAN  157   0  95  37  37  76  446  13  27
DFS   66  83   0  32  47  92  154  22  43
GBR   40  43  30   0  12  35  37   4   3
ITA   35  35  46  13   0  33  47  10  22
NZL  154  77  71  39  30   0  149  17  25
USA  249 447 122  40  50  156   0  34  42
NLD   13   8  16   5   7  14  34   0   8
CHE   20  26  42   4  24  23  43   6   0
-----

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JER
-----
common bulls below diagonal

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common three quarter sib group above diagonal									
	AUS	CAN	DFS	GBR	NZL	USA	NLD	CHE	ITA
AUS	0	151	86	91	152	255	17	22	35
CAN	157	0	89	115	76	443	13	27	37
DFS	64	81	0	90	84	147	21	43	46
GBR	90	120	90	0	67	141	15	37	43
NZL	154	77	65	69	0	149	16	25	33
USA	249	445	117	147	156	0	33	42	46
NLD	13	8	15	13	13	34	0	8	10
CHE	20	26	42	36	23	43	6	0	22
ITA	35	35	45	41	30	49	7	24	0

JER

common bulls below diagonal								
common three quarter sib group above diagonal								
	AUS	CAN	DFS	GBR	ITA	USA	NLD	CHE
AUS	0	124	74	79	32	212	15	19
CAN	129	0	95	115	37	446	13	27
DFS	53	83	0	98	47	154	22	43
GBR	77	120	93	0	43	141	15	37
ITA	31	35	46	41	0	47	10	22
USA	201	447	122	147	50	0	34	42
NLD	11	8	16	13	7	34	0	8
CHE	17	26	42	36	24	43	6	0

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RDC

common bulls below diagonal											
common three quarter sib group above diagonal											
	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM	LVA
AUS	0	23	10	45	9	14	21	13	9	3	16
CAN	23	0	10	145	70	4	33	150	3	0	10
DEU	10	10	0	52	4	11	10	4	12	0	29
DFS	34	146	43	0	54	83	57	82	34	0	122
GBR	8	69	4	50	0	0	26	56	1	0	3
NOR	10	4	10	62	0	0	6	0	22	0	11
NZL	20	31	10	55	23	5	0	22	2	2	6
USA	13	143	4	77	52	0	21	0	2	0	4
NLD	9	3	11	33	1	21	2	2	0	0	12
CAM	3	0	0	0	0	0	2	0	0	0	0
LVA	15	10	23	84	3	9	6	4	11	0	0

RDC

common bulls below diagonal											
common three quarter sib group above diagonal											
	AUS	CAN	DEU	DFS	GBR	NZL	USA	NLD	CAM	NOR	LVA
AUS	0	23	10	45	9	21	13	9	3	8	15
CAN	23	0	10	145	70	33	150	3	0	1	10
DEU	10	10	0	52	4	10	4	12	0	5	27
DFS	34	146	43	0	54	55	82	32	0	49	103
GBR	8	69	4	50	0	26	56	1	0	0	3
NZL	20	31	10	53	23	0	22	2	2	3	5
USA	13	143	4	77	52	21	0	2	0	0	4
NLD	9	3	11	31	1	2	2	0	0	13	11
CAM	3	0	0	0	0	2	0	0	0	0	0
NOR	7	1	4	35	0	3	0	12	0	0	1
LVA	14	10	21	69	3	5	4	10	0	0	0

RDC

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-----
common bulls below diagonal
common three quarter sib group above diagonal
  AUS  CAN  DEU  DFS  GBR  NOR  NZL  USA  NLD  CAM  LVA
-----
AUS   0   23   10   45   9   7   21   13   9   3   16
CAN   23   0   10  145   70   1   33  148   3   0   10
DEU   10   0   0   52   4   6   10   4   12   0   29
DFS   34  146   43   0   54   59   55   82   32   0  122
GBR    8   69   4   50   0   0   26   55   1   0   3
NOR    6    1   5   42   0   0   3   0   17   0   2
NZL   20   31   10   53   23   3   0   22   2   2   6
USA   13  142   4   77   51   0   21   0   2   0   4
NLD    9    3  11   31   1  16   2   2   0   0  12
CAM    3    0   0   0   0   0   2   0   0   0   0
LVA   15   10   23   84   3   1   6   4  11   0   0
-----

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RDC
-----
common bulls below diagonal
common three quarter sib group above diagonal
  AUS  CAN  DEU  DFS  GBR  USA  NLD  CAM  NOR  LVA
-----
AUS   0   23   1   45   9  13   9   3   8  16
CAN   23   0   0  145   70  150   3   0   3  10
DEU    1   0   0   12   0   0   0   0   1   1
DFS   34  146  10   0   54  82  31   0  57  122
GBR    8   69   0   50   0  56   1   0   0   3
USA   13  143   0   77  52   0   2   0   0   4
NLD    9   3   0   30   1   2   0   0  13  11
CAM    3   0   0   0   0   0   0   0   0   0
NOR    7   2   1  44   0   0  12   0   0   1
LVA   15  10   0   84   3   4  10   0   0   0
-----

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RDC
-----
common bulls below diagonal
common three quarter sib group above diagonal
  AUS  CAN  DEU  DFS  GBR  NOR  NZL  USA  NLD  CAM  LVA
-----
AUS   0   23  10   45   9  16  21  13   9   3  16
CAN   23   0  10  145   70   4  33  150   3   0  10
DEU   10  10   0   52   4  11  10   4  12   0  29
DFS   34  146  43   0   54  93  54  82  33   0  122
GBR    8   69   4   50   0   0  26  56   1   0   3
NOR   12   4  10  70   0   0   7   0  22   0  12
NZL   20  31  10  50  23   6   0  22   2   2   6
USA   13  143   4   77  52   0  21   0   2   0   4
NLD    9   3  11  32   1  21   2   2   0   0  12
CAM    3   0   0   0   0   0   2   0   0   0   0
LVA   15  10  23  84   3  10   6   4  11   0   0
-----

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RDC
-----
common bulls below diagonal
common three quarter sib group above diagonal
  AUS  CAN  DEU  DFS  GBR  NZL  USA  NLD  CAM  NOR  LVA
-----
AUS   0   23  10   45   9  21  13   9   3   7  16
CAN   23   0  10  145   70  33  150   3   0   1  10
DEU   10  10   0   52   4  10   4  12   0   5  29
DFS   34  146  43   0   54  55  82  33   0  47  122
GBR    8   69   4   50   0  26  56   1   0   0   3
NZL   20  31  10  53  23   0  22   2   2   3   6
USA   13  143   4   77  52  21   0   2   0   0   4
NLD    9   3  11  32   1   2   2   0   0  12  12
CAM    3   0   0   0   0   2   0   0   0   0   0
NOR    6   1   4  33   0   3   0  11   0   0   1
LVA   15  10  23  84   3   6   4  11   0   0   0
-----

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RDC

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM	LVA
AUS	0	23	10	45	9	16	21	13	9	3	16
CAN	23	0	10	145	70	4	33	150	3	0	10
DEU	10	10	0	52	4	11	10	4	12	0	29
DFS	34	146	43	0	54	96	57	82	34	0	122
GBR	8	69	4	50	0	0	26	56	1	0	3
NOR	12	4	10	72	0	0	7	0	22	0	12
NZL	20	31	10	55	23	6	0	22	2	2	6
USA	13	143	4	77	52	0	21	0	2	0	4
NLD	9	3	11	33	1	21	2	2	0	0	12
CAM	3	0	0	0	0	0	2	0	0	0	0
LVA	15	10	23	84	3	10	6	4	11	0	0

RDC

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	NOR	NLD	USA	CAM	LVA
AUS	0	23	10	45	16	9	13	3	15
CAN	23	0	10	144	4	3	150	0	10
DEU	10	10	0	52	11	12	4	0	27
DFS	34	145	43	0	93	31	82	0	103
NOR	12	4	10	70	0	22	0	0	10
NLD	9	3	11	30	21	0	2	0	11
USA	13	143	4	77	0	2	0	0	4
CAM	3	0	0	0	0	0	0	0	0
LVA	14	10	21	69	8	10	4	0	0

RDC

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM	LVA
AUS	0	23	7	45	9	16	13	9	3	16
CAN	23	0	8	145	70	4	150	3	0	10
DEU	7	8	0	43	4	10	4	12	0	16
DFS	34	146	37	0	54	93	82	32	0	122
GBR	8	69	4	50	0	0	56	1	0	3
NOR	12	4	9	70	0	0	0	22	0	12
USA	13	143	4	77	52	0	0	2	0	4
NLD	9	3	11	31	1	21	2	0	0	12
CAM	3	0	0	0	0	0	0	0	0	0
LVA	15	10	13	84	3	10	4	11	0	0

RDC

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM	LVA
AUS	0	23	10	45	9	16	21	13	8	3	16
CAN	23	0	10	145	70	4	33	150	3	0	10
DEU	10	10	0	52	4	11	10	4	12	0	29
DFS	34	146	43	0	54	96	57	82	31	0	122
GBR	8	69	4	50	0	0	26	56	1	0	3
NOR	12	4	10	72	0	0	7	0	22	0	12
NZL	20	31	10	55	23	6	0	22	2	2	6
USA	13	143	4	77	52	0	21	0	2	0	4
NLD	8	3	11	30	1	21	2	2	0	0	12
CAM	3	0	0	0	0	0	2	0	0	0	0
LVA	15	10	23	84	3	10	6	4	11	0	0

RDC

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM	LVA
AUS	0	23	10	45	9	16	21	13	8	3	16
CAN	23	0	10	145	70	4	33	150	3	0	10
DEU	10	10	0	52	4	11	10	4	12	0	29
DFS	34	146	43	0	54	93	55	82	31	0	116
GBR	8	69	4	50	0	0	26	56	1	0	3
NOR	12	4	10	70	0	0	7	0	22	0	12
NZL	20	31	10	52	23	6	0	22	2	2	6
USA	13	143	4	77	52	0	21	0	2	0	4
NLD	8	3	11	30	1	21	2	2	0	0	12
CAM	3	0	0	0	0	0	2	0	0	0	0
LVA	15	10	23	80	3	10	6	4	11	0	0

RDC

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM	LVA
AUS	0	23	10	45	9	16	21	13	8	3	16
CAN	23	0	10	145	70	4	33	150	3	0	10
DEU	10	10	0	52	4	12	10	4	12	0	29
DFS	34	146	43	0	54	88	57	82	33	0	122
GBR	8	69	4	50	0	0	26	56	1	0	3
NOR	12	4	11	67	0	0	7	0	22	0	12
NZL	20	31	10	55	23	6	0	22	2	2	6
USA	13	143	4	77	52	0	21	0	2	0	4
NLD	8	3	11	32	1	21	2	2	0	0	12
CAM	3	0	0	0	0	0	2	0	0	0	0
LVA	15	10	23	84	3	10	6	4	11	0	0

RDC

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM	LVA
AUS	0	23	10	45	9	16	13	9	3	16
CAN	23	0	10	145	70	4	147	3	0	10
DEU	10	10	0	52	4	11	4	12	0	29
DFS	34	146	43	0	54	96	82	35	0	122
GBR	8	69	4	50	0	0	56	1	0	3
NOR	12	4	10	72	0	0	0	25	0	12
USA	13	142	4	77	52	0	0	2	0	4
NLD	9	3	11	34	1	24	2	0	0	12
CAM	3	0	0	0	0	0	0	0	0	0
LVA	15	10	23	84	3	10	4	11	0	0

RDC

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM	LVA
AUS	0	23	10	45	9	16	21	13	9	3	15
CAN	23	0	10	145	70	4	33	150	3	0	10
DEU	10	10	0	52	4	12	10	4	12	0	27
DFS	34	146	43	0	54	95	55	82	34	0	103
GBR	8	69	4	50	0	0	26	56	1	0	3
NOR	12	4	11	72	0	0	7	0	25	0	11
NZL	20	31	10	53	23	6	0	22	2	2	5
USA	13	143	4	77	52	0	21	0	2	0	4
NLD	9	3	11	33	1	24	2	2	0	0	11

CAM	3	0	0	0	0	0	2	0	0	0	0
LVA	14	10	21	69	3	9	5	4	10	0	0

RDC

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common bulls below diagonal
common three quarter sib group above diagonal
  AUS  CAN  DEU  DFS  GBR  NOR  USA  NLD  CAM  LVA  NZL
-----
AUS   0   23   10   45   9   16   13   8   3   16   2
CAN  23   0   10  145   70   4  148   3   0   10   2
DEU  10  10   0   52   4   11   4   12   0   29   3
DFS  34 146  43   0   54  90   82  33   0  122   7
GBR   8   69   4   50   0   0   55   1   0   3   3
NOR  12   4   10  67   0   0   0  22   0  12   1
USA  13 142   4  77   51   0   0   2   0   4   2
NLD   8   3  11  32   1  21   2   0   0  12   0
CAM   3   0   0   0   0   0   0   0   0   0   0
LVA  15  10  23  84   3  10   4  11   0   0   0
NZL   2   2   3   7   3   1   2   0   0   0   0

```

RDC

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common bulls below diagonal
common three quarter sib group above diagonal
  AUS  CAN  DEU  DFS  NOR  NZL  NLD  USA  CAM  LVA
-----
AUS   0   23   10   40   16   21   9   13   3  16
CAN  23   0   10  139   4   33   3  150   0  10
DEU  10  10   0   49  12  10  12   4   0  29
DFS  31 139  43   0  87  50  32  77   0 105
NOR  12   4  11  67   0   7  25   0   0  12
NZL  20  31  10  49   6   0   1  22   2   6
NLD   9   3  11  31  24   1   0   2   0  11
USA  13 143   4  73   0  21   2   0   0   4
CAM   3   0   0   0   0   2   0   0   0   0
LVA  15  10  23  72  10   6  10   4   0   0

```

RDC

```

common bulls below diagonal
common three quarter sib group above diagonal
  AUS  CAN  DEU  DFS  GBR  NOR  NZL  USA  NLD  CAM
-----
AUS   0   23   10   45   8   18   21  13   9   3
CAN  23   0   10  145   6   33  150   3   3   0
DEU  10  10   0   52   4  13  10   4  12   0
DFS  34 146  43   0  54 111  57  82  34   0
GBR   7  66   4   50   0   0  23  54   1   0
NOR  14   5  12  88   0   0   8   0  24   0
NZL  20  31  10  55  20   7   0  22   2   2
USA  13 143   4  77  50   0  21   0   2   0
NLD   9   3  11  33   1  23   2   2   0   0
CAM   3   0   0   0   0   0   2   0   0   0

```

RDC

```

common bulls below diagonal
common three quarter sib group above diagonal
  AUS  CAN  DEU  DFS  GBR  NOR  NZL  USA  NLD  CAM
-----
AUS   0   23   10   45   8  16  21  13   8   3
CAN  23   0   10  145   6  4  33 147   3   0
DEU  10  10   0   52   4  11  10   4  12   0
DFS  34 146  43   0  54 96  57  82  33   0
GBR   7  66   4   50   0   0  23  54   1   0
NOR  12   4  10  72   0   0   7   0  22   0
NZL  20  31  10  55  20   6   0  22   2   2
USA  13 142   4  77  50   0  21   0   2   0

```


NLD	8	3	11	32	1	21	2	2	0	0
CAM	3	0	0	0	0	0	2	0	0	0

RDC

 common bulls below diagonal

common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM
AUS	0	23	10	45	8	16	13	9	3
CAN	23	0	10	145	67	4	150	3	0
DEU	10	10	0	52	4	11	4	12	0
DFS	34	146	43	0	54	96	82	34	0
GBR	7	66	4	50	0	0	54	1	0
NOR	12	4	10	72	0	0	0	22	0
USA	13	143	4	77	50	0	0	2	0
NLD	9	3	11	33	1	21	2	0	0
CAM	3	0	0	0	0	0	0	0	0

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