

Introduction

The latest routine international evaluation for conformation traits took place as scheduled at the Interbull Centre. Data from twenty four (24) 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 the 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:

ITA	JER	Base change based on cow birth year
ITA	HOL	Base change, editing and pedigree checks
ITA	BSW	Base change
BEL	HOL	Up to 21 bulls missing in current data most of them are Montbãliard bulls erroneously added before due to a bug in one of the programs preparing the file to be submitted. which has now been fixed.
NZL	ALL	Continuous DNA parentage testing
FRA	ALL	Base change
CAN	ALL	Base change
SVN	BSW/HOL	Base change
EST	HOL	Correction in type of proof
NOR	RDC	OCS - weights in index have changed, which affects edc and rel. RUH - new trait, turns out that ruw was actually delivered earlier. FTP - change in calculation of rel for older bulls with correlated trait only. OUS - index has changed. Old bulls now lacks one component. UDE - change in calculation of rel for older bulls with correlated trait only.
CHE	BSW/HOL	Continous work on the raw data by herd-book-organizations. Data from two databases were joined (for HOL-CHE and SIM-CHE). Base change
AUS	ALL	New database and procedures for data extraction. Mix99 software will be used for all traits. EBV expression is on the observable scale for a trait into consideration, (kg, days, log(scc), type scores, etc). Drop in reliabilities. The genetic parameters for all traits remain the same.

INTERBULL CHANGES COMPARED TO THE DECEMBER ROUTINE RUN

Subsetting:

As decided by the ITC in Orlando, new subsetting was introduced in the september test run. Sub-setting is necessary for operational purposes and restrictions of time scales. To minimize the effect of subsetting, larger subsets with 10-12 countries and with 4 link providing countries have been applied.

Window:

According to the decision taken by ITC in Orlando, the following changes have been introduced in regards to the windows used for post processing:

The upper bounds have been set to 0.99 as these were judged to have very little effect on evaluations. The lower values have been set to about the 25% percentile value. The largest changes are for the lower values for conformation traits, with the lowest window being 40% for OFL otherwise it is about 50% for all other confirmation traits. It is anticipated that these low values may not have large impact on evaluations since there were very few countries combinations whose estimated correlations fell between the old limit of 0.30 and these new limits. 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

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 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 2019).
 Number of records for stature by breed

Country	BSW	GUE	HOL	JER	RDC	SIM
AUS		47	3734	676	238	
BEL			1475			
CAN	198	98	11313	694	831	
CHE	2641		3126	39		
CZE			3902			
DEA	3378					
DEU			20956		269	
DFS			11702	1930	6106	
ESP			3628			
EST			694			
FRA	341		16567			
FRM						
GBR	19	206	5693	423	304	
HUN			2529			
IRL			1634			
ISR						
ITA	2025		8736	101		
JPN			5421			
KOR			1190			
LTU						
LVA						
NLD	120		14411	38	46	
NOR					2303	
NZL			5957	3786	574	
POL			8308			
PRT			2076			
SVK						
SVN	291		474			
URY						
USA	825	681	31805	3968	247	
ZAF			824	529		
HRV						

MEX									
CAM									31
No. Records	9838	1032	166155	12184	10949				
Pub. Proofs	7942	885	135315	10674	11739				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	6.70								
CHE	0.95	12.36							
FRA	0.98	0.96	0.91						
ITA	0.96	0.95	0.95	14.76					
NLD	0.95	0.95	0.96	0.92	4.54				
USA	0.98	0.95	0.97	0.95	0.94	1.60			
DEA	0.97	0.98	0.97	0.96	0.96	0.96	11.28		
SVN	0.92	0.90	0.91	0.93	0.91	0.90	0.92	16.42	
GBR	0.96	0.93	0.96	0.94	0.93	0.96	0.91	0.89	0.72

BSW cwi

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	8.79								
CHE	0.89	10.18							
FRA	0.84	0.83	0.92						
ITA	0.81	0.85	0.86	22.11					
NLD	0.89	0.79	0.80	0.71	4.29				
USA	0.90	0.90	0.87	0.85	0.81	0.86			
DEA	0.86	0.82	0.66	0.74	0.78	0.78	11.55		
SVN	0.85	0.84	0.79	0.86	0.73	0.84	0.87	22.91	
GBR	0.91	0.85	0.82	0.72	0.89	0.81	0.78	0.81	1.30

BSW bde

	CAN	CHE	FRA	ITA	NLD	DEA	SVN	GBR	USA
CAN	6.58								
CHE	0.86	10.23							
FRA	0.74	0.87	0.91						
ITA	0.79	0.91	0.91	18.18					
NLD	0.83	0.84	0.86	0.84	4.12				
DEA	0.84	0.90	0.92	0.90	0.84	11.34			
SVN	0.80	0.77	0.77	0.85	0.79	0.75	25.89		
GBR	0.87	0.88	0.82	0.85	0.90	0.86	0.86	1.32	
USA	0.73	0.76	0.86	0.78	0.86	0.79	0.79	0.87	0.80

BSW ang

	CAN	CHE	FRA	NLD	USA	GBR
CAN	8.41					
CHE	0.70	10.90				
FRA	0.88	0.67	0.88			
NLD	0.76	0.66	0.66	3.81		
USA	0.88	0.69	0.77	0.68	1.22	
GBR	0.89	0.77	0.80	0.79	0.90	0.68

BSW ran

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	6.76								
CHE	0.94	10.63							
FRA	0.97	0.96	0.93						
ITA	0.95	0.93	0.94	23.12					
NLD	0.95	0.92	0.95	0.93	4.39				
USA	0.97	0.94	0.97	0.92	0.95	1.12			
DEA	0.96	0.94	0.95	0.94	0.91	0.97	11.94		
SVN	0.92	0.91	0.91	0.91	0.92	0.92	0.91	20.79	
GBR	0.96	0.94	0.97	0.94	0.97	0.96	0.92	0.92	1.76

BSW rwi

	CAN	CHE	FRA	NLD	USA	DEA	GBR	SVN	ITA
CAN	7.31								
CHE	0.89	10.05							
FRA	0.89	0.83	0.94						
NLD	0.92	0.86	0.89	3.84					
USA	0.91	0.83	0.87	0.81	0.74				
DEA	0.93	0.89	0.80	0.81	0.87	13.37			
GBR	0.93	0.87	0.92	0.88	0.93	0.83	1.16		
SVN	0.91	0.85	0.83	0.88	0.84	0.89	0.88	26.61	
ITA	0.88	0.80	0.83	0.81	0.85	0.86	0.90	0.82	20.54

BSW rls

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	7.43								
CHE	0.92	12.94							
FRA	0.91	0.90	1.00						
ITA	0.91	0.85	0.92	23.90					
NLD	0.88	0.82	0.88	0.85	5.03				
USA	0.95	0.93	0.90	0.86	0.86	0.75			
DEA	0.93	0.92	0.93	0.90	0.81	0.92	12.41		
SVN	0.87	0.83	0.87	0.87	0.82	0.88	0.88	21.82	
GBR	0.85	0.89	0.91	0.84	0.87	0.84	0.89	0.83	1.06

BSW fan

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	8.70								
CHE	0.70	13.78							
FRA	0.73	0.72	1.08						
ITA	0.71	0.85	0.79	22.55					
NLD	0.74	0.67	0.82	0.70	5.42				
USA	0.79	0.70	0.84	0.85	0.81	0.71			
DEA	0.66	0.90	0.67	0.89	0.66	0.65	11.75		
SVN	0.70	0.84	0.70	0.85	0.67	0.69	0.94	24.54	
GBR	0.81	0.71	0.90	0.73	0.88	0.83	0.70	0.69	0.93

BSW hde

	CAN	CHE	FRA	ITA	NLD	DEA	SVN	USA
CAN	8.88							
CHE	0.88	12.62						
FRA	0.80	0.80	1.14					
ITA	0.79	0.83	0.85	22.82				
NLD	0.77	0.73	0.84	0.74	5.42			
DEA	0.78	0.86	0.83	0.91	0.77	12.28		
SVN	0.77	0.76	0.83	0.89	0.75	0.89	30.28	
USA	0.84	0.74	0.86	0.89	0.82	0.77	0.82	0.71

BSW fua									
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	7.04								
CHE	0.86	11.77							
FRA	0.88	0.86	0.89						
ITA	0.90	0.83	0.83	20.93					
NLD	0.91	0.84	0.90	0.84	4.70				
USA	0.94	0.84	0.85	0.91	0.87	1.29			
DEA	0.87	0.85	0.94	0.83	0.83	0.85	11.32		
SVN	0.80	0.75	0.84	0.86	0.79	0.79	0.89	21.73	
GBR	0.93	0.85	0.87	0.89	0.91	0.92	0.78	0.72	1.37

BSW ruh									
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	7.65								
CHE	0.91	11.58							
FRA	0.87	0.83	0.93						
ITA	0.78	0.86	0.85	13.40					
NLD	0.80	0.85	0.87	0.87	4.49				
USA	0.86	0.85	0.88	0.88	0.86	1.17			
DEA	0.83	0.86	0.89	0.93	0.92	0.88	11.93		
SVN	0.82	0.82	0.80	0.85	0.89	0.82	0.90	19.24	
GBR	0.77	0.82	0.86	0.85	0.87	0.91	0.79	0.77	1.27

BSW ruw									
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	8.15								
CHE	0.91	11.67							
FRA	0.87	0.86	0.84						
ITA	0.81	0.88	0.79	13.54					
NLD	0.72	0.66	0.79	0.70	4.49				
USA	0.86	0.89	0.85	0.90	0.78	1.04			
DEA	0.85	0.91	0.76	0.95	0.56	0.91	12.38		
SVN	0.81	0.80	0.73	0.83	0.69	0.79	0.82	17.79	

BSW usu									
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	8.65								
CHE	0.90	11.93							
FRA	0.84	0.91	0.90						
ITA	0.90	0.88	0.88	18.75					
NLD	0.83	0.83	0.90	0.83	4.35				
USA	0.84	0.89	0.87	0.85	0.89	1.08			
DEA	0.92	0.92	0.88	0.94	0.78	0.81	11.62		
SVN	0.83	0.82	0.71	0.82	0.67	0.72	0.83	23.70	
GBR	0.83	0.80	0.87	0.88	0.91	0.93	0.76	0.69	2.52

BSW ude									
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	6.68								
CHE	0.95	11.96							
FRA	0.95	0.95	0.97						
ITA	0.94	0.97	0.95	21.27					
NLD	0.96	0.95	0.95	0.94	4.21				
USA	0.96	0.95	0.96	0.95	0.95	1.22			
DEA	0.93	0.98	0.92	0.97	0.94	0.92	12.05		

SVN	0.93	0.95	0.91	0.97	0.94	0.92	0.95	21.41	
GBR	0.96	0.94	0.96	0.94	0.97	0.96	0.92	0.91	1.92

BSW ftp

	CAN	CHE	FRA	NLD	USA	DEA	SVN	GBR	ITA
CAN	7.28								
CHE	0.97	14.05							
FRA	0.97	0.95	0.92						
NLD	0.96	0.95	0.95	4.75					
USA	0.92	0.90	0.88	0.91	1.19				
DEA	0.96	0.99	0.95	0.95	0.89	11.12			
SVN	0.94	0.93	0.92	0.92	0.90	0.92	17.92		
GBR	0.96	0.93	0.90	0.94	0.94	0.89	0.93	1.24	
ITA	0.87	0.85	0.85	0.86	0.88	0.85	0.86	0.88	23.40

BSW ftl

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	6.49								
CHE	0.91	14.71							
FRA	0.94	0.95	0.96						
ITA	0.92	0.94	0.95	18.82					
NLD	0.92	0.96	0.92	0.93	5.05				
USA	0.93	0.96	0.95	0.94	0.96	1.38			
DEA	0.89	0.97	0.98	0.96	0.94	0.96	11.16		
SVN	0.90	0.93	0.90	0.93	0.94	0.91	0.92	18.06	
GBR	0.95	0.94	0.93	0.95	0.97	0.96	0.92	0.93	1.37

BSW rtp

	CAN	CHE	FRA	ITA	NLD	DEA	SVN	USA
CAN	7.15							
CHE	0.97	14.60						
FRA	0.96	0.97	0.92					
ITA	0.92	0.95	0.94	21.57				
NLD	0.97	0.96	0.97	0.93	4.44			
DEA	0.96	0.99	0.96	0.96	0.95	12.23		
SVN	0.94	0.93	0.92	0.94	0.94	0.92	17.46	
USA	0.93	0.90	0.92	0.91	0.94	0.90	0.91	1.19

BSW ocs

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	8.11								
CHE	0.86	8.91							
FRA	0.81	0.88	0.97						
ITA	0.83	0.83	0.89	9.54					
NLD	0.77	0.79	0.82	0.78	3.67				
USA	0.86	0.78	0.85	0.84	0.83	0.62			
DEA	0.82	0.91	0.91	0.89	0.77	0.76	10.84		
SVN	0.79	0.78	0.78	0.77	0.78	0.79	0.78	22.17	
GBR	0.83	0.89	0.89	0.83	0.88	0.89	0.82	0.79	1.61

BSW ous

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	8.37								
CHE	0.89	13.32							
FRA	0.89	0.93	0.97						
ITA	0.84	0.90	0.89	10.75					

NLD	0.89	0.88	0.92	0.81	4.49				
USA	0.87	0.90	0.89	0.88	0.87	0.94			
DEA	0.87	0.96	0.90	0.92	0.87	0.89	12.35		
SVN	0.77	0.82	0.76	0.82	0.76	0.81	0.91	20.83	
GBR	0.83	0.85	0.76	0.82	0.79	0.88	0.79	0.76	1.35

BSW ofl

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	8.09								
CHE	0.87	11.29							
FRA	0.67	0.69	1.27						
ITA	0.69	0.72	0.86	18.04					
NLD	0.68	0.68	0.76	0.67	4.60				
USA	0.75	0.68	0.78	0.75	0.68	0.99			
DEA	0.70	0.84	0.70	0.81	0.66	0.65	11.51		
SVN	0.76	0.86	0.67	0.76	0.69	0.74	0.89	28.14	
GBR	0.75	0.77	0.81	0.69	0.75	0.73	0.69	0.68	1.51

BSW ofr

	CAN	CHE	DEA	ITA	SVN	USA	FRA		
CAN	7.40								
CHE	0.84	11.95							
DEA	0.88	0.90	11.73						
ITA	0.84	0.91	0.94	18.90					
SVN	0.81	0.82	0.79	0.86	23.35				
USA	0.85	0.83	0.90	0.86	0.80	1.60			
FRA	0.82	0.87	0.92	0.91	0.83	0.90	0.89		

BSW tpl

	CAN	CHE	DEA	ITA	SVN	FRA			
CAN	7.01								
CHE	0.91	11.81							
DEA	0.91	0.91	11.82						
ITA	0.93	0.92	0.94	24.49					
SVN	0.91	0.90	0.90	0.89	23.52				
FRA	0.97	0.94	0.91	0.91	0.90	1.28			

BSW oru

	CAN	CHE	DEA	ITA	SVN	USA	FRA		
CAN	7.53								
CHE	0.78	15.85							
DEA	0.71	0.88	12.62						
ITA	0.92	0.79	0.76	19.07					
SVN	0.84	0.64	0.66	0.71	28.09				
USA	0.90	0.56	0.47	0.83	0.76	0.74			
FRA	0.91	0.90	0.81	0.90	0.74	0.84	1.08		

BSW rle

	CHE	DEA	ITA	SVN	USA	FRA			
CHE	11.77								
DEA	0.96	12.45							
ITA	0.83	0.87	21.82						
SVN	0.81	0.85	0.83	27.44					
USA	0.53	0.51	0.78	0.71	0.74				
FRA	0.93	0.93	0.90	0.84	0.73	1.03			

BSW		thp					
	CAN	CHE	DEA	ITA	SVN	USA	FRA
CAN	7.78						
CHE	0.84	11.17					
DEA	0.76	0.86	12.24				
ITA	0.88	0.92	0.83	30.51			
SVN	0.80	0.86	0.86	0.87	36.90		
USA	0.88	0.88	0.71	0.85	0.75	1.12	
FRA	0.89	0.87	0.87	0.85	0.85	0.82	1.01

BSW		hoq					
	CAN	CHE	DEA	ITA	SVN	FRA	
CAN	6.49						
CHE	0.93	11.82					
DEA	0.92	0.89	12.52				
ITA	0.91	0.82	0.86	20.07			
SVN	0.92	0.83	0.86	0.87	21.20		
FRA	0.89	0.82	0.90	0.88	0.88	1.01	

BSW		ful				
	CHE	DEA	ITA	SVN	FRA	
CHE	11.61					
DEA	0.91	12.49				
ITA	0.91	0.96	12.70			
SVN	0.78	0.87	0.85	21.30		
FRA	0.66	0.80	0.74	0.75	0.97	

BSW		udb				
	CHE	DEA	ITA	SVN	FRA	
CHE	11.30					
DEA	0.97	13.07				
ITA	0.93	0.98	26.64			
SVN	0.82	0.87	0.80	25.56		
FRA	0.91	0.89	0.85	0.80	0.95	

BSW		tdi				
	CHE	DEA	ITA	SVN	FRA	
CHE	15.68					
DEA	0.96	11.44				
ITA	0.94	0.95	21.34			
SVN	0.92	0.92	0.94	17.91		
FRA	0.96	0.96	0.91	0.92	0.92	

BSW		tth				
	CHE	DEA	ITA	SVN	FRA	
CHE	14.38					
DEA	0.97	12.95				
ITA	0.92	0.93	23.09			
SVN	0.89	0.91	0.88	20.04		
FRA	0.93	0.91	0.95	0.88	0.87	

GUE		sta				
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	CAN	GBR	USA	AUS
CAN	6.19			
GBR	0.97	1.08		
USA	0.98	0.96	2.44	
AUS	0.90	0.92	0.90	0.80

GUE cwi

	CAN	GBR	USA	AUS
CAN	6.89			
GBR	0.92	1.58		
USA	0.88	0.86	1.32	
AUS	0.72	0.79	0.67	0.39

GUE bde

	CAN	GBR	USA	AUS
CAN	6.26			
GBR	0.87	1.31		
USA	0.76	0.90	1.48	
AUS	0.85	0.83	0.75	0.44

GUE ang

	CAN	GBR	USA	AUS
CAN	7.78			
GBR	0.87	1.39		
USA	0.87	0.90	1.79	
AUS	0.66	0.77	0.68	0.40

GUE ran

	CAN	GBR	USA	AUS
CAN	6.39			
GBR	0.97	1.61		
USA	0.97	0.97	1.59	
AUS	0.93	0.96	0.92	0.76

GUE rwi

	CAN	GBR	USA	AUS
CAN	6.86			
GBR	0.94	1.42		
USA	0.92	0.92	1.37	
AUS	0.88	0.86	0.81	0.61

GUE rls

	CAN	GBR	USA	AUS
CAN	7.88			
GBR	0.82	1.77		
USA	0.93	0.80	1.00	
AUS	0.77	0.86	0.75	0.35

GUE rlr

	CAN	USA	AUS
CAN	7.07		
USA	0.85	0.71	

AUS 0.69 0.59 0.48

GUE fan

	CAN	GBR	USA	AUS
CAN	7.94			
GBR	0.78	1.59		
USA	0.84	0.75	0.81	
AUS	0.66	0.81	0.70	0.36

GUE fua

	CAN	GBR	USA	AUS
CAN	7.20			
GBR	0.94	1.50		
USA	0.92	0.91	1.65	
AUS	0.84	0.82	0.78	0.49

GUE ruh

	CAN	GBR	USA	AUS
CAN	6.93			
GBR	0.76	1.74		
USA	0.81	0.90	1.53	
AUS	0.79	0.80	0.77	0.46

GUE usu

	CAN	GBR	USA	AUS
CAN	7.10			
GBR	0.80	1.54		
USA	0.81	0.85	1.15	
AUS	0.84	0.80	0.78	0.37

GUE ude

	CAN	GBR	USA	AUS
CAN	6.10			
GBR	0.97	1.56		
USA	0.95	0.94	1.61	
AUS	0.95	0.95	0.93	0.59

GUE ftp

	CAN	GBR	USA	AUS
CAN	5.71			
GBR	0.96	1.23		
USA	0.92	0.91	1.35	
AUS	0.94	0.93	0.88	0.43

GUE ftl

	CAN	GBR	USA	AUS
CAN	4.81			
GBR	0.94	1.75		
USA	0.94	0.97	1.48	
AUS	0.95	0.96	0.95	0.81

GUE	rtp		
	CAN	AUS	USA
CAN	5.61		
AUS	0.96	0.53	
USA	0.94	0.92	1.35

GUE	ocs			
	CAN	GBR	USA	AUS
CAN	8.38			
GBR	0.84	1.53		
USA	0.81	0.87	1.18	
AUS	0.59	0.67	0.62	0.55

GUE	ous			
	CAN	GBR	USA	AUS
CAN	8.10			
GBR	0.84	1.42		
USA	0.91	0.84	0.75	
AUS	0.73	0.83	0.71	0.62

GUE	ofl			
	CAN	GBR	USA	AUS
CAN	7.76			
GBR	0.73	1.40		
USA	0.81	0.69	1.24	
AUS	0.54	0.47	0.50	8.89

HOL	sta																						
	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT
AUS	0.64																						
BEL	0.89	1.08																					
CAN	0.89	0.95	5.59																				
CHE	0.89	0.92	0.95	10.57																			
DEU	0.89	0.94	0.98	0.96	12.79																		
DFS	0.87	0.95	0.97	0.96	0.97	10.74																	
ESP	0.88	0.94	0.98	0.96	0.98	0.97	0.84																
FRA	0.90	0.96	0.98	0.97	0.97	0.97	0.98	1.07															
GBR	0.92	0.93	0.97	0.95	0.96	0.94	0.96	0.97	1.14														
ITA	0.86	0.88	0.95	0.92	0.94	0.93	0.95	0.95	0.95	1.14													
NLD	0.86	0.93	0.96	0.96	0.97	0.98	0.97	0.97	0.94	0.92	4.54												
USA	0.90	0.91	0.98	0.94	0.95	0.94	0.96	0.96	0.97	0.94	0.93	1.20											
HUN	0.89	0.93	0.96	0.93	0.95	0.93	0.96	0.97	0.95	0.93	0.94	0.94	0.94										
POL	0.85	0.88	0.92	0.89	0.93	0.91	0.94	0.93	0.91	0.91	0.91	0.90	0.92	7.22									
NZL	0.88	0.86	0.85	0.85	0.85	0.85	0.85	0.88	0.90	0.85	0.84	0.86	0.85	0.84	0.43								
ZAF	0.91	0.91	0.92	0.89	0.91	0.87	0.89	0.91	0.94	0.87	0.86	0.91	0.89	0.86	0.89	0.74							
JPN	0.89	0.95	0.98	0.96	0.97	0.97	0.98	0.98	0.96	0.94	0.96	0.97	0.96	0.92	0.86	0.91	1.24						
CZE	0.89	0.94	0.97	0.93	0.97	0.95	0.96	0.96	0.95	0.92	0.95	0.94	0.95	0.93	0.85	0.92	0.96	13.52					
EST	0.87	0.90	0.93	0.91	0.95	0.94	0.92	0.93	0.91	0.91	0.96	0.89	0.92	0.90	0.84	0.86	0.93	0.94	11.57				
IRL	0.88	0.90	0.93	0.92	0.91	0.88	0.92	0.94	0.97	0.92	0.89	0.93	0.92	0.87	0.91	0.91	0.92	0.93	0.87	0.74			
KOR	0.85	0.85	0.85	0.85	0.85	0.84	0.85	0.85	0.85	0.84	0.85	0.85	0.85	0.84	0.85	0.85	0.85	0.85	0.85	0.85	4.62		
SVN	0.86	0.92	0.93	0.92	0.94	0.94	0.94	0.94	0.90	0.89	0.93	0.91	0.91	0.92	0.86	0.86	0.94	0.92	0.90	0.88	0.86	14.74	
PRT	0.87	0.91	0.94	0.91	0.94	0.93	0.93	0.94	0.94	0.92	0.91	0.92	0.93	0.89	0.85	0.87	0.93	0.94	0.88	0.90	0.85	0.86	1.30

HOL	cwi																						
	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT

NLD	0.74	0.60	0.74	0.68	0.60	0.66	0.76	0.63	0.79	0.73	4.56												
USA	0.69	0.76	0.93	0.81	0.85	0.90	0.85	0.85	0.91	0.86	0.68	1.38											
HUN	0.61	0.71	0.77	0.72	0.84	0.78	0.70	0.81	0.71	0.75	0.59	0.79	1.00										
POL	0.60	0.68	0.72	0.69	0.62	0.72	0.77	0.75	0.66	0.77	0.64	0.69	0.60	6.53									
ZAF	0.66	0.79	0.72	0.67	0.76	0.80	0.70	0.72	0.85	0.77	0.60	0.76	0.76	0.61	0.73								
JPN	0.69	0.80	0.90	0.79	0.80	0.90	0.88	0.86	0.86	0.91	0.74	0.87	0.74	0.76	0.77	1.57							
CZE	0.64	0.77	0.82	0.74	0.75	0.85	0.73	0.78	0.75	0.80	0.60	0.78	0.80	0.62	0.66	0.78	15.41						
EST	0.63	0.76	0.67	0.64	0.70	0.80	0.62	0.67	0.64	0.62	0.61	0.64	0.74	0.64	0.70	0.70	0.76	16.38					
IRL	0.74	0.74	0.89	0.79	0.80	0.84	0.80	0.84	0.93	0.84	0.69	0.90	0.74	0.65	0.82	0.85	0.76	0.63	0.75				
KOR	0.70	0.78	0.78	0.74	0.73	0.75	0.77	0.75	0.78	0.74	0.61	0.76	0.74	0.63	0.79	0.84	0.69	0.68	0.76	2.35			
PRT	0.60	0.69	0.78	0.63	0.74	0.78	0.75	0.73	0.78	0.80	0.60	0.80	0.69	0.64	0.69	0.79	0.70	0.62	0.74	0.77	1.30		
SVN	0.71	0.69	0.74	0.78	0.61	0.66	0.70	0.68	0.72	0.73	0.73	0.71	0.61	0.83	0.63	0.70	0.66	0.67	0.67	0.72	0.66	22.16	

HOL ran

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT	
AUS	0.63																							
BEL	0.95	1.63																						
CAN	0.93	0.97	6.09																					
CHE	0.94	0.96	0.96	11.41																				
DEU	0.93	0.97	0.98	0.95	12.04																			
DFS	0.93	0.98	0.98	0.95	0.98	11.62																		
ESP	0.93	0.97	0.97	0.96	0.97	0.97	1.14																	
FRA	0.96	0.98	0.97	0.96	0.96	0.96	0.97	1.07																
GBR	0.96	0.96	0.97	0.94	0.97	0.95	0.96	0.98	1.27															
ITA	0.90	0.95	0.96	0.93	0.95	0.95	0.96	0.96	0.95	1.52														
NLD	0.92	0.96	0.97	0.94	0.98	0.96	0.97	0.96	0.97	0.95	5.01													
USA	0.92	0.95	0.97	0.94	0.96	0.96	0.96	0.96	0.97	0.94	0.96	1.46												
HUN	0.93	0.97	0.96	0.95	0.97	0.96	0.97	0.97	0.95	0.95	0.95	0.95	1.01											
POL	0.91	0.95	0.95	0.94	0.95	0.95	0.96	0.94	0.93	0.95	0.95	0.92	0.95	11.94										
NZL	0.96	0.90	0.90	0.90	0.90	0.90	0.90	0.93	0.95	0.90	0.90	0.90	0.90	0.89	0.34									
ZAF	0.96	0.96	0.93	0.92	0.93	0.93	0.94	0.95	0.95	0.91	0.94	0.92	0.95	0.90	0.89	0.89								
JPN	0.90	0.95	0.98	0.95	0.96	0.97	0.96	0.94	0.93	0.94	0.95	0.94	0.95	0.95	0.89	0.90	1.44							
CZE	0.90	0.94	0.96	0.91	0.97	0.95	0.95	0.93	0.95	0.94	0.95	0.96	0.95	0.93	0.89	0.91	0.93	14.90						
EST	0.89	0.91	0.92	0.88	0.94	0.92	0.91	0.90	0.91	0.91	0.95	0.91	0.89	0.92	0.86	0.87	0.90	0.93	14.37					
IRL	0.95	0.92	0.93	0.93	0.94	0.91	0.92	0.96	0.98	0.92	0.94	0.94	0.91	0.90	0.95	0.92	0.90	0.90	0.88	1.71				
KOR	0.90	0.90	0.90	0.89	0.90	0.90	0.90	0.90	0.89	0.90	0.90	0.90	0.90	0.90	0.89	0.90	0.90	0.89	0.86	0.89	4.99			
SVN	0.91	0.95	0.94	0.92	0.95	0.95	0.93	0.94	0.92	0.94	0.92	0.92	0.92	0.94	0.89	0.89	0.94	0.90	0.89	0.90	0.89	18.16		
PRT	0.90	0.92	0.92	0.90	0.94	0.92	0.94	0.94	0.93	0.93	0.94	0.93	0.93	0.91	0.90	0.90	0.90	0.93	0.89	0.91	0.90	0.93	1.81	

HOL rwi

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	PRT	SVN	
AUS	0.53																							
BEL	0.89	1.43																						
CAN	0.91	0.95	5.94																					
CHE	0.89	0.95	0.93	11.03																				
DEU	0.85	0.93	0.95	0.88	11.33																			
DFS	0.84	0.92	0.95	0.89	0.97	12.35																		
ESP	0.92	0.93	0.97	0.91	0.94	0.94	1.01																	
FRA	0.90	0.96	0.96	0.92	0.95	0.95	0.95	1.11																
GBR	0.87	0.91	0.94	0.87	0.89	0.91	0.92	0.94	1.16															
ITA	0.80	0.84	0.88	0.81	0.84	0.85	0.88	0.89	0.91	1.32														
NLD	0.88	0.95	0.94	0.92	0.96	0.93	0.94	0.95	0.89	0.81	4.64													
USA	0.80	0.84	0.91	0.80	0.84	0.87	0.88	0.89	0.94	0.89	0.81	1.28												
HUN	0.80	0.91	0.92	0.85	0.92	0.91	0.89	0.93	0.90	0.89	0.90	0.88	1.02											
POL	0.81	0.90	0.91	0.89	0.90	0.89	0.89	0.90	0.88	0.86	0.88	0.82	0.90	10.72										
NZL	0.87	0.83	0.85	0.80	0.81	0.80	0.85	0.83	0.85	0.80	0.82	0.80	0.80	0.80	0.30									
ZAF	0.80	0.82	0.84	0.80	0.83	0.84	0.80	0.84	0.91	0.81	0.80	0.88	0.86	0.81	0.80	0.90								
JPN	0.84	0.95	0.96	0.93	0.93	0.95	0.94	0.97	0.93	0.90	0.93	0.90	0.93	0.91	0.83	0.86	1.36							
CZE	0.85	0.92	0.94	0.87	0.94	0.93	0.94	0.92	0.89	0.86	0.92	0.85	0.91	0.91	0.83	0.81	0.92	15.38						
EST	0.83	0.87	0.89	0.86	0.91	0.88	0.88	0.87	0.84	0.82	0.90	0.80	0.85	0.90	0.80	0.80	0.87	0.89	13.21					
IRL	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.87	0.80	0.80	0.85	0.80	0.80	0.80	0.80	0.80	0.80	0.81	1.59				
KOR	0.80	0.84	0.81	0.81	0.81	0.80	0.80	0.84	0.80	0.79	0.80	0.79	0.82	0.80	0.80	0.80	0.83	0.80	0.80	0.80	3.42			

ZAF	0.75	0.77	0.75	0.80	0.79	0.82	0.79	0.76	0.86	0.79	0.77	0.81	0.75	0.75	0.78	0.81							
JPN	0.82	0.91	0.91	0.91	0.89	0.93	0.92	0.90	0.84	0.85	0.87	0.87	0.85	0.85	0.81	0.79	1.44						
CZE	0.84	0.88	0.89	0.83	0.89	0.86	0.79	0.84	0.76	0.75	0.76	0.79	0.85	0.75	0.76	0.78	0.85	14.49					
EST	0.74	0.81	0.77	0.74	0.79	0.81	0.81	0.77	0.77	0.76	0.76	0.80	0.80	0.78	0.76	0.73	0.81	0.77	11.95				
IRL	0.75	0.77	0.75	0.77	0.81	0.84	0.86	0.81	0.93	0.88	0.83	0.89	0.79	0.78	0.85	0.82	0.79	0.74	0.74	1.05			
KOR	0.75	0.85	0.83	0.76	0.75	0.75	0.76	0.75	0.74	0.74	0.75	0.75	0.75	0.74	0.74	0.75	0.83	0.79	0.73	0.74	3.57		
SVN	0.75	0.91	0.83	0.79	0.87	0.85	0.80	0.83	0.77	0.75	0.83	0.76	0.74	0.77	0.74	0.73	0.81	0.83	0.81	0.73	0.78	16.47	
PRT	0.75	0.77	0.75	0.75	0.79	0.82	0.85	0.80	0.85	0.84	0.81	0.80	0.80	0.80	0.75	0.76	0.77	0.75	0.75	0.81	0.75	0.74	1.40

HOL usu

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT
AUS	0.45																						
BEL	0.67	1.41																					
CAN	0.82	0.76	5.50																				
CHE	0.78	0.89	0.90	11.91																			
DEU	0.77	0.79	0.91	0.91	11.59																		
DFS	0.71	0.86	0.81	0.90	0.82	11.50																	
ESP	0.81	0.70	0.86	0.80	0.79	0.80	0.79																
FRA	0.75	0.86	0.79	0.86	0.74	0.83	0.83	1.07															
GBR	0.82	0.67	0.83	0.80	0.75	0.83	0.92	0.89	1.21														
ITA	0.75	0.71	0.82	0.80	0.79	0.79	0.91	0.82	0.88	1.43													
NLD	0.80	0.80	0.84	0.86	0.79	0.90	0.89	0.92	0.92	0.82	4.58												
USA	0.80	0.70	0.84	0.79	0.75	0.86	0.91	0.88	0.95	0.89	0.90	1.49											
HUN	0.74	0.90	0.82	0.92	0.85	0.91	0.78	0.90	0.79	0.80	0.85	0.80	1.02										
POL	0.69	0.76	0.82	0.85	0.89	0.81	0.76	0.72	0.70	0.78	0.74	0.73	0.82	9.72									
NZL	0.63	0.63	0.63	0.62	0.62	0.62	0.66	0.62	0.63	0.65	0.62	0.64	0.62	0.63	0.37								
ZAF	0.80	0.65	0.68	0.67	0.63	0.76	0.79	0.76	0.84	0.72	0.79	0.83	0.75	0.65	0.64	0.85							
JPN	0.63	0.94	0.71	0.84	0.70	0.84	0.63	0.88	0.66	0.66	0.78	0.68	0.87	0.70	0.60	0.63	1.68						
CZE	0.63	0.87	0.80	0.86	0.88	0.77	0.65	0.70	0.63	0.70	0.69	0.64	0.87	0.86	0.62	0.63	0.79	15.81					
EST	0.72	0.87	0.81	0.84	0.86	0.81	0.67	0.79	0.68	0.68	0.80	0.67	0.84	0.79	0.60	0.61	0.84	0.84	14.24				
IRL	0.79	0.71	0.85	0.81	0.80	0.76	0.89	0.81	0.93	0.88	0.85	0.87	0.77	0.74	0.70	0.77	0.65	0.70	0.70	1.06			
KOR	0.74	0.71	0.85	0.79	0.81	0.70	0.74	0.65	0.64	0.77	0.64	0.71	0.75	0.81	0.62	0.64	0.66	0.75	0.65	0.72	2.82		
SVN	0.67	0.76	0.82	0.77	0.87	0.71	0.66	0.63	0.63	0.63	0.64	0.63	0.69	0.79	0.62	0.60	0.67	0.87	0.80	0.69	0.69	20.56	
PRT	0.73	0.66	0.76	0.73	0.81	0.69	0.79	0.63	0.73	0.79	0.72	0.69	0.71	0.75	0.63	0.63	0.63	0.72	0.66	0.77	0.71	0.71	1.69

HOL ude

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT	
AUS	0.59																						
BEL	0.96	1.43																					
CAN	0.94	0.96	5.56																				
CHE	0.97	0.95	0.95	11.54																			
DEU	0.95	0.96	0.98	0.96	13.02																		
DFS	0.93	0.95	0.97	0.96	0.97	11.74																	
ESP	0.95	0.97	0.97	0.96	0.97	0.97	1.05																
FRA	0.96	0.97	0.97	0.98	0.98	0.97	0.97	1.11															
GBR	0.95	0.97	0.97	0.95	0.97	0.95	0.96	0.97	1.16														
ITA	0.94	0.95	0.96	0.95	0.96	0.95	0.98	0.97	0.95	1.39													
NLD	0.95	0.96	0.97	0.97	0.98	0.97	0.97	0.98	0.97	0.95	5.08												
USA	0.94	0.95	0.96	0.96	0.96	0.97	0.97	0.97	0.97	0.96	0.96	1.48											
HUN	0.92	0.95	0.97	0.95	0.95	0.96	0.96	0.96	0.95	0.96	0.95	0.96	1.07										
POL	0.93	0.95	0.94	0.95	0.95	0.94	0.94	0.95	0.93	0.94	0.94	0.94	0.94	9.09									
ZAF	0.93	0.94	0.96	0.93	0.95	0.93	0.94	0.94	0.97	0.92	0.94	0.96	0.94	0.92	0.94								
JPN	0.94	0.95	0.97	0.96	0.96	0.97	0.98	0.97	0.95	0.97	0.96	0.97	0.95	0.94	0.92	1.28							
CZE	0.95	0.96	0.97	0.94	0.97	0.94	0.95	0.94	0.95	0.95	0.95	0.93	0.96	0.94	0.96	0.93	13.78						
EST	0.92	0.92	0.94	0.92	0.93	0.94	0.94	0.91	0.92	0.92	0.94	0.93	0.92	0.93	0.92	0.92	0.95	12.55					
IRL	0.93	0.94	0.92	0.93	0.92	0.91	0.92	0.92	0.98	0.91	0.93	0.94	0.90	0.90	0.96	0.91	0.91	0.89	1.30				
KOR	0.90	0.90	0.90	0.90	0.90	0.90	0.91	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.92	0.90	0.88	0.89	4.72			
SVN	0.91	0.93	0.93	0.92	0.95	0.93	0.93	0.92	0.91	0.94	0.94	0.91	0.92	0.94	0.90	0.91	0.95	0.92	0.88	0.90	16.53		
PRT	0.90	0.93	0.91	0.90	0.91	0.90	0.91	0.90	0.90	0.92	0.91	0.90	0.91	0.90	0.91	0.90	0.93	0.90	0.90	0.90	0.90	0.90	1.64

HOL ftp

ITA	0.89	0.90	0.89	0.89	0.94	0.92	0.93	0.93	0.92	1.30													
NLD	0.94	0.96	0.98	0.97	0.98	0.97	0.98	0.98	0.98	0.92	4.77												
USA	0.93	0.94	0.95	0.93	0.95	0.97	0.96	0.95	0.97	0.91	0.96	1.61											
POL	0.90	0.92	0.93	0.92	0.96	0.94	0.96	0.94	0.94	0.91	0.94	0.92	10.12										
NZL	0.96	0.95	0.95	0.94	0.95	0.91	0.93	0.95	0.95	0.89	0.94	0.91	0.92	0.46									
JPN	0.96	0.97	0.98	0.97	0.96	0.96	0.97	0.97	0.96	0.91	0.97	0.96	0.93	0.94	1.50								
CZE	0.94	0.96	0.94	0.94	0.96	0.94	0.94	0.94	0.94	0.90	0.94	0.94	0.95	0.93	0.94	16.31							
EST	0.94	0.94	0.94	0.93	0.96	0.91	0.94	0.94	0.94	0.90	0.95	0.91	0.93	0.92	0.93	0.93	13.04						
IRL	0.93	0.95	0.95	0.94	0.95	0.94	0.94	0.96	0.96	0.90	0.95	0.93	0.90	0.94	0.94	0.89	0.89	1.31					
KOR	0.89	0.91	0.93	0.92	0.93	0.92	0.95	0.93	0.90	0.92	0.93	0.92	0.90	0.90	0.94	0.89	0.86	0.90	2.28				
SVN	0.89	0.93	0.94	0.94	0.96	0.92	0.95	0.95	0.93	0.91	0.95	0.91	0.92	0.91	0.91	0.92	0.91	0.91	0.92	14.63			
PRT	0.89	0.91	0.93	0.90	0.92	0.91	0.93	0.91	0.93	0.89	0.91	0.92	0.92	0.91	0.91	0.90	0.89	0.89	0.89	0.92	1.58		
ZAF	0.92	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	0.89	0.87	0.89	0.89	0.89	0.88	0.89	0.58
HUN	0.92	0.95	0.94	0.94	0.97	0.95	0.96	0.96	0.96	0.91	0.96	0.94	0.96	0.92	0.94	0.95	0.94	0.92	0.89	0.94	0.92	0.89	1.03

HOL ocs

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	JPN	CZE	EST	IRL	KOR	SVN	PRT	
AUS	0.66																						
BEL	0.59	1.18																					
CAN	0.58	0.75	5.43																				
CHE	0.60	0.78	0.92	11.70																			
DEU	0.58	0.74	0.84	0.84	12.87																		
DFS	0.65	0.75	0.77	0.80	0.85	10.28																	
ESP	0.66	0.75	0.78	0.79	0.84	0.87	0.80																
FRA	0.58	0.75	0.77	0.88	0.85	0.87	0.88	1.10															
GBR	0.67	0.75	0.84	0.91	0.91	0.89	0.87	0.90	0.90														
ITA	0.55	0.74	0.81	0.83	0.82	0.81	0.85	0.87	0.84	0.80													
NLD	0.59	0.75	0.77	0.82	0.88	0.88	0.86	0.85	0.89	0.79	3.02												
USA	0.61	0.75	0.83	0.86	0.87	0.87	0.86	0.87	0.91	0.84	0.86	0.90											
HUN	0.57	0.75	0.80	0.80	0.83	0.75	0.77	0.80	0.83	0.79	0.75	0.79	1.06										
POL	0.56	0.74	0.73	0.74	0.73	0.74	0.75	0.74	0.74	0.74	0.75	0.74	0.75	6.92									
NZL	0.77	0.56	0.63	0.61	0.63	0.57	0.62	0.56	0.70	0.56	0.64	0.67	0.57	0.55	0.29								
JPN	0.55	0.81	0.86	0.92	0.77	0.75	0.78	0.83	0.80	0.82	0.78	0.82	0.75	0.75	0.56	0.59							
CZE	0.63	0.75	0.84	0.81	0.88	0.77	0.79	0.79	0.83	0.76	0.79	0.80	0.85	0.75	0.68	0.75	13.58						
EST	0.60	0.76	0.77	0.76	0.79	0.76	0.76	0.76	0.76	0.76	0.76	0.75	0.76	0.74	0.62	0.77	0.77	12.33					
IRL	0.60	0.56	0.71	0.69	0.70	0.66	0.67	0.63	0.78	0.66	0.62	0.66	0.65	0.56	0.61	0.58	0.67	0.60	0.91				
KOR	0.56	0.74	0.73	0.74	0.73	0.73	0.75	0.73	0.73	0.74	0.74	0.73	0.74	0.74	0.55	0.75	0.75	0.77	0.56	6.73			
SVN	0.63	0.81	0.76	0.77	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.77	0.76	0.60	0.77	0.76	0.79	0.58	0.77	18.36		
PRT	0.56	0.75	0.75	0.75	0.77	0.78	0.78	0.76	0.82	0.78	0.78	0.75	0.75	0.75	0.56	0.75	0.75	0.77	0.61	0.75	0.76	0.30	

HOL ous

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	JPN	CZE	EST	IRL	SVN	PRT		
AUS	0.69																						
BEL	0.73	1.29																					
CAN	0.72	0.78	5.33																				
CHE	0.79	0.85	0.95	11.79																			
DEU	0.76	0.79	0.90	0.91	13.48																		
DFS	0.62	0.82	0.84	0.89	0.87	12.84																	
ESP	0.75	0.70	0.83	0.86	0.84	0.75	0.88																
FRA	0.68	0.82	0.86	0.93	0.90	0.93	0.81	1.03															
GBR	0.86	0.70	0.83	0.87	0.85	0.70	0.89	0.76	1.07														
ITA	0.69	0.72	0.87	0.91	0.86	0.83	0.91	0.89	0.84	1.03													
NLD	0.66	0.82	0.88	0.93	0.91	0.89	0.82	0.94	0.79	0.85	4.82												
USA	0.76	0.76	0.92	0.95	0.90	0.85	0.91	0.89	0.89	0.94	0.89	1.13											
HUN	0.73	0.80	0.84	0.87	0.87	0.81	0.82	0.83	0.78	0.81	0.78	0.83	1.17										
POL	0.75	0.79	0.74	0.78	0.78	0.71	0.71	0.73	0.77	0.71	0.71	0.74	0.72	7.40									
NZL	0.82	0.69	0.82	0.87	0.80	0.70	0.76	0.79	0.82	0.75	0.80	0.84	0.73	0.71	0.41								
JPN	0.79	0.82	0.93	0.94	0.89	0.79	0.81	0.85	0.86	0.86	0.86	0.92	0.80	0.80	0.81	0.74							
CZE	0.72	0.85	0.89	0.91	0.94	0.90	0.80	0.92	0.77	0.85	0.88	0.86	0.90	0.76	0.76	0.85	13.33						
EST	0.66	0.82	0.83	0.87	0.86	0.90	0.76	0.90	0.73	0.81	0.88	0.84	0.79	0.72	0.71	0.79	0.90	12.19					
IRL	0.84	0.61	0.75	0.79	0.78	0.57	0.83	0.68	0.96	0.77	0.69	0.82	0.72	0.73	0.82	0.78	0.70	0.64	0.96				
SVN	0.73	0.75	0.71	0.73	0.73	0.71	0.71	0.71	0.71	0.71	0.70	0.71	0.71	0.79	0.64	0.73	0.72	0.72	0.67	18.79			

KOR	0.75	0.76	0.83	0.86	0.86	0.81	0.84	0.78	0.74	0.84	0.87	0.76	2.51						
CAN	0.75	0.92	0.95	0.94	0.94	0.95	0.93	0.95	0.78	0.93	0.97	0.89	0.84	6.09					
PRT	0.75	0.83	0.86	0.86	0.86	0.86	0.83	0.85	0.75	0.82	0.86	0.77	0.81	0.86	2.00				
ESP	0.76	0.88	0.94	0.94	0.95	0.93	0.93	0.92	0.75	0.92	0.95	0.85	0.87	0.95	0.87	1.07			
SVN	0.76	0.84	0.89	0.90	0.84	0.79	0.88	0.91	0.76	0.89	0.88	0.77	0.78	0.85	0.76	0.86	22.34		
EST	0.78	0.84	0.86	0.86	0.84	0.77	0.87	0.88	0.77	0.84	0.88	0.78	0.79	0.82	0.77	0.77	0.87	13.07	
HUN	0.76	0.88	0.94	0.91	0.92	0.88	0.93	0.90	0.75	0.95	0.92	0.78	0.83	0.92	0.82	0.91	0.85	0.80	0.98

JER sta

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.56									
CAN	0.89	6.58								
DFS	0.90	0.96	11.80							
GBR	0.91	0.95	0.94	1.01						
ITA	0.88	0.94	0.92	0.95	1.19					
NZL	0.90	0.86	0.88	0.92	0.89	0.37				
USA	0.91	0.97	0.95	0.96	0.93	0.89	1.30			
ZAF	0.89	0.87	0.86	0.93	0.87	0.93	0.89	8.99		
NLD	0.88	0.96	0.97	0.94	0.92	0.87	0.93	0.87	4.77	
CHE	0.90	0.95	0.96	0.95	0.92	0.87	0.94	0.88	0.96	11.14

JER cwi

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.32									
CAN	0.76	6.88								
DFS	0.77	0.84	15.61							
GBR	0.84	0.91	0.84	1.57						
ITA	0.67	0.82	0.71	0.73	1.35					
NZL	0.83	0.69	0.69	0.81	0.67	0.37				
USA	0.79	0.91	0.81	0.84	0.88	0.66	0.88			
ZAF	0.73	0.83	0.72	0.85	0.72	0.79	0.79	8.81		
NLD	0.70	0.90	0.90	0.89	0.73	0.68	0.85	0.79	4.02	
CHE	0.69	0.89	0.87	0.82	0.83	0.69	0.88	0.73	0.87	11.30

JER bde

	AUS	CAN	DFS	GBR	ITA	NZL	ZAF	NLD	USA	CHE
AUS	0.38									
CAN	0.78	5.73								
DFS	0.83	0.86	13.58							
GBR	0.78	0.86	0.84	1.53						
ITA	0.72	0.73	0.75	0.83	1.40					
NZL	0.80	0.71	0.71	0.72	0.72	0.37				
ZAF	0.85	0.75	0.83	0.81	0.74	0.79	9.14			
NLD	0.73	0.83	0.83	0.90	0.86	0.70	0.79	3.08		
USA	0.70	0.72	0.75	0.78	0.89	0.71	0.73	0.87	0.88	
CHE	0.80	0.87	0.89	0.89	0.83	0.74	0.83	0.91	0.86	13.21

JER ang

	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE	
AUS	0.38									
CAN	0.65	7.64								
DFS	0.70	0.80	13.29							
GBR	0.79	0.77	0.86	1.08						
ITA	0.69	0.83	0.80	0.85	1.30					
USA	0.72	0.83	0.88	0.85	0.78	0.94				
ZAF	0.63	0.63	0.72	0.82	0.72	0.72	8.99			
NLD	0.74	0.75	0.67	0.79	0.73	0.69	0.64	4.05		
CHE	0.63	0.80	0.71	0.71	0.72	0.73	0.65	0.70	9.56	

JER	ran									
	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.40									
CAN	0.91	5.80								
DFS	0.91	0.96	11.45							
GBR	0.96	0.95	0.95	1.21						
ITA	0.91	0.96	0.94	0.93	1.40					
NZL	0.95	0.90	0.90	0.93	0.90	0.30				
USA	0.92	0.95	0.96	0.97	0.93	0.91	1.06			
ZAF	0.91	0.91	0.91	0.95	0.91	0.91	0.91	9.23		
NLD	0.92	0.96	0.96	0.96	0.94	0.90	0.95	0.93	4.96	
CHE	0.93	0.96	0.95	0.94	0.93	0.91	0.93	0.91	0.94	13.11

JER	rwi									
	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.35									
CAN	0.85	6.47								
DFS	0.83	0.91	12.10							
GBR	0.83	0.93	0.86	1.36						
ITA	0.81	0.85	0.83	0.86	1.47					
NZL	0.89	0.86	0.81	0.82	0.80	0.29				
USA	0.80	0.84	0.83	0.86	0.85	0.79	0.77			
ZAF	0.81	0.81	0.81	0.83	0.81	0.80	0.81	9.44		
NLD	0.88	0.93	0.92	0.88	0.80	0.84	0.80	0.80	4.21	
CHE	0.86	0.92	0.85	0.85	0.82	0.82	0.81	0.81	0.91	11.77

JER	rls									
	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.20									
CAN	0.74	5.93								
DFS	0.74	0.95	12.73							
GBR	0.78	0.83	0.80	1.72						
ITA	0.74	0.84	0.83	0.79	1.50					
NZL	0.73	0.73	0.73	0.77	0.74	0.12				
USA	0.73	0.92	0.93	0.89	0.82	0.74	0.68			
ZAF	0.75	0.74	0.73	0.83	0.74	0.90	0.78	12.28		
NLD	0.79	0.91	0.92	0.86	0.86	0.73	0.88	0.77	3.56	
CHE	0.82	0.91	0.85	0.82	0.81	0.75	0.85	0.77	0.89	9.47

JER	rlr									
	AUS	CAN	DFS	ITA	ZAF	NLD	USA	CHE		
AUS	0.27									
CAN	0.58	6.78								
DFS	0.62	0.75	13.23							
ITA	0.66	0.78	0.65	1.06						
ZAF	0.58	0.61	0.58	0.59	13.02					
NLD	0.61	0.85	0.88	0.74	0.65	5.62				
USA	0.56	0.78	0.66	0.80	0.57	0.75	0.68			
CHE	0.70	0.70	0.66	0.64	0.59	0.71	0.60	11.59		

JER	fan									
	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE	
AUS	0.25									
CAN	0.66	5.80								
DFS	0.66	0.87	12.74							

GBR	0.77	0.78	0.73	1.37						
ITA	0.66	0.74	0.68	0.74	1.77					
USA	0.68	0.87	0.79	0.86	0.82	0.73				
ZAF	0.72	0.68	0.69	0.90	0.68	0.80	9.97			
NLD	0.73	0.75	0.78	0.87	0.72	0.79	0.74	4.58		
CHE	0.69	0.76	0.78	0.69	0.67	0.68	0.70	0.69	12.18	

JER fua

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.43									
CAN	0.79	5.46								
DFS	0.82	0.86	12.60							
GBR	0.80	0.94	0.85	1.58						
ITA	0.72	0.87	0.80	0.87	1.50					
NZL	0.83	0.73	0.73	0.81	0.73	0.40				
USA	0.79	0.94	0.87	0.93	0.90	0.73	1.21			
ZAF	0.77	0.91	0.86	0.93	0.83	0.74	0.90	11.89		
NLD	0.79	0.91	0.90	0.92	0.82	0.81	0.87	0.87	4.96	
CHE	0.83	0.92	0.84	0.87	0.82	0.75	0.86	0.88	0.89	11.07

JER ruh

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.40									
CAN	0.77	6.90								
DFS	0.78	0.88	10.94							
GBR	0.85	0.81	0.85	1.14						
ITA	0.76	0.79	0.82	0.86	1.33					
NZL	0.76	0.76	0.79	0.80	0.80	0.40				
USA	0.78	0.85	0.90	0.91	0.83	0.78	1.07			
ZAF	0.86	0.76	0.83	0.90	0.82	0.76	0.88	9.45		
NLD	0.77	0.79	0.92	0.88	0.84	0.80	0.85	0.79	4.49	
CHE	0.81	0.92	0.87	0.84	0.79	0.79	0.84	0.79	0.83	12.51

JER usu

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.43									
CAN	0.82	6.29								
DFS	0.71	0.86	13.04							
GBR	0.84	0.89	0.84	1.64						
ITA	0.70	0.77	0.72	0.78	1.54					
NZL	0.64	0.64	0.64	0.65	0.66	0.39				
USA	0.74	0.85	0.87	0.83	0.79	0.63	0.80			
ZAF	0.78	0.82	0.76	0.82	0.67	0.64	0.81	10.36		
NLD	0.82	0.83	0.89	0.90	0.80	0.64	0.88	0.80	5.12	
CHE	0.77	0.90	0.88	0.80	0.78	0.67	0.84	0.76	0.86	9.76

JER ude

	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE	
AUS	0.40									
CAN	0.95	5.21								
DFS	0.95	0.94	12.09							
GBR	0.96	0.96	0.94	1.54						
ITA	0.94	0.94	0.94	0.93	1.43					
USA	0.94	0.96	0.96	0.94	0.95	1.42				
ZAF	0.91	0.91	0.93	0.94	0.91	0.92	10.74			
NLD	0.95	0.97	0.96	0.96	0.95	0.95	0.93	4.31		
CHE	0.96	0.95	0.94	0.94	0.95	0.94	0.91	0.96	9.14	

JER ftp										
	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.48									
CAN	0.91	6.36								
DFS	0.88	0.95	12.84							
GBR	0.91	0.93	0.91	1.36						
ITA	0.86	0.86	0.86	0.86	1.61					
NZL	0.91	0.93	0.87	0.87	0.86	0.30				
USA	0.88	0.95	0.95	0.93	0.87	0.89	1.08			
ZAF	0.87	0.93	0.91	0.93	0.86	0.91	0.90	10.47		
NLD	0.94	0.97	0.95	0.94	0.85	0.89	0.90	0.91	5.16	
CHE	0.93	0.95	0.93	0.93	0.86	0.88	0.90	0.88	0.96	10.25

JER ftl										
	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE	
AUS	0.34									
CAN	0.92	5.84								
DFS	0.92	0.91	13.96							
GBR	0.93	0.92	0.94	1.40						
ITA	0.91	0.90	0.91	0.93	1.63					
USA	0.92	0.92	0.95	0.93	0.93	0.92				
ZAF	0.94	0.90	0.92	0.94	0.91	0.97	10.98			
NLD	0.94	0.93	0.97	0.97	0.92	0.96	0.94	4.79		
CHE	0.93	0.91	0.94	0.96	0.91	0.94	0.93	0.96	11.69	

JER rtp									
	AUS	CAN	DFS	NZL	ZAF	NLD	USA	CHE	
AUS	0.40								
CAN	0.97	6.42							
DFS	0.92	0.95	12.97						
NZL	0.95	0.95	0.92	0.41					
ZAF	0.95	0.95	0.91	0.90	9.80				
NLD	0.94	0.97	0.96	0.92	0.90	4.50			
USA	0.90	0.91	0.93	0.89	0.89	0.94	1.39		
CHE	0.96	0.98	0.96	0.94	0.93	0.97	0.92	11.88	

JER ocs									
	AUS	CAN	DFS	GBR	ITA	NZL	USA	NLD	CHE
AUS	0.86								
CAN	0.57	6.19							
DFS	0.61	0.76	12.81						
GBR	0.65	0.84	0.84	1.95					
ITA	0.58	0.81	0.77	0.82	0.74				
NZL	0.64	0.59	0.58	0.63	0.59	0.30			
USA	0.64	0.79	0.81	0.87	0.81	0.61	0.91		
NLD	0.60	0.78	0.87	0.88	0.80	0.64	0.84	2.60	
CHE	0.63	0.89	0.79	0.91	0.81	0.63	0.83	0.83	7.70

JER ous									
	AUS	CAN	DFS	GBR	NZL	USA	NLD	CHE	
AUS	0.94								
CAN	0.70	6.42							
DFS	0.57	0.84	12.89						
GBR	0.77	0.88	0.72	1.27					
NZL	0.81	0.72	0.63	0.74	0.42				
USA	0.65	0.90	0.80	0.87	0.67	0.65			

NLD	0.64	0.88	0.89	0.79	0.75	0.89	4.48		
CHE	0.72	0.93	0.81	0.87	0.69	0.88	0.92	11.16	

JER ofl

	AUS	CAN	DFS	GBR	ITA	USA	NLD	CHE	
AUS	6.31								
CAN	0.52	6.03							
DFS	0.42	0.81	13.71						
GBR	0.58	0.72	0.67	1.30					
ITA	0.42	0.73	0.65	0.73	1.10				
USA	0.66	0.84	0.66	0.72	0.76	0.92			
NLD	0.42	0.67	0.65	0.74	0.68	0.68	5.31		
CHE	0.48	0.87	0.72	0.73	0.69	0.75	0.70	10.02	

RDC sta

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0.62									
CAN	0.89	6.15								
DEU	0.90	0.97	13.27							
DFS	0.88	0.97	0.97	8.60						
GBR	0.92	0.96	0.96	0.93	1.16					
NOR	0.92	0.94	0.96	0.98	0.93	12.63				
NZL	0.89	0.91	0.87	0.90	0.93	0.93	0.49			
USA	0.90	0.97	0.95	0.94	0.97	0.92	0.89	2.11		
NLD	0.87	0.95	0.97	0.97	0.93	0.96	0.85	0.93	4.77	
CAM	0.93	0.92	0.92	0.92	0.93	0.93	0.92	0.92	0.92	5.49

RDC cwi

	AUS	CAN	DEU	DFS	GBR	NZL	USA	NLD	CAM	NOR
AUS	0.43									
CAN	0.74	7.19								
DEU	0.71	0.87	11.77							
DFS	0.79	0.83	0.89	12.77						
GBR	0.81	0.87	0.90	0.86	1.49					
NZL	0.81	0.69	0.72	0.70	0.82	0.35				
USA	0.69	0.86	0.82	0.82	0.84	0.71	1.15			
NLD	0.70	0.91	0.92	0.88	0.91	0.67	0.83	4.44		
CAM	0.82	0.82	0.81	0.82	0.82	0.82	0.82	0.82	6.88	
NOR	0.84	0.82	0.80	0.88	0.83	0.82	0.83	0.85	0.83	14.78

RDC bde

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0.44									
CAN	0.84	6.12								
DEU	0.80	0.88	9.69							
DFS	0.84	0.84	0.92	11.75						
GBR	0.82	0.85	0.91	0.88	1.34					
NOR	0.83	0.83	0.79	0.79	0.83	14.70				
NZL	0.80	0.71	0.73	0.77	0.76	0.82	0.35			
USA	0.72	0.76	0.88	0.82	0.90	0.83	0.74	1.04		
NLD	0.73	0.83	0.90	0.84	0.92	0.80	0.70	0.90	4.01	
CAM	0.85	0.83	0.84	0.84	0.84	0.83	0.85	0.84	0.83	4.92

RDC ang

	AUS	CAN	DEU	DFS	GBR	USA	NLD	CAM
AUS	0.49							

CAN	0.66	6.92							
DEU	0.67	0.81	12.58						
DFS	0.67	0.81	0.83	9.15					
GBR	0.78	0.81	0.77	0.84	1.25				
USA	0.69	0.87	0.83	0.85	0.85	1.04			
NLD	0.73	0.75	0.63	0.68	0.79	0.69	4.79		
CAM	0.74	0.76	0.76	0.76	0.76	0.76	0.76	7.12	

RDC ran

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0.43									
CAN	0.92	5.97								
DEU	0.93	0.97	8.90							
DFS	0.92	0.94	0.96	10.05						
GBR	0.95	0.97	0.97	0.95	1.49					
NOR	0.92	0.94	0.93	0.91	0.95	12.60				
NZL	0.94	0.93	0.91	0.91	0.94	0.93	0.29			
USA	0.92	0.98	0.96	0.94	0.97	0.95	0.92	1.04		
NLD	0.92	0.97	0.98	0.96	0.97	0.95	0.90	0.96	5.78	
CAM	0.94	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	5.72

RDC rwi

	AUS	CAN	DEU	DFS	GBR	NZL	USA	NLD	CAM	NOR
AUS	0.41									
CAN	0.88	6.01								
DEU	0.85	0.93	9.49							
DFS	0.87	0.93	0.92	10.46						
GBR	0.87	0.91	0.89	0.88	1.27					
NZL	0.86	0.88	0.82	0.89	0.89	0.32				
USA	0.81	0.91	0.84	0.88	0.93	0.86	1.17			
NLD	0.88	0.94	0.95	0.92	0.88	0.83	0.81	5.79		
CAM	0.89	0.88	0.87	0.88	0.88	0.88	0.88	0.88	6.40	
NOR	0.87	0.88	0.86	0.91	0.88	0.89	0.88	0.88	0.88	12.98

RDC rls

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0.26									
CAN	0.77	6.32								
DEU	0.79	0.94	9.19							
DFS	0.74	0.97	0.94	9.23						
GBR	0.85	0.80	0.86	0.79	1.57					
NOR	0.77	0.90	0.90	0.96	0.83	12.69				
NZL	0.74	0.74	0.74	0.74	0.76	0.79	0.12			
USA	0.76	0.93	0.92	0.94	0.83	0.87	0.74	0.75		
NLD	0.79	0.92	0.92	0.89	0.87	0.82	0.73	0.90	5.03	
CAM	0.83	0.84	0.84	0.83	0.84	0.84	0.84	0.84	0.84	6.46

RDC rlr

	AUS	CAN	DEU	DFS	NOR	NLD	USA	CAM
AUS	0.29							
CAN	0.63	6.59						
DEU	0.64	0.87	9.73					
DFS	0.64	0.84	0.91	10.76				
NOR	0.64	0.78	0.85	0.91	15.36			
NLD	0.61	0.87	0.91	0.89	0.87	5.51		
USA	0.60	0.73	0.76	0.70	0.74	0.81	0.75	
CAM	0.79	0.75	0.74	0.74	0.74	0.74	0.74	6.76

RDC fan									
	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM
AUS	0.30								
CAN	0.66	6.27							
DEU	0.73	0.81	14.10						
DFS	0.66	0.73	0.80	9.32					
GBR	0.79	0.79	0.91	0.72	1.56				
NOR	0.70	0.74	0.81	0.67	0.76	14.35			
USA	0.71	0.84	0.84	0.73	0.84	0.76	0.90		
NLD	0.74	0.76	0.89	0.78	0.89	0.69	0.81	4.63	
CAM	0.77	0.76	0.76	0.76	0.77	0.76	0.77	0.77	7.83

RDC fua										
	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0.45									
CAN	0.78	5.61								
DEU	0.79	0.91	11.85							
DFS	0.81	0.82	0.82	11.68						
GBR	0.80	0.88	0.95	0.87	1.63					
NOR	0.87	0.84	0.76	0.85	0.84	14.18				
NZL	0.76	0.80	0.81	0.73	0.79	0.77	0.33			
USA	0.76	0.93	0.89	0.83	0.92	0.83	0.85	1.18		
NLD	0.79	0.92	0.93	0.89	0.92	0.87	0.82	0.87	4.31	
CAM	0.84	0.84	0.83	0.83	0.83	0.83	0.83	0.84	0.84	6.84

RDC ruh										
	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0.50									
CAN	0.80	5.76								
DEU	0.83	0.87	14.01							
DFS	0.78	0.88	0.89	10.69						
GBR	0.80	0.77	0.86	0.84	1.38					
NOR	0.79	0.86	0.88	0.86	0.83	12.84				
NZL	0.80	0.76	0.81	0.79	0.90	0.80	0.31			
USA	0.77	0.86	0.89	0.91	0.90	0.85	0.84	1.17		
NLD	0.77	0.77	0.92	0.92	0.88	0.91	0.81	0.84	4.88	
CAM	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	6.12

RDC usu										
	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0.40									
CAN	0.77	5.75								
DEU	0.76	0.90	12.16							
DFS	0.69	0.75	0.78	12.59						
GBR	0.80	0.82	0.76	0.77	1.88					
NOR	0.71	0.75	0.73	0.77	0.78	13.63				
NZL	0.65	0.71	0.66	0.65	0.70	0.73	0.30			
USA	0.79	0.83	0.75	0.81	0.89	0.79	0.70	1.02		
NLD	0.79	0.83	0.79	0.89	0.91	0.87	0.64	0.90	4.64	
CAM	0.77	0.79	0.78	0.79	0.79	0.79	0.79	0.79	0.79	5.91

RDC ude									
	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM
AUS	0.49								
CAN	0.93	5.35							
DEU	0.95	0.97	11.91						

DFS	0.92	0.97	0.95	10.72					
GBR	0.95	0.96	0.96	0.94	1.79				
NOR	0.92	0.95	0.92	0.91	0.95	12.33			
USA	0.93	0.97	0.96	0.96	0.96	0.95	1.06		
NLD	0.95	0.97	0.98	0.96	0.97	0.96	0.96	4.39	
CAM	0.94	0.95	0.95	0.95	0.95	0.95	0.95	0.95	4.57

RDC ftp

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0.53									
CAN	0.93	5.22								
DEU	0.94	0.97	12.84							
DFS	0.89	0.95	0.92	11.81						
GBR	0.94	0.94	0.96	0.89	1.47					
NOR	0.89	0.91	0.89	0.89	0.92	12.10				
NZL	0.93	0.89	0.89	0.86	0.89	0.90	0.26			
USA	0.88	0.93	0.92	0.92	0.93	0.92	0.87	1.18		
NLD	0.95	0.98	0.97	0.95	0.95	0.89	0.90	0.90	4.16	
CAM	0.92	0.92	0.92	0.92	0.92	0.92	0.93	0.92	0.92	6.59

RDC ftl

	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM
AUS	0.46								
CAN	0.94	4.90							
DEU	0.96	0.94	13.51						
DFS	0.95	0.91	0.97	10.55					
GBR	0.96	0.93	0.98	0.94	1.40				
NOR	0.94	0.94	0.94	0.93	0.94	13.06			
USA	0.96	0.94	0.96	0.93	0.97	0.95	1.15		
NLD	0.95	0.93	0.98	0.97	0.97	0.94	0.95	5.54	
CAM	0.94	0.95	0.95	0.95	0.95	0.95	0.95	0.95	7.08

RDC rtp

	AUS	CAN	DEU	DFS	NOR	NZL	NLD	USA	CAM
AUS	0.39								
CAN	0.94	6.27							
DEU	0.93	0.97	13.86						
DFS	0.91	0.94	0.96	12.16					
NOR	0.91	0.93	0.91	0.90	14.30				
NZL	0.94	0.96	0.94	0.90	0.92	0.35			
NLD	0.94	0.98	0.97	0.96	0.91	0.95	5.08		
USA	0.92	0.92	0.95	0.93	0.94	0.91	0.96	1.18	
CAM	0.93	0.94	0.94	0.94	0.94	0.94	0.94	0.94	6.24

RDC ocs

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0.70									
CAN	0.60	5.31								
DEU	0.60	0.83	18.79							
DFS	0.69	0.76	0.81	10.40						
GBR	0.68	0.81	0.91	0.84	1.50					
NOR	0.65	0.84	0.81	0.76	0.86	11.30				
NZL	0.73	0.61	0.65	0.61	0.67	0.73	0.26			
USA	0.64	0.83	0.87	0.82	0.88	0.86	0.70	0.80		
NLD	0.62	0.77	0.87	0.86	0.89	0.79	0.64	0.86	3.17	
CAM	0.78	0.86	0.86	0.86	0.86	0.86	0.78	0.87	0.87	5.84

RDC	ous	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS		0.66									
CAN		0.71	5.45								
DEU		0.73	0.89	15.60							
DFS		0.60	0.80	0.82	10.99						
GBR		0.84	0.84	0.86	0.73	1.41					
NOR		0.64	0.86	0.79	0.82	0.88	11.71				
NZL		0.82	0.78	0.78	0.71	0.78	0.67	0.34			
USA		0.74	0.91	0.90	0.88	0.88	0.89	0.83	0.97		
NLD		0.67	0.88	0.90	0.89	0.79	0.84	0.78	0.89	4.11	
CAM		0.72	0.88	0.88	0.87	0.89	0.88	0.70	0.89	0.90	6.34

RDC	ofl	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM
AUS		7.25								
CAN		0.42	5.70							
DEU		0.43	0.83	14.99						
DFS		0.42	0.81	0.79	13.24					
GBR		0.42	0.74	0.73	0.69	1.40				
NOR		0.49	0.72	0.74	0.66	0.74	14.27			
USA		0.46	0.74	0.72	0.66	0.71	0.74	1.17		
NLD		0.42	0.68	0.74	0.66	0.75	0.72	0.68	7.28	
CAM		0.59	0.74	0.74	0.74	0.74	0.74	0.75	0.75	7.03

^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	110	69	110	39	131	97	23	16	
CHE	90	0	149	424	63	254	480	53	14	
FRA	60	111	0	164	54	87	162	39	13	
ITA	89	366	132	0	84	191	510	68	15	
NLD	32	58	42	65	0	54	78	28	10	
USA	115	227	60	140	40	0	206	25	16	
DEA	74	387	121	428	67	163	0	69	12	
SVN	21	51	37	66	27	20	64	0	7	
GBR	12	12	12	13	8	14	10	5	0	

BSW

	common bulls below diagonal									
	common three quarter sib group above diagonal									
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR	
CAN	0	104	69	110	33	131	95	22	16	
CHE	87	0	132	369	58	225	417	50	14	
FRA	60	95	0	164	50	87	160	38	13	
ITA	89	312	132	0	76	191	475	66	15	
NLD	29	55	39	61	0	40	72	28	10	
USA	115	194	60	140	31	0	188	24	16	
DEA	73	328	120	392	65	138	0	67	11	
SVN	20	48	36	64	27	19	63	0	7	
GBR	12	12	12	13	8	14	10	5	0	

BSW

common bulls below diagonal

	common three quarter			sib	group	above diagonal			
	CAN	CHE	FRA	ITA	NLD	DEA	SVN	GBR	USA
CAN	0	110	69	110	33	97	16	16	131
CHE	90	0	149	424	62	480	38	14	254
FRA	60	111	0	164	50	162	27	13	87
ITA	89	366	132	0	76	510	50	15	191
NLD	29	58	39	61	0	73	20	10	40
DEA	74	387	121	428	66	0	50	12	206
SVN	15	35	27	47	20	47	0	6	17
GBR	12	12	12	13	8	10	4	0	16
USA	115	227	60	140	31	163	14	14	0

BSW

common bulls below diagonal						
	common three quarter			sib	group	above diagonal
	CAN	CHE	FRA	NLD	USA	GBR
CAN	0	109	69	22	130	16
CHE	90	0	144	38	252	14
FRA	60	107	0	32	87	13
NLD	19	38	27	0	25	7
USA	114	227	60	20	0	16
GBR	12	12	12	5	14	0

BSW

common bulls below diagonal									
	common three quarter			sib	group	above diagonal			
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	110	69	110	39	131	97	23	16
CHE	90	0	149	424	63	254	480	53	14
FRA	60	111	0	164	54	87	162	39	13
ITA	89	366	132	0	84	191	510	68	15
NLD	32	58	42	65	0	54	78	28	10
USA	115	227	60	140	40	0	206	25	16
DEA	74	387	121	428	67	163	0	69	12
SVN	21	51	37	66	27	20	64	0	7
GBR	12	12	12	13	8	14	10	5	0

BSW

common bulls below diagonal									
	common three quarter			sib	group	above diagonal			
	CAN	CHE	FRA	NLD	USA	DEA	GBR	SVN	ITA
CAN	0	110	69	39	131	97	16	16	107
CHE	90	0	149	63	254	480	14	39	418
FRA	60	111	0	54	87	162	13	27	163
NLD	32	58	42	0	54	78	10	20	83
USA	115	227	60	40	0	206	16	17	179
DEA	74	387	121	67	163	0	12	50	504
GBR	12	12	12	8	14	10	0	6	15
SVN	15	36	27	20	14	47	4	0	50
ITA	87	361	132	65	128	421	13	47	0

BSW

common bulls below diagonal									
	common three quarter			sib	group	above diagonal			
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	110	69	110	39	131	97	23	16
CHE	90	0	149	424	63	254	480	53	14

FRA	60	111	0	164	54	87	162	39	13
ITA	89	366	132	0	84	191	510	68	15
NLD	32	58	42	65	0	54	78	28	10
USA	115	227	60	140	40	0	206	25	16
DEA	74	387	121	428	67	163	0	69	12
SVN	21	51	37	66	27	20	64	0	7
GBR	12	12	12	13	8	14	10	5	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	110	69	110	32	131	97	23	16
CHE	90	0	149	424	61	254	480	53	14
FRA	60	111	0	164	50	87	162	39	13
ITA	89	366	132	0	75	191	510	68	15
NLD	28	57	39	60	0	39	72	28	10
USA	115	227	60	140	29	0	206	25	16
DEA	74	387	121	428	65	163	0	69	12
SVN	21	51	37	66	27	20	64	0	7
GBR	12	12	12	13	8	14	10	5	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	DEA	SVN	USA
CAN	0	110	69	107	32	97	23	131
CHE	90	0	149	418	61	480	53	254
FRA	60	111	0	163	50	162	39	87
ITA	87	361	132	0	75	504	68	179
NLD	28	57	39	60	0	72	28	39
DEA	74	387	121	421	65	0	69	206
SVN	21	51	37	66	27	64	0	25
USA	115	227	60	128	29	163	20	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	110	40	70	32	131	64	16	16
CHE	90	0	86	252	62	253	286	39	14
FRA	37	60	0	83	34	51	90	27	10
ITA	61	205	66	0	56	94	229	45	12
NLD	28	58	28	50	0	39	60	20	10
USA	115	227	34	69	30	0	109	18	16
DEA	51	221	65	197	54	74	0	48	9
SVN	15	36	27	43	20	15	45	0	6
GBR	12	12	9	10	8	14	8	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	110	69	110	33	131	97	23	16
CHE	90	0	149	424	62	254	480	53	14
FRA	60	111	0	164	50	87	162	39	13
ITA	89	366	132	0	76	191	510	69	15
NLD	29	58	39	61	0	40	73	28	10

USA	115	227	60	140	31	0	206	26	16
DEA	74	387	121	428	66	163	0	69	12
SVN	21	51	37	67	27	21	64	0	7
GBR	12	12	12	13	8	14	10	5	0

BSW

common bulls below diagonal
 common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN
CAN	0	110	69	110	33	131	97	23
CHE	90	0	149	424	62	254	480	53
FRA	60	111	0	164	50	87	162	39
ITA	89	366	132	0	76	191	510	69
NLD	29	58	39	61	0	40	73	28
USA	115	227	60	140	31	0	206	26
DEA	74	387	121	428	66	163	0	69
SVN	21	51	37	67	27	21	64	0

BSW

common bulls below diagonal
 common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	110	69	110	39	131	97	16	16
CHE	90	0	149	424	63	254	480	38	14
FRA	60	111	0	164	54	87	162	27	13
ITA	89	366	132	0	84	191	510	51	15
NLD	32	58	42	65	0	54	78	20	10
USA	115	227	60	140	40	0	206	18	16
DEA	74	387	121	428	67	163	0	50	12
SVN	15	35	27	48	20	15	47	0	6
GBR	12	12	12	13	8	14	10	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	110	69	110	39	129	97	23	16
CHE	90	0	149	424	63	254	480	53	14
FRA	60	111	0	164	54	87	162	39	13
ITA	89	366	132	0	84	191	510	69	15
NLD	32	58	42	65	0	54	78	28	10
USA	114	227	60	140	40	0	206	26	16
DEA	74	387	121	428	67	163	0	69	12
SVN	21	51	37	67	27	21	64	0	7
GBR	12	12	12	13	8	14	10	5	0

BSW

common bulls below diagonal
 common three quarter sib group above diagonal

	CAN	CHE	FRA	NLD	USA	DEA	SVN	GBR	ITA
CAN	0	110	69	39	131	86	22	16	99
CHE	90	0	149	63	254	448	51	14	382
FRA	60	111	0	54	87	152	38	13	151
NLD	32	58	42	0	54	72	28	10	75
USA	115	227	60	40	0	181	25	16	149
DEA	66	356	113	65	135	0	67	11	418
SVN	20	49	36	27	20	63	0	7	67
GBR	12	12	12	8	14	10	5	0	15

ITA 80 329 120 61 109 358 65 13 0

BSW

common bulls below diagonal

common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	110	69	110	39	131	97	22	16
CHE	90	0	149	424	63	254	480	52	14
FRA	60	111	0	164	54	87	162	38	13
ITA	89	366	132	0	84	189	510	68	15
NLD	32	58	42	65	0	54	78	28	10
USA	115	227	60	139	40	0	206	25	16
DEA	74	387	121	428	67	163	0	68	12
SVN	20	50	36	66	27	20	63	0	7
GBR	12	12	12	13	8	14	10	5	0

BSW

common bulls below diagonal

common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	DEA	SVN	USA
CAN	0	110	69	70	28	64	22	131
CHE	90	0	146	252	58	286	51	253
FRA	60	108	0	103	47	110	38	87
ITA	61	205	80	0	55	229	55	94
NLD	25	56	37	50	0	59	27	34
DEA	51	221	76	197	54	0	60	109
SVN	20	49	36	54	27	54	0	24
USA	115	227	60	69	26	74	20	0

BSW

common bulls below diagonal

common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	104	59	110	39	131	64	16	16
CHE	87	0	111	368	58	225	281	38	14
FRA	55	83	0	130	44	72	99	27	13
ITA	89	310	108	0	82	188	264	50	15
NLD	32	55	37	65	0	54	60	20	10
USA	115	194	53	140	40	0	109	17	16
DEA	51	217	73	231	54	74	0	48	9
SVN	15	35	27	47	20	14	45	0	6
GBR	12	12	12	13	8	14	8	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	104	59	110	39	130	97	16	16
CHE	87	0	111	369	58	225	425	38	14
FRA	55	83	0	130	44	72	131	27	13
ITA	89	312	108	0	84	191	503	51	15
NLD	32	55	37	65	0	54	78	20	10
USA	114	194	53	140	40	0	204	18	16
DEA	73	338	99	424	67	159	0	50	12
SVN	15	35	27	48	20	15	47	0	6
GBR	12	12	12	13	8	14	10	4	0

BSW

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common bulls below diagonal
common three quarter sib group above diagonal
  CAN  CHE  FRA  ITA  NLD  USA  DEA  SVN  GBR
-----
CAN   0  104  59  107  39  131  97  16  16
CHE   87   0  111  368  58  225  425  39  14
FRA   55  83   0  129  44   72  131  27  13
ITA   87  311 108   0   83  179  498  50  15
NLD   32  55  37   65   0   54   78  20  10
USA  115 194  53  128  40   0  204  17  16
DEA   73  338  99  418  67  159   0  50  12
SVN   15  36  27  47  20  14  47   0  6
GBR   12  12  12  13   8  14  10   4  0
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BSW
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BSW
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BSW
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common bulls below diagonal
common three quarter sib group above diagonal
  CAN  CHE  DEA  ITA  SVN  USA  FRA
-----
CAN   0  104  96  71  16  139  41
CHE   86   0  419  252  38  224  86
DEA   73  335   0  269  50  200  100
ITA   61  204  222   0  44  94  83
SVN   15  35  47  42   0  17  27
USA  115 194 158  69  14   0  51
FRA   38  60  72  66  27  34   0
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BSW
-----
common bulls below diagonal
common three quarter sib group above diagonal
  CAN  CHE  DEA  ITA  SVN  USA  FRA
-----
CAN   0  111  98  114  23  72
CHE   89   0  480  424  52  149
DEA   73  387   0  509  69  162
ITA   89  366  427   0  67  164
SVN   21  51  64  66   0  39
FRA   61  111  121  132  37   0
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BSW
-----
common bulls below diagonal
common three quarter sib group above diagonal
  CAN  CHE  DEA  ITA  SVN  USA  FRA
-----
CAN   0  104  74  71  16  139  41
CHE   86   0  316  252  38  224  86
DEA   60  248   0  236  49  137  92
ITA   61  204  204   0  44  94  83
SVN   15  35  46  42   0  17  27
USA  115 194  98  69  14   0  51
FRA   38  60  67  66  27  34   0
-----

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

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CHE	0	462	252	38	253	147
DEA	372	0	268	50	191	158
ITA	205	221	0	44	94	103
SVN	35	47	42	0	17	27
USA	227	147	69	14	0	86
FRA	110	119	80	27	60	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	CHE	DEA	ITA	SVN	USA	FRA
CAN	0	61	48	53	14	71	29
CHE	50	0	316	252	33	224	86
DEA	35	248	0	236	43	137	92
ITA	44	204	204	0	38	94	83
SVN	13	31	40	37	0	17	26
USA	61	194	98	69	14	0	51
FRA	26	60	67	66	26	34	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	CHE	DEA	ITA	SVN	FRA
CAN	0	111	98	111	22	72
CHE	89	0	480	418	50	149
DEA	73	387	0	503	68	162
ITA	87	361	420	0	65	163
SVN	20	49	63	64	0	38
FRA	61	111	121	132	36	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CHE	DEA	ITA	SVN	FRA
CHE	0	479	421	38	146
DEA	386	0	509	50	161
ITA	363	427	0	50	162
SVN	36	47	48	0	27
FRA	110	120	132	27	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CHE	DEA	ITA	SVN	FRA
CHE	0	252	227	37	99
DEA	206	0	228	48	109
ITA	189	197	0	45	102
SVN	35	45	43	0	27
FRA	73	75	80	27	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CHE	DEA	ITA	SVN	FRA
CHE	0	479	415	51	146
DEA	386	0	503	68	161

ITA	358	420	0	67	161
SVN	50	63	66	0	38
FRA	110	120	132	36	0

BSW

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

CHE	0	285	250	51	82
DEA	220	0	229	60	88
ITA	203	197	0	55	82
SVN	50	54	54	0	30
FRA	59	64	65	29	0

GUE

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

CAN	0	21	61	17
GBR	18	0	72	10
USA	50	71	0	21
AUS	19	9	18	0

GUE

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

CAN	0	21	61	17
GBR	18	0	72	10
USA	50	71	0	21
AUS	19	9	18	0

GUE

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

CAN	0	21	61	17
GBR	18	0	72	10
USA	50	71	0	21
AUS	19	9	18	0

GUE

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

CAN	0	21	61	17
GBR	18	0	72	10
USA	50	71	0	21
AUS	19	9	18	0

GUE

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

CAN	0	21	61	17
GBR	18	0	72	10
USA	50	71	0	21
AUS	19	9	18	0

GUE

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

CAN	0	21	61	17
GBR	18	0	72	10
USA	50	71	0	21
AUS	19	9	18	0

GUE

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

CAN	0	21	61	17
GBR	18	0	72	10
USA	50	71	0	21
AUS	19	9	18	0

GUE

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

CAN	0	33	9
USA	31	0	5
AUS	10	4	0

GUE

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

CAN	0	21	61	17
GBR	18	0	72	10
USA	50	71	0	21
AUS	19	9	18	0

GUE

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

CAN	0	21	61	17
GBR	18	0	72	10
USA	50	71	0	21
AUS	19	9	18	0

GUE

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

CAN	0	21	61	17
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GBR	18	0	72	10
USA	50	71	0	21
AUS	19	9	18	0

GUE

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

CAN	0	21	61	17
GBR	18	0	72	10
USA	50	71	0	21
AUS	19	9	18	0

GUE

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

CAN	0	21	59	16
GBR	18	0	72	9
USA	49	71	0	20
AUS	18	8	17	0

GUE

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

CAN	0	21	61	17
GBR	18	0	72	10
USA	50	71	0	21
AUS	19	9	18	0

GUE

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

CAN	0	21	61	17
GBR	18	0	72	10
USA	50	71	0	21
AUS	19	9	18	0

GUE

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

CAN	0	6	61
AUS	7	0	8
USA	50	7	0

GUE

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

CAN	0	12	61	17
GBR	9	0	33	10

USA	50	31	0	21
AUS	19	9	18	0

GUE

common bulls below diagonal
 common three quarter sib group above diagonal

	CAN	GBR	USA	AUS
CAN	0	19	59	16
GBR	16	0	70	9
USA	49	69	0	21
AUS	18	8	18	0

GUE

common bulls below diagonal
 common three quarter sib group above diagonal

	CAN	GBR	USA	AUS
CAN	0	19	61	21
GBR	16	0	70	12
USA	50	69	0	26
AUS	20	9	22	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
AUS	0	446	784	419	776	712	556	749	800	672	822	965	428	495	478	296	506	495	76	394	277	108	472
BEL	381	0	555	467	770	600	504	680	646	625	916	669	362	476	261	234	377	470	73	373	214	133	477
CAN	700	519	0	752	1707	1047	1124	1189	1333	1519	1136	2680	768	920	346	363	1052	931	118	404	564	153	835
CHE	360	466	600	0	854	551	493	537	621	664	742	817	355	469	236	211	366	458	61	334	225	109	429
DEU	399	645	583	555	0	1899	1234	1956	1551	2098	2199	2500	905	1389	422	366	1088	1449	170	544	461	233	877
DFS	453	519	722	465	829	0	848	1351	1243	1298	1511	1554	673	1004	439	372	739	995	127	521	375	184	743
ESP	422	485	640	393	550	563	0	993	949	1156	933	1345	624	772	297	354	757	759	101	390	397	150	707
FRA	443	613	633	442	668	549	628	0	1312	1460	1664	2131	735	1187	465	347	1020	1056	117	508	416	149	723
GBR	649	644	1316	598	746	820	751	694	0	1417	1462	1825	698	940	451	382	805	917	122	676	424	173	808
ITA	516	601	1145	587	1010	927	817	654	1142	0	1465	2239	840	1171	380	364	953	1152	141	493	518	202	910
NLD	667	1008	957	697	1168	1065	767	807	1182	1145	0	1977	718	1122	566	372	825	1211	155	630	389	192	850
USA	777	560	2553	709	842	917	807	922	1597	1541	1491	0	1019	1345	514	452	1555	1374	161	523	709	179	1066
HUN	303	294	663	278	520	461	463	411	557	670	515	899	0	623	260	288	532	750	88	318	358	117	546
POL	313	382	618	328	690	623	466	577	673	799	805	1049	460	0	293	276	656	935	138	372	411	182	723
NZL	379	203	294	195	244	277	242	221	350	293	501	429	197	179	0	205	301	311	37	331	162	55	277
ZAF	270	198	331	182	252	286	319	239	349	313	328	469	239	195	182	0	300	289	45	231	211	69	304
JPN	251	198	323	187	225	261	259	229	292	296	277	374	209	198	136	185	0	665	90	310	419	112	520
CZE	302	349	606	317	837	557	506	587	628	792	999	965	628	618	201	212	185	0	109	381	408	173	669
EST	37	43	48	28	77	57	40	39	53	66	90	92	50	74	16	18	19	57	0	58	52	43	93
IRL	367	363	388	331	389	421	377	402	738	460	581	488	267	278	274	219	176	292	32	0	184	88	360
KOR	196	147	499	154	211	237	273	200	312	422	250	789	288	299	108	164	183	280	20	131	0	79	386
SVN	79	108	113	79	202	148	108	99	132	173	166	136	86	144	40	48	54	127	26	68	49	0	134
PRT	356	481	834	372	577	631	665	564	739	860	835	1083	520	658	214	286	242	550	57	312	324	107	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
AUS	0	439	784	419	776	711	569	605	800	672	765	965	428	493	478	246	504	495	76	394	274	108	475

BEL	380	0	548	464	763	593	517	603	638	620	859	652	359	472	257	203	366	468	73	370	212	133	478
CAN	700	519	0	752	1706	1047	1135	1013	1333	1519	1061	2680	768	919	346	310	1049	931	118	404	559	153	837
CHE	360	465	600	0	854	551	502	483	621	664	719	817	355	467	236	188	364	458	61	334	223	109	430
DEU	399	644	583	555	0	1899	1260	1747	1550	2098	2109	2500	905	1382	422	320	1086	1449	170	544	456	233	877
DFS	453	518	722	465	829	0	872	1163	1241	1297	1432	1553	672	999	438	318	737	995	127	519	372	184	746
ESP	434	510	650	403	586	586	0	915	972	1175	924	1366	634	789	309	309	762	776	105	404	396	154	725
FRA	396	566	574	403	541	516	621	0	1151	1377	1312	1684	681	1093	374	261	852	1001	113	448	376	148	684
GBR	649	644	1316	598	746	820	782	640	0	1417	1396	1823	698	938	451	326	802	917	122	673	419	173	810
ITA	516	601	1145	587	1010	927	847	620	1142	0	1437	2239	840	1171	380	337	950	1152	141	493	511	202	911
NLD	632	944	900	673	1129	1041	768	675	1128	1121	0	1740	697	1098	539	309	752	1194	153	616	368	192	834
USA	777	559	2553	709	842	916	826	719	1597	1541	1247	0	1019	1343	514	383	1552	1374	161	521	702	179	1069
HUN	303	294	663	278	520	461	473	394	557	670	498	899	0	622	260	260	532	750	88	318	353	117	549
POL	313	382	618	328	690	623	484	534	672	799	794	1049	460	0	293	250	655	935	138	372	406	182	725
NZL	379	203	294	195	244	277	251	192	350	293	479	429	197	179	0	168	301	311	37	331	160	55	278
ZAF	228	181	287	166	227	262	280	199	298	293	269	384	222	187	145	0	253	268	44	194	191	69	288
JPN	246	194	318	184	222	258	258	219	286	293	268	367	208	197	134	170	0	664	90	309	414	112	521
CZE	302	349	606	317	837	557	526	552	628	792	983	965	628	618	201	200	184	0	109	381	405	173	671
EST	37	43	48	28	77	57	43	39	53	66	89	92	50	74	16	18	19	57	0	58	50	43	93
IRL	367	363	388	331	389	421	395	371	736	460	567	488	267	278	274	188	174	292	32	0	181	88	361
KOR	195	147	496	154	211	237	274	192	311	420	239	782	285	297	108	149	181	279	20	131	0	78	383
SVN	79	108	113	79	202	148	114	99	132	173	164	136	86	144	40	48	54	127	26	68	48	0	134
PRT	357	483	836	372	577	633	683	556	742	860	822	1083	524	661	214	276	239	552	57	313	322	107	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
AUS	0	445	784	419	776	709	557	748	800	672	795	964	428	494	474	296	505	495	76	394	274	475	81
BEL	381	0	555	467	770	599	507	680	646	625	892	669	362	476	261	234	376	470	73	373	212	479	102
CAN	700	519	0	752	1707	1047	1127	1189	1333	1519	1105	2680	768	920	346	363	1051	931	118	404	559	837	128
CHE	360	466	600	0	854	551	495	538	621	664	734	817	355	469	236	211	365	458	61	334	223	430	84
DEU	399	645	583	555	0	1899	1239	1957	1551	2098	2158	2500	905	1389	422	366	1088	1449	170	544	456	878	199
DFS	453	519	722	465	829	0	851	1350	1242	1297	1469	1553	672	1003	438	372	738	995	127	520	372	747	152
ESP	423	488	641	395	557	566	0	996	951	1159	922	1348	625	775	299	354	757	762	103	391	392	712	122
FRA	443	613	633	443	669	549	632	0	1312	1460	1549	2131	735	1187	465	347	1020	1056	117	508	412	728	125
GBR	649	644	1316	598	746	820	754	694	0	1417	1434	1824	698	940	451	382	804	917	122	674	419	812	140
ITA	516	601	1145	587	1010	927	822	654	1142	0	1457	2239	840	1171	380	364	952	1152	141	493	512	911	169
NLD	663	982	950	696	1160	1064	769	785	1170	1144	0	1849	709	1113	553	362	790	1207	154	623	380	847	153
USA	776	560	2553	709	842	916	809	922	1597	1541	1449	0	1019	1345	514	452	1554	1374	161	522	703	1069	148
HUN	303	294	663	278	520	461	464	411	557	670	515	899	0	623	260	288	532	750	88	318	354	549	100
POL	313	382	618	328	690	623	468	577	673	799	804	1049	460	0	293	276	656	935	138	372	406	725	157
NZL	379	203	294	195	244	277	243	221	350	293	499	429	197	179	0	205	301	311	37	331	160	278	45
ZAF	270	198	331	182	252	286	320	239	349	313	326	469	239	195	182	0	300	289	45	231	209	304	51
JPN	247	196	320	185	223	259	258	227	289	294	273	370	208	197	134	184	0	665	90	309	415	522	89
CZE	302	349	606	317	837	557	508	587	628	792	999	965	628	618	201	212	184	0	109	381	405	672	145
EST	37	43	48	28	77	57	41	39	53	66	90	92	50	74	16	18	19	57	0	58	50	93	39
IRL	367	363	388	331	389	421	378	402	736	460	578	488	267	278	274	219	174	292	32	0	182	361	66
KOR	195	147	496	154	211	237	272	199	311	420	246	783	286	297	108	163	182	279	20	131	0	384	65
PRT	357	482	836	372	577	633	670	568	741	860	834	1083	523	661	214	286	241	552	57	313	323	0	108
SVN	60	81	96	64	176	122	88	83	106	144	133	114	72	124	33	35	39	107	22	54	41	87	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	PRT	SVN
AUS	0	432	784	402	774	710	573	605	796	670	395	962	427	489	293	504	491	74	392	274	466	80
BEL	378	0	539	440	748	583	514	599	623	613	507	635	353	463	223	360	459	72	363	207	466	101
CAN	700	514	0	715	1705	1043	1138	1012	1329	1518	680	2679	768	918	357	1048	930	117	403	559	831	128
CHE	355	441	570	0	756	537	496	478	607	638	453	760	347	446	208	363	435	58	331	221	415	83
DEU	398	634	583	494	0	1884	1268	1746	1548	2095	1190	2494	901	1377	360	1085	1442	169	543	456	858	198
DFS	453	514	722	455	826	0	875	1157	1229	1291	812	1540	667	987	367	734	985	125	518	372	728	151
ESP	437	512	652	401	602	595	0	921	975	1183	579	1372	635	791	355	765	775	105	405	396	722	124

FRA	396	566	574	398	541	516	632	0	1150	1376	726	1682	680	1091	290	852	1001	111	447	376	670	125
GBR	649	634	1316	587	745	820	788	640	0	1413	758	1815	694	928	375	801	910	119	665	419	795	139
ITA	515	599	1144	567	1008	927	856	620	1140	0	916	2236	838	1165	358	949	1150	139	492	511	896	168
NLD	365	554	660	417	753	733	491	489	705	813	0	881	414	750	196	380	788	114	337	233	529	144
USA	776	551	2552	654	841	916	829	719	1596	1538	734	0	1017	1338	445	1552	1365	160	518	701	1053	148
HUN	303	292	663	273	520	461	477	394	556	669	303	898	0	620	285	532	748	88	315	353	543	100
POL	313	377	618	307	690	620	491	534	669	797	623	1048	460	0	270	654	927	137	369	406	714	156
ZAF	268	197	328	179	249	283	321	206	346	310	169	464	237	191	0	295	282	43	227	206	299	48
JPN	246	194	318	184	222	258	258	219	286	293	194	367	208	197	181	0	664	90	308	414	518	89
CZE	302	345	606	304	835	552	530	552	626	792	752	962	628	614	209	184	0	105	378	405	659	144
EST	37	43	48	28	77	57	45	39	53	66	71	92	50	74	18	19	56	0	56	50	91	38
IRL	367	361	388	327	388	421	398	371	729	460	347	488	267	277	217	174	292	32	0	181	354	66
KOR	195	147	496	153	211	237	274	192	311	420	166	781	285	297	162	181	279	20	131	0	383	65
PRT	357	477	836	362	574	625	684	556	740	858	535	1081	523	653	284	239	544	56	313	322	0	108
SVN	60	81	96	63	176	122	91	83	106	144	132	114	72	124	32	39	106	22	54	41	87	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
AUS	0	446	784	419	776	712	554	749	800	672	822	965	428	495	478	296	506	495	76	394	277	108	475
BEL	381	0	555	467	770	600	501	680	646	625	916	669	362	476	261	234	377	470	73	373	214	133	479
CAN	700	519	0	752	1707	1047	1122	1189	1333	1519	1136	2680	768	920	346	363	1052	931	118	404	565	153	837
CHE	360	466	600	0	854	551	492	537	621	664	742	817	355	469	236	211	366	458	61	334	225	109	430
DEU	399	645	583	555	0	1899	1228	1956	1551	2098	2199	2500	905	1389	422	366	1088	1449	170	544	462	233	878
DFS	453	519	722	465	829	0	843	1351	1243	1298	1511	1554	673	1004	439	372	739	995	127	521	375	184	747
ESP	420	482	638	391	543	558	0	987	943	1150	927	1339	622	769	296	354	753	756	101	388	397	150	707
FRA	443	613	633	442	668	548	621	0	1312	1460	1664	2131	735	1187	465	347	1020	1056	117	508	416	149	728
GBR	649	644	1316	598	746	820	744	694	0	1417	1462	1825	698	940	451	382	805	917	122	676	424	173	812
ITA	516	601	1145	587	1010	927	810	654	1142	0	1465	2239	840	1171	380	364	953	1152	141	493	519	202	911
NLD	667	1008	957	697	1168	1065	760	807	1182	1145	0	1977	718	1122	566	372	825	1211	155	630	389	192	852
USA	777	560	2553	709	842	916	801	922	1597	1541	1491	0	1019	1345	514	452	1555	1374	161	523	709	179	1069
HUN	303	294	663	278	520	461	462	411	557	670	515	899	0	623	260	288	532	750	88	318	358	117	549
POL	313	382	618	328	690	623	462	577	673	799	805	1049	460	0	293	276	656	935	138	372	412	182	725
NZL	379	203	294	195	244	277	241	221	350	293	501	429	197	179	0	205	301	311	37	331	162	55	278
ZAF	270	198	331	182	252	286	319	239	349	313	328	469	239	195	182	0	300	289	45	231	211	69	304
JPN	250	197	322	186	224	260	257	228	291	295	276	373	208	197	135	184	0	665	90	310	419	112	522
CZE	302	349	606	317	837	557	503	587	628	792	999	965	628	618	201	212	185	0	109	381	408	173	672
EST	37	43	48	28	77	57	40	39	53	66	90	92	50	74	16	18	19	57	0	58	52	43	93
IRL	367	363	388	331	389	421	375	402	738	460	581	488	267	278	274	219	175	292	32	0	184	88	361
KOR	196	147	499	154	211	237	271	200	312	422	250	789	288	299	108	164	183	280	20	131	0	79	386
SVN	79	108	113	79	202	148	108	99	132	173	166	136	86	144	40	48	54	127	26	68	49	0	134
PRT	357	482	836	372	577	633	663	568	741	860	837	1083	523	661	214	286	241	552	57	313	324	107	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
AUS	0	422	784	419	776	712	555	749	800	672	820	965	428	495	478	295	308	495	76	394	273	475	81
BEL	378	0	533	460	740	578	484	633	614	610	826	621	347	464	246	221	265	456	73	358	203	471	102
CAN	700	509	0	752	1707	1047	1123	1189	1333	1519	1133	2680	768	920	346	362	747	931	118	404	559	837	128
CHE	360	462	600	0	854	551	492	538	621	664	740	817	355	469	236	210	282	458	61	334	222	430	84
DEU	399	626	583	555	0	1899	1229	1957	1551	2098	2194	2500	905	1389	422	365	810	1449	170	544	456	878	199
DFS	453	514	722	465	829	0	845	1351	1243	1298	1503	1554	673	1004	439	371	510	995	127	521	371	747	152
ESP	421	476	640	391	545	560	0	990	946	1153	926	1342	624	770	296	353	574	758	101	389	392	709	122
FRA	443	601	633	443	669	549	626	0	1312	1460	1653	2131	735	1187	465	346	683	1056	117	508	412	728	125
GBR	649	626	1316	598	746	820	748	694	0	1417	1460	1825	698	940	451	381	561	917	122	676	421	812	140
ITA	516	598	1145	587	1010	927	814	654	1142	0	1464	2239	840	1171	380	363	787	1152	141	493	513	911	169
NLD	667	909	957	697	1167	1065	762	808	1181	1145	0	1970	718	1121	565	371	577	1211	154	629	383	852	153
USA	777	545	2553	709	842	916	805	922	1597	1541	1488	0	1019	1345	514	451	1033	1374	161	523	702	1069	148
HUN	303	290	663	278	520	461	463	411	557	670	515	899	0	623	260	287	414	750	88	318	354	549	100
POL	313	379	618	328	690	623	464	577	673	799	805	1049	460	0	293	275	551	935	138	372	407	725	157

NZL	379	197	294	195	244	277	242	221	350	293	501	429	197	179	0	204	187	311	37	331	159	278	45
ZAF	269	195	330	181	251	285	318	238	348	312	327	468	238	194	182	0	201	288	44	230	207	303	50
JPN	206	168	280	166	197	229	215	197	241	267	232	312	180	187	110	139	0	522	78	221	331	408	86
CZE	302	346	606	317	837	557	505	587	628	792	999	965	628	618	201	212	166	0	109	381	405	672	145
EST	37	43	48	28	77	57	40	39	53	66	90	92	50	74	16	18	19	57	0	58	51	93	39
IRL	367	357	388	331	389	421	376	402	738	460	581	488	267	278	274	218	150	292	32	0	181	361	66
KOR	195	147	498	154	211	237	272	200	312	421	250	784	287	298	108	163	167	279	20	131	0	383	65
PRT	357	479	836	372	577	633	666	568	741	860	837	1083	523	661	214	285	211	552	57	313	323	0	108
SVN	60	81	96	64	176	122	87	83	106	144	133	114	72	124	33	35	39	107	22	54	41	87	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
AUS	0	446	784	419	776	712	560	749	800	672	822	965	428	495	478	296	504	495	76	394	272	108	475
BEL	381	0	555	467	770	600	508	680	646	625	916	669	362	476	261	234	374	470	73	373	210	133	479
CAN	700	519	0	752	1707	1047	1128	1189	1333	1519	1136	2680	768	920	346	363	1049	931	118	404	555	153	838
CHE	360	466	600	0	854	551	495	537	621	664	742	817	355	469	236	211	364	458	61	334	222	109	430
DEU	399	645	583	555	0	1899	1242	1956	1551	2098	2199	2500	905	1389	422	366	1086	1449	170	544	453	233	879
DFS	453	519	722	465	829	0	855	1351	1243	1298	1511	1554	673	1004	439	372	737	995	127	521	369	184	748
ESP	425	489	642	395	560	568	0	998	954	1161	939	1349	626	777	300	355	756	763	103	393	388	151	714
FRA	443	613	633	442	668	549	634	0	1312	1460	1664	2131	735	1187	465	347	1018	1056	117	508	407	149	729
GBR	649	644	1316	598	746	820	756	694	0	1417	1462	1825	698	940	451	382	802	917	122	676	416	173	812
ITA	516	601	1145	587	1010	927	824	654	1142	0	1465	2239	840	1171	380	364	950	1152	141	493	508	202	912
NLD	667	1008	957	697	1168	1065	773	807	1182	1145	0	1977	718	1122	566	372	822	1211	155	630	380	192	853
USA	777	560	2553	709	842	917	810	922	1597	1541	1491	0	1019	1345	514	452	1552	1374	161	523	697	179	1070
HUN	303	294	663	278	520	461	465	411	557	670	515	899	0	623	260	288	532	750	88	318	351	117	550
POL	313	382	618	328	690	623	470	577	673	799	805	1049	460	0	293	276	656	935	138	372	403	182	726
NZL	379	203	294	195	244	277	244	221	350	293	501	429	197	179	0	205	301	311	37	331	159	55	278
ZAF	270	198	331	182	252	286	321	239	349	313	328	469	239	195	182	0	299	289	45	231	208	69	304
JPN	246	194	318	184	222	258	256	225	286	293	271	367	208	197	134	182	0	664	90	309	412	112	522
CZE	302	349	606	317	837	557	509	587	628	792	999	965	628	618	201	212	184	0	109	381	402	173	672
EST	37	43	48	28	77	57	41	39	53	66	90	92	50	74	16	18	19	57	0	58	50	43	93
IRL	367	363	388	331	389	421	380	402	738	460	581	488	267	278	274	219	174	292	32	0	180	88	361
KOR	195	146	495	154	210	237	271	197	311	419	247	780	285	296	108	163	181	279	20	131	0	78	379
SVN	79	108	113	79	202	148	110	99	132	173	166	136	86	144	40	48	54	127	26	68	48	0	134
PRT	357	483	836	372	577	633	673	568	743	862	839	1086	526	662	214	286	239	553	57	313	323	107	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	
AUS	0	393	671	405	719	655	512	464	731	645	682	840	402	437	244	437	364	74	371	187	105	455	
BEL	370	0	503	448	708	549	475	512	584	599	766	588	337	432	194	330	380	70	335	158	130	461	
CAN	616	498	0	717	1626	951	1061	863	1238	1491	996	2486	746	868	300	926	797	114	374	456	150	820	
CHE	356	452	585	0	854	550	498	444	621	664	709	817	353	443	189	356	380	61	325	174	106	426	
DEU	390	604	579	555	0	1898	1246	1516	1549	2098	2064	2500	902	1336	322	1051	1218	170	525	376	230	875	
DFS	448	505	719	465	829	0	852	951	1237	1297	1394	1552	668	950	320	694	808	127	494	287	183	742	
ESP	414	477	632	398	569	575	0	792	954	1168	890	1350	627	748	310	722	662	103	382	315	152	717	
FRA	334	483	504	369	496	461	539	0	942	1235	1116	1343	600	1020	220	700	825	102	365	296	141	603	
GBR	622	605	1243	597	746	818	765	540	0	1415	1347	1816	695	895	328	754	763	121	630	332	170	806	
ITA	511	593	1140	587	1010	926	833	565	1140	0	1429	2237	838	1144	339	931	1033	141	485	435	199	909	
NLD	591	846	880	668	1116	1036	740	614	1104	1123	0	1645	680	1048	305	719	1043	153	567	297	189	824	
USA	710	535	2440	709	842	916	815	588	1596	1541	1214	0	1016	1293	386	1420	1166	161	495	569	176	1063	
HUN	297	281	657	278	520	461	468	351	556	670	501	899	0	596	261	517	634	88	304	297	115	549	
POL	298	365	597	315	669	599	447	527	650	788	770	1019	442	0	237	620	832	137	335	357	179	704	
ZAF	230	180	286	167	228	263	281	165	301	294	270	387	223	179	0	246	228	44	191	145	68	288	
JPN	241	193	316	184	222	257	252	197	282	292	265	360	207	191	170	0	553	88	282	328	112	515	
CZE	245	293	528	261	708	477	415	442	516	708	888	813	519	562	164	169	0	102	301	333	164	599	
EST	37	42	48	28	77	57	41	35	53	66	89	92	50	73	18	19	52	0	56	45	43	93	
IRL	357	348	385	328	387	419	382	313	703	458	551	482	265	265	189	173	237	32	0	129	87	347	
KOR	133	124	409	128	177	195	210	174	238	356	194	630	237	275	107	150	235	18	98	0	70	325	

SVN	78	105	112	78	200	148	111	95	131	171	163	135	85	143	48	54	123	26	68	46	0	133
PRT	354	473	815	369	577	631	676	511	740	861	817	1082	525	650	276	238	493	57	310	278	107	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	
AUS	0	418	784	419	460	709	569	744	800	672	785	965	426	493	296	504	493	74	393	274	106	480
BEL	378	0	529	458	541	572	500	624	612	609	816	618	346	462	222	350	454	71	357	204	132	474
CAN	700	509	0	751	1237	1046	1135	1173	1333	1519	1089	2680	765	915	363	1049	925	115	404	558	151	841
CHE	360	462	600	0	613	550	502	530	620	662	729	816	354	467	211	363	455	61	334	222	108	434
DEU	300	491	486	427	0	1199	949	1245	1044	1630	1460	1661	653	1084	224	727	1043	141	355	351	210	655
DFS	453	513	722	465	662	0	871	1321	1240	1295	1454	1550	668	998	372	737	987	124	520	372	182	751
ESP	434	502	650	403	427	585	0	1004	971	1175	937	1366	631	785	359	761	772	103	403	396	152	730
FRA	442	596	633	442	444	548	663	0	1297	1455	1493	2090	731	1176	346	1004	1049	114	502	407	148	731
GBR	649	626	1316	598	563	820	781	694	0	1417	1417	1822	696	935	381	801	911	121	670	419	172	815
ITA	516	598	1145	586	802	927	847	653	1142	0	1447	2239	838	1168	364	950	1151	141	493	510	201	913
NLD	658	904	944	694	856	1061	793	765	1161	1142	0	1804	700	1097	360	780	1196	152	616	376	190	847
USA	776	545	2553	709	622	916	826	886	1597	1541	1433	0	1016	1338	452	1551	1369	160	521	699	177	1072
HUN	303	289	663	278	385	458	473	411	557	670	512	899	0	620	287	531	746	86	317	353	115	550
POL	313	378	618	327	587	620	482	577	671	799	796	1049	458	0	275	654	927	135	370	405	179	727
ZAF	270	196	331	182	161	286	323	239	349	313	322	469	239	195	0	298	288	45	231	209	69	309
JPN	246	194	318	184	182	258	257	224	285	293	268	366	208	197	181	0	661	89	309	414	110	526
CZE	302	344	606	316	637	556	525	587	627	792	996	965	626	615	212	184	0	106	380	404	171	671
EST	37	42	48	28	63	56	43	39	52	66	89	92	49	71	18	19	55	0	57	50	42	92
IRL	367	357	388	331	289	421	394	402	732	460	577	488	267	278	219	174	292	32	0	181	87	362
KOR	195	147	495	154	179	237	272	198	311	420	244	774	285	297	163	181	279	20	131	0	78	384
SVN	79	107	113	79	191	146	114	99	132	173	165	136	85	142	48	54	126	25	68	48	0	133
PRT	359	483	839	376	478	637	689	571	748	863	837	1090	528	665	287	239	556	56	314	323	107	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	
AUS	0	439	784	419	776	711	569	698	800	672	765	965	428	494	478	296	504	495	76	394	274	108	475
BEL	380	0	550	466	764	595	519	654	640	622	861	654	359	473	257	232	367	468	73	371	212	133	479
CAN	700	519	0	752	1706	1047	1135	1111	1333	1519	1061	2680	768	920	346	363	1049	931	118	404	561	153	838
CHE	360	465	600	0	854	551	502	528	621	664	719	817	355	469	236	211	364	458	61	334	223	109	430
DEU	399	644	583	555	0	1899	1259	1920	1551	2098	2110	2500	905	1388	422	366	1086	1449	170	544	458	233	879
DFS	453	518	722	465	829	0	871	1272	1242	1297	1432	1553	672	1003	438	372	737	995	127	520	373	184	748
ESP	434	510	650	403	585	585	0	978	972	1175	924	1366	634	789	309	359	762	775	105	403	398	154	725
FRA	441	609	630	442	665	546	663	0	1257	1445	1458	1931	721	1175	432	332	940	1046	115	490	396	149	721
GBR	649	644	1316	598	746	820	781	689	0	1417	1397	1824	698	940	451	382	802	917	122	674	421	173	812
ITA	516	601	1145	587	1010	927	847	653	1142	0	1437	2239	840	1171	380	364	950	1152	141	493	514	202	912
NLD	632	944	901	673	1129	1040	767	754	1129	1121	0	1742	697	1100	539	353	752	1194	153	616	370	192	835
USA	777	559	2553	709	842	917	826	851	1597	1541	1247	0	1019	1345	514	452	1552	1374	161	522	705	179	1070
HUN	303	294	663	278	520	461	473	410	557	670	498	899	0	623	260	288	532	750	88	318	356	117	550
POL	313	382	618	328	690	623	483	577	673	799	796	1049	460	0	293	276	656	935	138	372	408	182	726
NZL	379	203	294	195	244	277	251	219	350	293	479	429	197	179	0	205	301	311	37	331	160	55	278
ZAF	270	198	331	182	252	286	323	237	349	313	308	469	239	195	182	0	299	289	45	231	209	69	304
JPN	246	194	318	184	222	258	258	225	286	293	268	367	208	197	134	182	0	664	90	309	414	112	522
CZE	302	349	606	317	837	557	525	585	628	792	983	965	628	618	201	212	184	0	109	381	406	173	672
EST	37	43	48	28	77	57	43	39	53	66	89	92	50	74	16	18	19	57	0	58	50	43	93
IRL	367	363	388	331	389	421	394	400	736	460	566	488	267	278	274	219	174	292	32	0	182	88	361
KOR	195	147	497	154	211	237	274	199	312	421	240	784	287	298	108	163	181	279	20	131	0	78	384
SVN	79	108	113	79	202	148	114	99	132	173	164	136	86	144	40	48	54	127	26	68	48	0	134
PRT	357	483	836	372	577	633	683	566	742	861	823	1084	525	662	214	286	239	552	57	313	323	107	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
AUS	0	439	784	419	776	664	561	745	800	672	796	965	428	495	478	296	505	495	76	394	274	108	474
BEL	380	0	550	466	764	584	507	666	640	622	877	654	359	473	257	232	368	468	73	371	212	133	478
CAN	700	519	0	752	1707	969	1129	1174	1333	1519	1105	2680	768	920	346	363	1050	931	118	404	561	153	835
CHE	360	465	600	0	854	532	497	534	621	664	734	817	355	469	236	211	364	458	61	334	223	109	430
DEU	399	644	583	555	0	1812	1244	1944	1551	2098	2158	2500	905	1389	422	366	1087	1449	170	544	458	233	876
DFS	453	518	722	465	828	0	814	1241	1184	1279	1435	1460	656	982	411	345	684	964	124	503	360	184	737
ESP	425	491	643	397	562	570	0	988	956	1162	926	1351	627	779	301	357	758	764	103	394	395	151	713
FRA	443	612	633	442	666	548	637	0	1299	1456	1542	2092	733	1183	461	346	1006	1052	116	503	410	149	724
GBR	649	643	1315	598	745	819	756	693	0	1417	1434	1824	698	940	451	382	803	917	122	674	422	173	810
ITA	516	601	1145	587	1010	926	826	654	1141	0	1457	2239	840	1171	380	364	951	1152	141	493	515	202	910
NLD	663	977	950	696	1160	1064	773	783	1169	1144	0	1849	709	1113	553	362	789	1207	154	623	382	192	846
USA	777	559	2553	709	842	916	812	887	1597	1541	1449	0	1019	1345	514	452	1553	1374	161	522	706	179	1067
HUN	303	294	663	278	520	461	467	411	557	670	515	899	0	623	260	288	532	750	88	318	356	117	549
POL	313	382	618	328	690	623	472	577	673	799	804	1049	460	0	293	276	656	935	138	372	409	182	723
NZL	379	203	294	195	244	277	244	221	350	293	499	429	197	179	0	205	301	311	37	331	160	55	278
ZAF	270	198	331	182	252	286	322	239	349	313	326	469	239	195	182	0	300	289	45	231	209	69	303
JPN	246	195	319	184	223	259	258	226	287	294	271	368	208	197	134	183	0	665	90	309	416	112	522
CZE	302	349	606	317	837	557	511	587	628	792	999	965	628	618	201	212	184	0	109	381	406	173	671
EST	37	43	48	28	77	57	41	39	53	66	90	92	50	74	16	18	19	57	0	58	51	43	92
IRL	367	363	388	331	389	421	381	402	736	460	578	488	267	278	274	219	174	292	32	0	182	88	361
KOR	195	147	498	154	211	237	273	200	312	421	247	785	287	298	108	164	182	279	20	131	0	78	384
SVN	79	108	113	79	202	148	110	99	132	173	166	136	86	144	40	48	54	127	26	68	48	0	134
PRT	357	482	836	372	577	630	672	568	741	860	834	1083	523	661	214	286	240	552	57	313	323	107	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
AUS	0	439	784	419	776	712	572	749	800	672	822	965	428	495	478	296	504	495	76	394	272	108	475
BEL	380	0	550	466	764	596	520	669	640	622	885	654	359	473	257	232	367	468	73	371	210	133	479
CAN	700	519	0	752	1707	1047	1137	1189	1333	1519	1136	2680	768	920	346	363	1049	931	118	404	555	153	838
CHE	360	465	600	0	854	551	502	537	621	664	742	817	355	469	236	211	364	458	61	334	222	109	430
DEU	399	644	583	555	0	1899	1267	1956	1551	2098	2199	2500	905	1389	422	366	1086	1449	170	544	453	233	879
DFS	453	518	723	465	829	0	877	1351	1243	1298	1511	1554	673	1004	439	372	737	995	127	521	369	184	748
ESP	435	512	651	403	598	592	0	1022	976	1183	968	1370	636	795	311	359	765	779	106	406	392	154	728
FRA	443	612	633	442	668	549	675	0	1312	1460	1664	2131	735	1187	465	347	1018	1056	117	508	407	149	729
GBR	649	644	1316	598	746	820	786	694	0	1417	1462	1825	698	940	451	382	802	917	122	676	416	173	812
ITA	516	601	1145	587	1010	927	856	654	1142	0	1465	2239	840	1171	380	364	950	1152	141	493	508	202	912
NLD	667	984	957	697	1168	1065	808	807	1182	1145	0	1977	718	1122	566	372	822	1211	155	630	380	192	853
USA	777	559	2553	709	842	918	828	922	1597	1541	1491	0	1019	1345	514	452	1552	1374	161	523	696	179	1070
HUN	303	294	663	278	520	462	476	411	557	670	515	899	0	623	260	288	532	750	88	318	351	117	550
POL	313	382	618	328	690	623	489	577	673	799	805	1049	460	0	293	276	656	935	138	372	403	182	726
NZL	379	203	294	195	244	277	252	221	350	293	501	429	197	179	0	205	301	311	37	331	159	55	278
ZAF	270	198	331	182	252	287	323	239	349	313	328	469	239	195	182	0	299	289	45	231	208	69	304
JPN	246	194	318	184	222	258	258	225	286	293	271	367	208	197	134	182	0	664	90	309	411	112	522
CZE	302	349	606	317	837	557	528	587	628	792	999	965	628	618	201	212	184	0	109	381	402	173	672
EST	37	43	48	28	77	57	44	39	53	66	90	92	50	74	16	18	19	57	0	58	50	43	93
IRL	367	363	388	331	389	421	397	402	738	460	581	488	267	278	274	219	174	292	32	0	180	88	361
KOR	195	146	495	154	210	237	273	197	311	419	247	779	285	296	108	163	181	279	20	131	0	78	379
SVN	79	108	113	79	202	148	114	99	132	173	166	136	86	144	40	48	54	127	26	68	48	0	134
PRT	357	483	836	372	577	633	685	568	743	862	839	1086	526	662	214	286	239	553	57	313	323	107	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
AUS	0	442	784	418	775	710	556	748	799	671	821	965	428	494	295	505	494	76	393	274	107	474
BEL	378	0	550	465	763	595	503	673	640	622	908	663	359	473	231	373	468	73	368	209	133	478
CAN	700	515	0	752	1707	1047	1125	1189	1333	1519	1136	2680	768	920	363	1052	931	118	404	560	153	837
CHE	359	464	600	0	854	551	493	537	621	664	742	817	355	469	211	366	458	61	334	223	109	430

DEU	398	641	583	555	0	1899	1234	1956	1551	2098	2199	2500	905	1389	366	1088	1449	170	544	457	233	878
DFS	452	518	723	465	829	0	849	1351	1243	1298	1511	1554	673	1004	372	739	995	127	521	372	184	747
ESP	421	484	640	393	551	563	0	993	950	1156	934	1345	624	773	354	757	760	102	391	393	150	711
FRA	442	611	633	442	668	549	628	0	1312	1460	1664	2131	735	1187	347	1020	1056	117	508	413	149	728
GBR	648	640	1316	598	746	820	751	694	0	1417	1462	1825	698	940	382	805	917	122	673	422	173	812
ITA	515	601	1145	587	1010	927	818	654	1142	0	1465	2239	840	1171	364	953	1152	141	493	514	202	911
NLD	666	996	957	697	1168	1065	767	807	1182	1145	0	1977	718	1122	372	825	1211	155	630	385	192	852
USA	776	556	2553	709	842	918	807	922	1597	1541	1491	0	1019	1345	452	1555	1374	161	523	704	179	1069
HUN	303	293	663	278	520	462	463	411	557	670	515	899	0	623	288	532	750	88	318	355	117	549
POL	312	382	618	328	690	623	466	577	673	799	805	1049	460	0	276	656	935	138	372	408	182	725
ZAF	269	198	331	182	252	287	319	239	349	313	328	469	239	195	0	300	289	45	231	209	69	304
JPN	249	197	322	186	224	260	258	228	291	295	276	373	208	197	184	0	665	90	310	416	112	522
CZE	301	349	606	317	837	557	506	587	628	792	999	965	628	618	212	185	0	109	381	406	173	672
EST	37	43	48	28	77	57	40	39	53	66	90	92	50	74	18	19	57	0	58	51	43	93
IRL	367	362	388	331	389	421	377	402	735	460	581	488	267	278	219	175	292	32	0	182	88	361
KOR	195	147	498	154	211	237	272	200	312	421	250	785	287	298	164	182	279	20	131	0	78	384
SVN	78	108	113	79	202	148	108	99	132	173	166	136	86	144	48	54	127	26	68	48	0	134
PRT	356	481	836	372	577	633	668	568	741	860	837	1083	523	661	286	241	552	57	313	323	107	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
AUS	0	439	784	419	776	712	561	749	800	672	822	965	428	495	478	296	505	495	76	394	274	106	475
BEL	380	0	550	466	764	596	507	669	640	622	885	654	359	473	257	232	369	468	73	371	212	131	479
CAN	700	519	0	752	1707	1047	1128	1189	1333	1519	1136	2680	768	920	346	363	1051	931	118	404	561	151	837
CHE	360	465	600	0	854	551	496	537	621	664	742	817	355	469	236	211	365	458	61	334	223	107	430
DEU	399	644	583	555	0	1899	1243	1956	1551	2098	2199	2500	905	1389	422	366	1088	1449	170	544	458	231	878
DFS	453	518	723	465	829	0	855	1351	1243	1298	1511	1554	673	1004	439	372	738	995	127	521	373	183	747
ESP	425	491	642	396	561	569	0	999	955	1161	940	1350	626	778	301	356	757	763	103	393	394	150	711
FRA	443	612	633	442	668	549	636	0	1312	1460	1664	2131	735	1187	465	347	1020	1056	117	508	414	147	728
GBR	649	644	1316	598	746	820	757	694	0	1417	1462	1825	698	940	451	382	804	917	122	676	422	171	812
ITA	516	601	1145	587	1010	927	825	654	1142	0	1465	2239	840	1171	380	364	952	1152	141	493	515	200	911
NLD	667	984	957	697	1168	1065	774	807	1182	1145	0	1977	718	1122	566	372	824	1211	155	630	387	190	852
USA	777	559	2553	709	842	917	811	922	1597	1541	1491	0	1019	1345	514	452	1554	1374	161	523	706	177	1069
HUN	303	294	663	278	520	462	466	411	557	670	515	899	0	623	260	288	532	750	88	318	356	115	549
POL	313	382	618	328	690	623	471	577	673	799	805	1049	460	0	293	276	656	935	138	372	409	180	725
NZL	379	203	294	195	244	277	244	221	350	293	501	429	197	179	0	205	301	311	37	331	160	55	278
ZAF	270	198	331	182	252	287	321	239	349	313	328	469	239	195	182	0	300	289	45	231	209	68	304
JPN	247	196	320	185	223	259	258	227	289	294	274	370	208	197	134	184	0	665	90	309	416	111	522
CZE	302	349	606	317	837	557	510	587	628	792	999	965	628	618	201	212	184	0	109	381	406	171	672
EST	37	43	48	28	77	57	41	39	53	66	90	92	50	74	16	18	19	57	0	58	51	42	93
IRL	367	363	388	331	389	421	380	402	738	460	581	488	267	278	274	219	174	292	32	0	182	87	361
KOR	195	147	498	154	211	237	272	200	312	421	250	785	287	298	108	164	182	279	20	131	0	77	384
SVN	79	107	113	79	201	148	110	99	132	172	165	135	85	143	40	48	54	127	26	68	48	0	133
PRT	357	482	836	372	577	633	671	568	741	860	837	1083	523	661	214	286	241	552	57	313	323	107	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
AUS	0	446	784	419	776	711	557	749	800	672	822	965	415	495	296	497	495	76	393	277	106	475
BEL	381	0	555	467	770	600	505	680	646	625	916	669	355	476	234	374	470	73	373	214	131	479
CAN	700	519	0	752	1707	1047	1125	1189	1333	1520	1136	2680	754	920	363	1043	930	118	404	564	151	837
CHE	360	466	600	0	854	551	493	537	621	664	742	817	349	469	211	365	458	61	334	225	107	430
DEU	399	645	583	555	0	1899	1234	1956	1551	2099	2199	2500	887	1389	366	1085	1449	170	544	461	231	878
DFS	453	519	723	465	829	0	849	1351	1243	1299	1511	1554	658	1004	372	732	995	127	521	375	183	747
ESP	422	486	640	393	552	563	0	993	950	1156	934	1345	614	773	354	747	760	102	391	397	149	711
FRA	443	613	633	442	668	549	628	0	1312	1460	1664	2131	717	1187	347	1007	1056	117	508	416	147	728
GBR	649	644	1316	598	746	820	752	694	0	1417	1462	1825	683	940	382	798	917	122	673	424	171	812
ITA	516	601	1145	587	1010	927	819	654	1142	0	1465	2240	836	1171	364	947	1152	141	493	518	200	911
NLD	667	1008	957	697	1168	1065	768	807	1182	1145	0	1977	700	1122	372	817	1211	155	630	389	190	852

USA	776	560	2553	709	842	918	807	922	1597	1541	1491	0	989	1345	452	1534	1373	161	523	709	177	1069
HUN	290	285	649	274	511	453	449	403	541	663	502	873	0	617	279	522	737	88	311	356	115	547
POL	313	382	618	328	690	623	466	577	673	799	805	1049	456	0	276	654	935	138	372	411	180	725
ZAF	270	198	331	182	252	287	319	239	349	313	328	469	228	195	0	297	289	45	231	211	68	304
JPN	247	196	320	185	223	259	258	227	289	294	274	370	202	197	184	0	664	89	307	419	111	522
CZE	302	349	606	317	837	557	507	587	628	792	999	965	616	618	212	184	0	109	381	408	171	672
EST	37	43	48	28	77	57	40	39	53	66	90	92	50	74	18	19	57	0	58	52	42	93
IRL	367	363	388	331	389	421	378	402	735	460	581	488	259	278	219	174	292	32	0	184	87	361
KOR	196	147	499	154	211	237	273	200	312	422	250	789	286	299	164	183	280	20	131	0	78	386
SVN	79	107	113	79	201	148	108	99	132	172	165	135	85	143	48	54	127	26	68	49	0	133
PRT	357	482	836	372	577	633	669	568	741	860	837	1083	520	661	286	241	552	57	313	324	107	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
AUS	0	396	640	380	632	537	484	595	622	605	609	625	366	386	290	349	70	319	153	104	367	155	262
BEL	369	0	541	441	727	538	508	654	559	614	768	548	388	252	266	384	73	311	132	131	407	132	247
CAN	592	514	0	716	1639	889	1130	1187	1152	1516	981	2267	814	340	747	800	116	338	382	151	718	211	596
CHE	347	441	570	0	743	487	492	523	567	638	614	704	381	230	281	366	60	286	146	105	362	123	261
DEU	371	622	571	489	0	1655	1219	1852	1334	2071	1913	2044	1225	392	807	1208	166	445	316	231	752	203	667
DFS	406	480	692	423	774	0	752	1119	998	1222	1288	1156	845	350	497	779	120	406	228	179	620	200	467
ESP	393	495	645	395	556	522	0	1006	846	1165	845	1181	681	302	576	659	102	324	265	151	618	205	466
FRA	405	609	633	433	599	510	647	0	1027	1452	1264	1435	1024	455	683	875	114	394	269	147	603	181	531
GBR	545	577	1158	542	673	716	650	586	0	1319	1163	1448	795	342	546	735	111	481	271	169	667	208	484
ITA	495	600	1143	567	1001	879	832	654	1063	0	1386	2020	1073	371	787	1029	140	435	357	200	804	228	662
NLD	537	838	841	583	1042	966	699	690	947	1089	0	1364	961	441	568	1023	149	492	242	187	699	201	504
USA	578	520	2281	628	747	817	706	656	1376	1467	1045	0	1148	340	994	1114	151	397	465	174	863	242	720
POL	255	318	559	263	593	543	380	491	579	725	697	928	0	214	529	799	126	288	308	170	623	173	480
NZL	320	201	292	192	237	246	246	221	282	291	402	300	135	0	185	220	36	266	92	54	209	101	140
JPN	205	168	280	166	197	228	216	197	241	267	232	312	174	110	0	495	77	204	260	99	386	155	359
CZE	238	293	528	252	706	472	415	458	509	707	881	797	542	151	162	0	100	287	278	164	562	188	549
EST	37	43	48	28	76	54	41	39	50	66	86	89	65	16	19	51	0	51	42	42	85	37	76
IRL	318	324	345	294	348	359	328	336	507	416	484	413	226	231	150	234	32	0	102	85	288	120	208
KOR	119	105	343	110	149	160	170	147	194	295	158	525	241	68	126	193	18	80	0	65	259	107	231
SVN	78	107	113	78	201	146	111	99	130	172	164	135	133	40	50	123	26	68	43	0	126	59	106
PRT	291	405	693	306	496	520	550	470	596	749	679	877	575	161	198	463	52	253	226	100	0	193	401
ZAF	144	119	188	102	140	172	172	140	179	187	168	236	138	88	112	140	16	113	75	41	182	0	158
HUN	202	200	523	205	377	333	313	302	379	509	354	647	366	106	156	458	43	182	186	78	390	133	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	446	784	419	776	712	564	623	800	672	822	962	428	494	478	505	495	76	394	277	81	475
BEL	381	0	553	465	769	598	512	623	644	623	914	664	362	475	261	375	470	73	372	214	102	478
CAN	700	519	0	752	1707	1047	1131	1030	1333	1519	1136	2665	768	919	346	1051	931	118	404	567	128	837
CHE	360	466	600	0	854	551	499	499	621	664	742	813	355	467	236	365	458	61	334	225	84	430
DEU	399	645	583	555	0	1899	1250	1773	1551	2098	2199	2490	905	1384	422	1088	1449	170	544	462	199	877
DFS	453	519	723	465	829	0	862	1186	1243	1298	1511	1552	673	1001	439	738	995	127	520	376	152	746
ESP	427	497	645	398	570	575	0	929	964	1168	951	1353	630	785	307	760	770	103	399	401	123	721
FRA	426	587	600	428	574	541	639	0	1175	1394	1382	1706	690	1104	386	866	1012	113	463	387	125	688
GBR	649	644	1316	598	746	820	766	682	0	1417	1462	1819	698	939	451	804	917	122	675	424	140	810
ITA	516	601	1145	587	1010	927	833	645	1142	0	1465	2234	840	1171	380	952	1152	141	493	520	169	911
NLD	667	1008	957	697	1168	1065	785	738	1182	1145	0	1971	718	1120	566	824	1211	155	630	389	153	852
USA	774	558	2529	704	835	915	814	764	1589	1536	1484	0	1017	1340	513	1550	1369	160	520	711	148	1066
HUN	303	294	663	278	520	462	468	408	557	670	515	898	0	622	260	532	750	88	318	358	100	549
POL	313	382	618	328	690	623	475	545	673	799	805	1045	460	0	293	655	935	138	372	412	157	725
NZL	379	203	294	195	244	277	248	215	350	293	501	427	197	179	0	301	311	37	331	163	45	278
JPN	247	195	319	185	224	259	258	227	289	294	274	370	208	197	134	0	665	90	309	420	89	522
CZE	302	349	606	317	837	557	516	571	628	792	999	960	628	618	201	185	0	109	381	408	145	671
EST	37	43	48	28	77	57	41	39	53	66	90	92	50	74	16	19	57	0	58	52	39	93

IRL	367	363	388	331	389	421	386	398	738	460	581	486	267	278	274	174	292	32	0	184	66	361
KOR	196	147	499	154	211	237	275	197	312	422	250	789	288	299	108	183	280	20	131	0	66	386
SVN	60	81	96	64	176	122	89	83	106	144	133	114	72	124	33	39	107	22	54	42	0	108
PRT	357	482	836	372	577	633	677	559	741	860	837	1076	523	661	214	240	552	57	313	324	87	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	446	784	419	776	712	564	749	800	672	822	965	428	495	478	505	495	76	381	81	475
BEL	381	0	555	467	770	600	514	680	646	625	916	669	362	476	261	376	470	73	361	102	479
CAN	700	519	0	752	1707	1047	1131	1189	1333	1519	1136	2680	768	920	346	1051	931	118	390	128	837
CHE	360	466	600	0	854	551	499	537	621	664	742	817	355	469	236	365	458	61	325	85	430
DEU	399	645	583	555	0	1899	1250	1956	1551	2098	2199	2499	905	1389	422	1088	1449	170	526	200	878
DFS	453	519	723	465	829	0	862	1351	1243	1298	1511	1554	673	1004	439	738	995	127	497	153	747
ESP	427	497	645	398	570	575	0	1008	964	1168	951	1357	630	785	307	760	770	103	385	123	721
FRA	443	613	633	442	668	549	647	0	1312	1460	1664	2131	735	1187	465	1020	1056	117	479	125	728
GBR	649	642	1315	598	744	819	763	693	0	1417	1462	1825	698	940	451	804	917	122	637	141	812
ITA	516	601	1145	587	1010	927	833	654	1140	0	1465	2239	840	1171	380	952	1152	141	485	170	911
NLD	667	1008	957	697	1168	1065	785	807	1180	1145	0	1976	718	1122	566	824	1211	155	594	154	852
USA	777	560	2553	709	841	918	818	922	1597	1541	1490	0	1019	1345	514	1554	1373	161	497	148	1069
HUN	303	294	663	278	520	462	468	411	557	670	515	899	0	623	260	532	750	88	307	100	549
POL	313	382	618	328	690	623	475	577	673	799	805	1049	460	0	293	656	935	138	361	158	725
NZL	379	203	294	195	244	277	248	221	350	293	501	429	197	179	0	301	311	37	317	45	278
JPN	247	195	319	185	224	259	258	228	289	294	274	370	208	197	134	0	665	90	295	89	522
CZE	302	349	606	317	837	557	516	587	627	792	999	965	628	618	201	185	0	109	366	146	672
EST	37	43	48	28	77	57	41	39	53	66	90	92	50	74	16	19	57	0	57	39	93
IRL	365	362	387	329	387	420	383	397	713	458	573	482	265	278	270	174	291	32	0	66	350
SVN	60	81	96	64	176	122	89	83	106	145	134	114	72	124	33	39	107	22	54	0	108
PRT	357	483	836	372	577	633	678	568	741	860	838	1083	524	661	214	240	552	57	313	87	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	407	742	392	730	669	518	577	739	634	746	908	390	457	468	464	68	362	71	441
BEL	335	0	547	462	760	593	511	603	637	619	867	647	351	470	361	467	73	358	102	481
CAN	649	518	0	752	1707	1047	1132	1013	1333	1519	1105	2672	754	919	1034	930	118	390	128	845
CHE	316	463	600	0	854	551	500	483	621	664	731	814	349	467	363	458	61	325	84	436
DEU	343	642	583	555	0	1899	1253	1747	1551	2098	2161	2494	887	1383	1080	1449	170	526	199	886
DFS	401	517	723	465	829	0	865	1164	1243	1298	1484	1540	658	1001	727	995	127	497	152	755
ESP	367	502	646	400	575	579	0	909	965	1171	936	1356	620	786	749	771	104	386	123	730
FRA	356	566	574	403	541	516	610	0	1152	1377	1336	1677	675	1094	846	1001	113	438	125	688
GBR	577	641	1315	598	744	819	768	639	0	1417	1438	1818	683	939	791	917	122	634	140	817
ITA	452	601	1145	587	1010	927	838	620	1140	0	1450	2236	836	1171	945	1152	141	485	169	916
NLD	560	948	910	675	1138	1042	761	677	1142	1122	0	1867	693	1109	785	1201	154	589	153	849
USA	687	555	2553	709	840	918	818	719	1596	1541	1281	0	989	1342	1501	1371	161	495	148	1077
HUN	248	285	649	274	511	453	455	390	541	663	486	873	0	616	521	737	88	302	100	550
POL	269	381	618	328	690	623	477	534	673	799	797	1049	456	0	653	935	138	361	157	731
JPN	221	195	319	184	223	259	259	220	287	294	270	368	202	197	0	662	89	291	89	527
CZE	268	348	606	317	837	557	518	552	627	792	983	964	616	618	184	0	109	366	145	675
EST	30	43	48	28	77	57	42	39	53	66	89	92	50	74	19	57	0	57	39	93
IRL	333	362	387	329	387	420	385	369	710	458	563	482	258	278	174	291	32	0	66	353
SVN	51	81	96	64	176	122	89	83	106	144	133	114	72	124	39	107	22	54	0	108
PRT	317	487	840	377	582	640	688	560	749	864	830	1090	525	667	240	557	57	315	87	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
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BEL	0	500	368	571	544	452	563	581	456	710	587	370	333	118	84	394	40	245
CAN	498	0	604	1300	950	1018	983	1236	1223	915	2483	779	374	322	109	702	66	594
CHE	374	491	0	591	432	397	412	501	498	528	638	335	259	125	67	334	37	252
DEU	511	503	399	0	1347	991	1335	1140	1365	1547	1814	1068	387	256	152	643	102	626
DFS	501	720	377	699	0	773	1159	1230	874	1249	1531	787	494	198	123	615	72	472
ESP	450	576	304	443	530	0	852	862	884	794	1227	643	347	227	103	601	61	462
FRA	548	572	339	448	516	584	0	1149	931	1141	1676	844	437	231	102	584	67	529
GBR	604	1242	467	591	817	663	640	0	1018	1172	1806	744	629	229	116	673	72	490
ITA	467	974	442	672	703	604	507	856	0	963	1584	808	335	290	130	665	84	594
NLD	776	809	495	885	961	635	635	950	822	0	1389	992	509	210	124	672	90	496
USA	535	2438	547	662	917	684	719	1594	1216	1017	0	1131	494	387	127	879	87	733
CZE	290	516	233	647	463	413	441	500	580	854	786	0	290	229	117	540	59	545
IRL	348	384	255	306	420	343	369	704	343	495	482	229	0	90	52	286	30	210
KOR	94	299	99	129	145	155	133	167	250	139	442	161	73	0	53	217	19	197
SVN	68	84	52	137	103	79	70	94	112	108	98	86	44	37	0	94	22	81
PRT	396	686	286	467	516	535	466	588	636	654	873	443	250	196	74	0	48	396
EST	23	25	14	37	31	21	24	32	37	50	35	31	18	9	11	28	0	48
HUN	199	519	197	367	334	311	300	376	478	350	644	452	181	162	59	384	26	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
BEL	0	424	560	299	416	584	476	771	587	338	210	307	128	402	281	460	101	53	204
CHE	430	0	670	261	373	581	560	678	769	341	227	281	145	571	259	459	83	49	224
DEU	499	459	0	774	1125	1145	1502	1599	1823	1006	615	343	297	1149	511	997	193	130	544
DFS	239	205	322	0	424	627	525	788	686	436	218	278	131	323	261	412	83	58	224
FRA	386	311	402	172	0	740	906	880	1078	653	488	263	229	705	397	674	118	84	433
GBR	606	559	594	352	451	0	1104	1319	1771	677	437	566	267	931	478	889	139	96	423
ITA	482	489	692	357	468	908	0	1072	1747	839	594	335	344	1168	546	955	158	109	554
NLD	843	643	913	504	524	1071	879	0	1599	947	435	501	237	770	484	842	152	120	424
USA	525	678	664	343	494	1584	1291	1161	0	1040	798	451	462	1852	643	1278	147	115	646
CZE	265	239	619	231	361	460	595	820	733	0	396	240	268	651	406	590	141	80	463
JPN	136	136	162	106	159	199	223	192	260	139	0	142	236	559	267	476	79	57	296
IRL	324	288	284	206	243	637	334	485	446	190	110	0	90	266	176	333	61	37	162
KOR	101	110	148	77	143	194	290	156	527	189	125	72	0	348	229	257	63	35	216
CAN	424	500	489	247	440	983	960	756	2007	471	234	297	328	0	493	825	124	82	495
PRT	280	220	365	191	342	417	517	452	667	334	155	156	200	495	0	430	101	65	308
ESP	465	368	434	270	461	712	640	692	758	364	181	340	169	514	366	0	121	78	405
SVN	80	64	176	58	81	106	138	133	114	106	38	50	41	96	80	88	0	36	94
EST	33	22	55	24	33	43	55	72	57	44	17	24	18	41	45	32	21	0	63
HUN	165	170	317	146	255	328	431	294	570	384	131	137	178	468	309	266	70	38	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	128	71	81	44	144	220	120	15	11
CAN	132	0	64	112	48	70	359	134	12	15
DFS	47	47	0	85	52	75	123	103	15	28
GBR	80	115	76	0	50	71	143	98	12	29
ITA	43	46	49	50	0	36	64	57	14	16
NZL	143	72	52	72	32	0	142	95	15	13
USA	208	354	87	149	68	150	0	234	26	26
ZAF	122	133	82	95	57	93	241	0	23	21
NLD	11	8	10	10	11	13	27	19	0	3
CHE	9	13	27	27	17	11	26	21	2	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	128	71	81	44	144	220	113	15	18
CAN	132	0	64	112	48	70	359	123	12	21
DFS	47	47	0	85	52	75	123	94	15	39
GBR	80	115	76	0	50	71	143	93	12	37
ITA	43	46	49	50	0	36	64	57	14	24
NZL	143	72	52	72	32	0	142	86	15	20
USA	208	354	87	149	68	150	0	214	26	34
ZAF	116	124	76	91	57	85	223	0	23	34
NLD	11	8	10	10	11	13	27	19	0	7
CHE	16	19	37	35	24	17	34	33	5	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	127	71	81	44	144	113	15	219	22
CAN	131	0	64	112	48	70	123	12	359	25
DFS	47	47	0	85	52	75	94	15	123	41
GBR	80	115	76	0	50	71	93	12	143	40
ITA	43	46	49	50	0	36	57	14	64	27
NZL	143	72	52	72	32	0	86	15	142	24
ZAF	116	124	76	91	57	85	0	23	214	38
NLD	11	8	10	10	11	13	19	0	26	9
USA	207	354	87	149	68	150	223	27	0	38
CHE	19	21	39	38	26	21	36	6	38	0

JER

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE
AUS	0	128	68	80	44	220	119	2	22
CAN	132	0	64	112	48	359	134	4	25
DFS	45	47	0	83	52	123	102	5	41
GBR	79	115	74	0	50	143	98	6	40
ITA	43	46	49	50	0	64	57	5	27
USA	208	354	87	149	68	0	233	9	38
ZAF	121	133	81	95	57	240	0	8	38
NLD	1	3	5	5	4	8	7	0	4
CHE	19	21	39	38	26	38	36	4	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	128	71	81	44	144	220	120	15	22
CAN	132	0	64	112	48	70	359	134	12	25
DFS	47	47	0	85	52	75	123	103	15	41
GBR	80	115	76	0	50	71	143	98	12	40
ITA	43	46	49	50	0	36	64	57	14	27
NZL	143	72	52	72	32	0	142	95	15	24
USA	208	354	87	149	68	150	0	234	26	38
ZAF	122	133	82	95	57	93	241	0	23	38
NLD	11	8	10	10	11	13	27	19	0	9
CHE	19	21	39	38	26	21	38	36	6	0

JER

common bulls below diagonal

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common three quarter sib group above diagonal
      AUS  CAN  DFS  GBR  ITA  NZL  USA  ZAF  NLD  CHE
-----
AUS   0  128  71  81  44  144  220  120  15  22
CAN  132   0  64 112  48  70  359  134  12  25
DFS   47  47   0  85  52  75  123  103  15  41
GBR   80 115  76   0  50  71  143   98  12  40
ITA   43  46  49  50   0  36  64   57  14  27
NZL  143  72  52  72  32   0  142   95  15  24
USA  208 354  87 149  68 150   0  234  26  38
ZAF  122 133  82  95  57  93  241   0  23  38
NLD   11   8  10  10  11  13  27  19   0   9
CHE   19  21  39  38  26  21  38  36   6   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
-----
AUS   0  128  71  81  44  144  220  120  15  22
CAN  132   0  64 112  48  70  359  134  12  25
DFS   47  47   0  85  52  75  123  103  15  41
GBR   80 115  76   0  50  71  143   98  12  40
ITA   43  46  49  50   0  36  64   57  14  27
NZL  143  72  52  72  32   0  142   95  15  24
USA  208 354  87 149  68 150   0  234  26  38
ZAF  122 133  82  95  57  93  241   0  23  38
NLD   11   8  10  10  11  13  27  19   0   9
CHE   19  21  39  38  26  21  38  36   6   0
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JER
-----
common bulls below diagonal
common three quarter sib group above diagonal
      AUS  CAN  DFS  ITA  ZAF  NLD  USA  CHE
-----
AUS   0  116  62  44  89  15  190  22
CAN  119   0  64  48 109  12  359  25
DFS   41  47   0  52  73  15  123  41
ITA   43  46  49   0  51  14  64  27
ZAF   89 104  58  49   0  20  179  38
NLD   11   8  10  11  14   0  26   9
USA  181 354  87  68 177  27   0  38
CHE   19  21  39  26  36   6  38   0
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JER
-----
common bulls below diagonal
common three quarter sib group above diagonal
      AUS  CAN  DFS  GBR  ITA  USA  ZAF  NLD  CHE
-----
AUS   0  128  68  80  44  220  119  15  22
CAN  132   0  64 112  48  359  134  12  25
DFS   45  47   0  83  52  123  102  15  41
GBR   79 115  74   0  50  143   98  12  40
ITA   43  46  49  50   0  64  57  14  27
USA  208 354  87 149  68   0  233  26  38
ZAF  121 133  81  95  57  240   0  23  38
NLD   11   8  10  10  11  27  19   0   9
CHE   19  21  39  38  26  38  36   6   0
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JER
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common bulls below diagonal
common three quarter sib group above diagonal

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	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0	128	71	81	44	144	220	120	15	22
CAN	132	0	64	112	48	70	359	134	12	25
DFS	47	47	0	85	52	75	123	103	15	41
GBR	80	115	76	0	50	71	143	98	12	40
ITA	43	46	49	50	0	36	64	57	14	27
NZL	143	72	52	72	32	0	142	95	15	24
USA	208	354	87	149	68	150	0	234	26	38
ZAF	122	133	82	95	57	93	241	0	23	38
NLD	11	8	10	10	11	13	27	19	0	9
CHE	19	21	39	38	26	21	38	36	6	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	128	69	81	44	144	220	120	15	22
CAN	132	0	58	112	48	70	359	134	12	25
DFS	45	45	0	76	52	68	116	96	15	41
GBR	80	115	71	0	50	70	143	97	12	40
ITA	43	46	49	50	0	36	64	57	14	27
NZL	143	72	46	71	32	0	142	94	15	24
USA	208	354	82	149	68	150	0	234	26	38
ZAF	122	133	79	94	57	92	241	0	23	38
NLD	11	8	10	10	11	13	27	19	0	9
CHE	19	21	39	38	26	21	38	36	6	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	128	71	81	44	144	220	120	15	22
CAN	132	0	64	112	48	70	359	134	12	25
DFS	47	47	0	85	52	75	123	103	15	41
GBR	80	115	76	0	50	71	143	98	12	40
ITA	43	46	49	50	0	36	64	57	14	27
NZL	143	72	52	72	32	0	142	95	15	24
USA	208	354	87	149	68	150	0	234	26	38
ZAF	122	133	82	95	57	93	241	0	23	38
NLD	11	8	10	10	11	13	27	19	0	9
CHE	19	21	39	38	26	21	38	36	6	0

JER

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE
AUS	0	127	68	80	44	219	118	15	22
CAN	132	0	64	112	48	356	134	12	25
DFS	45	47	0	83	52	123	102	15	41
GBR	79	114	74	0	50	143	98	12	40
ITA	43	46	49	50	0	64	57	14	27
USA	207	352	87	149	68	0	233	26	38
ZAF	121	133	81	95	57	240	0	23	38
NLD	11	8	10	10	11	27	19	0	9
CHE	19	21	39	38	26	38	36	6	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	128	71	81	44	144	220	120	15	22
CAN	132	0	64	112	48	70	359	134	12	25
DFS	47	47	0	85	52	75	123	103	15	41
GBR	80	115	76	0	50	71	143	98	12	40
ITA	43	46	49	50	0	36	64	57	14	27
NZL	143	72	52	72	32	0	142	95	15	24
USA	208	354	87	149	68	150	0	234	26	38
ZAF	122	133	82	95	57	93	241	0	23	38
NLD	11	8	10	10	11	13	27	19	0	9
CHE	19	21	39	38	26	21	38	36	6	0

JER

common bulls below diagonal										
common three quarter sib group above diagonal										
	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE	
AUS	0	128	68	80	44	220	112	15	22	
CAN	132	0	64	112	48	359	123	12	25	
DFS	45	47	0	83	52	123	93	15	41	
GBR	79	115	74	0	50	143	93	12	40	
ITA	43	46	49	50	0	64	57	14	27	
USA	208	354	87	149	68	0	213	26	38	
ZAF	115	124	75	91	57	222	0	23	38	
NLD	11	8	10	10	11	27	19	0	9	
CHE	19	21	39	38	26	38	36	6	0	

JER

common bulls below diagonal										
common three quarter sib group above diagonal										
	AUS	CAN	DFS	NZL	ZAF	NLD	USA	CHE		
AUS	0	103	53	108	94	12	158	22		
CAN	105	0	53	70	120	12	359	25		
DFS	34	42	0	61	85	15	109	41		
NZL	103	72	42	0	81	15	142	24		
ZAF	98	118	68	76	0	23	209	38		
NLD	10	8	10	13	19	0	26	9		
USA	155	354	77	150	210	27	0	38		
CHE	19	21	39	21	36	6	38	0		

JER

common bulls below diagonal										
common three quarter sib group above diagonal										
	AUS	CAN	DFS	GBR	ITA	NZL	USA	NLD	CHE	
AUS	0	128	71	32	44	144	220	15	18	
CAN	132	0	64	37	48	70	359	12	21	
DFS	47	47	0	30	52	75	123	15	39	
GBR	36	43	28	0	14	37	37	4	3	
ITA	43	46	49	15	0	36	64	14	24	
NZL	143	72	52	41	32	0	142	15	20	
USA	208	354	87	40	68	150	0	26	34	
NLD	11	8	10	5	11	13	27	0	7	
CHE	16	19	37	4	24	17	34	5	0	

JER

common bulls below diagonal										
common three quarter sib group above diagonal										
	AUS	CAN	DFS	GBR	NZL	USA	NLD	CHE		

AUS	0	128	69	81	144	220	15	18
CAN	132	0	58	112	70	356	12	21
DFS	45	45	0	76	68	116	15	39
GBR	80	114	71	0	68	143	12	37
NZL	143	72	46	69	0	142	15	20
USA	208	352	82	149	150	0	26	34
NLD	11	8	10	10	13	27	0	7
CHE	16	19	37	35	17	34	5	0

JER

common bulls below diagonal
 common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	USA	NLD	CHE
AUS	0	124	65	80	40	213	14	18
CAN	129	0	64	112	48	359	12	21
DFS	41	47	0	83	52	123	15	39
GBR	79	114	74	0	50	143	12	37
ITA	38	46	49	50	0	64	14	24
USA	201	354	87	149	68	0	26	34
NLD	11	8	10	10	11	27	0	7
CHE	16	19	37	35	24	34	5	0

JER

JER

RDC

common bulls below diagonal
 common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0	25	9	44	10	13	22	14	7	2
CAN	25	0	7	112	60	4	33	133	3	0
DEU	9	7	0	32	0	8	3	0	9	0
DFS	30	111	21	0	43	68	56	65	26	0
GBR	8	59	0	40	0	0	24	48	1	0
NOR	9	4	7	46	0	0	7	0	17	0
NZL	21	31	3	53	21	6	0	21	2	2
USA	13	127	0	60	43	0	20	0	2	0
NLD	7	3	9	26	1	17	2	2	0	0
CAM	2	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	NZL	USA	NLD	CAM	NOR
AUS	0	25	9	44	10	22	14	7	2	4
CAN	25	0	7	112	60	33	133	3	0	1
DEU	9	7	0	32	0	3	0	7	0	3
DFS	30	111	21	0	43	54	65	24	0	26
GBR	8	59	0	40	0	24	48	1	0	0
NZL	21	31	3	51	21	0	21	2	2	2
USA	13	127	0	60	43	20	0	2	0	0
NLD	7	3	7	24	1	2	2	0	0	6
CAM	2	0	0	0	0	2	0	0	0	0
NOR	3	1	2	12	0	2	0	6	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	25	9	44	10	4	22	14	7	2
CAN	25	0	7	112	60	1	33	131	3	0
DEU	9	7	0	32	0	3	3	0	8	0
DFS	30	111	21	0	43	42	54	65	24	0
GBR	8	59	0	40	0	0	24	47	1	0
NOR	3	1	2	24	0	0	3	0	12	0
NZL	21	31	3	51	21	3	0	21	2	2
USA	13	126	0	60	42	0	20	0	2	0
NLD	7	3	8	24	1	12	2	2	0	0
CAM	2	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	USA	NLD	CAM		
AUS	0	25	9	44	10	14	7	2		
CAN	25	0	7	112	60	133	3	0		
DEU	9	7	0	32	0	0	7	0		
DFS	30	111	21	0	43	65	22	0		
GBR	8	59	0	40	0	48	1	0		
USA	13	127	0	60	43	0	2	0		
NLD	7	3	7	22	1	2	0	0		
CAM	2	0	0	0	0	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	25	9	44	10	13	22	14	7	2
CAN	25	0	7	112	60	4	33	133	3	0
DEU	9	7	0	32	0	9	3	0	9	0
DFS	30	111	21	0	43	77	53	65	25	0
GBR	8	59	0	40	0	0	24	48	1	0
NOR	9	4	8	53	0	0	7	0	17	0
NZL	21	31	3	48	21	6	0	21	2	2
USA	13	127	0	60	43	0	20	0	2	0
NLD	7	3	9	25	1	17	2	2	0	0
CAM	2	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	NZL	USA	NLD	CAM	NOR
AUS	0	25	9	44	10	22	14	7	2	4
CAN	25	0	7	112	60	33	133	3	0	1
DEU	9	7	0	32	0	3	0	9	0	3
DFS	30	111	21	0	43	54	65	25	0	26
GBR	8	59	0	40	0	24	48	1	0	0
NZL	21	31	3	51	21	0	21	2	2	2
USA	13	127	0	60	43	20	0	2	0	0
NLD	7	3	9	25	1	2	2	0	0	6
CAM	2	0	0	0	0	2	0	0	0	0
NOR	3	1	2	12	0	2	0	6	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	25	9	44	10	13	22	14	7	2
CAN	25	0	7	112	60	4	33	133	3	0
DEU	9	7	0	32	0	9	3	0	9	0
DFS	30	111	21	0	43	80	56	65	26	0
GBR	8	59	0	40	0	0	24	48	1	0
NOR	9	4	8	55	0	0	7	0	17	0
NZL	21	31	3	53	21	6	0	21	2	2
USA	13	127	0	60	43	0	20	0	2	0
NLD	7	3	9	26	1	17	2	2	0	0
CAM	2	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	NOR	NLD	USA	CAM		
AUS	0	21	9	42	13	7	11	2		
CAN	21	0	7	111	4	3	133	0		
DEU	9	7	0	32	9	7	0	0		
DFS	29	110	21	0	77	23	65	0		
NOR	9	4	8	53	0	17	0	0		
NLD	7	3	7	23	17	0	2	0		
USA	11	127	0	60	0	2	0	0		
CAM	2	0	0	0	0	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	25	6	44	10	13	14	7	2	
CAN	25	0	4	112	60	4	133	3	0	
DEU	6	4	0	20	0	7	0	7	0	
DFS	30	111	13	0	43	77	65	24	0	
GBR	8	59	0	40	0	0	48	1	0	
NOR	9	4	6	53	0	0	0	17	0	
USA	13	127	0	60	43	0	0	2	0	
NLD	7	3	7	24	1	17	2	0	0	
CAM	2	0	0	0	0	0	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	25	9	44	10	13	22	14	7	2
CAN	25	0	7	112	60	4	33	133	3	0
DEU	9	7	0	32	0	9	3	0	7	0
DFS	30	111	21	0	43	80	56	65	24	0
GBR	8	59	0	40	0	0	24	48	1	0
NOR	9	4	8	55	0	0	7	0	17	0
NZL	21	31	3	53	21	6	0	21	2	2
USA	13	127	0	60	43	0	20	0	2	0
NLD	7	3	7	24	1	17	2	2	0	0
CAM	2	0	0	0	0	0	2	0	0	0

RDC

	common bulls below diagonal			common three quarter			sib	group	above diagonal	
AUS	0	25	9	44	10	13	22	14	7	2
CAN	25	0	7	112	60	4	33	133	3	0
DEU	9	7	0	32	0	9	3	0	7	0
DFS	30	111	21	0	43	80	56	65	24	0
GBR	8	59	0	40	0	0	24	48	1	0
NOR	9	4	8	55	0	0	7	0	17	0
NZL	21	31	3	53	21	6	0	21	2	2
USA	13	127	0	60	43	0	20	0	2	0
NLD	7	3	7	24	1	17	2	2	0	0
CAM	2	0	0	0	0	0	2	0	0	0

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0	25	9	44	10	13	22	14	7	2
CAN	25	0	7	112	60	4	33	133	3	0
DEU	9	7	0	32	0	9	3	0	8	0
DFS	30	111	21	0	43	77	54	65	24	0
GBR	8	59	0	40	0	0	24	48	1	0
NOR	9	4	8	53	0	0	7	0	17	0
NZL	21	31	3	50	21	6	0	21	2	2
USA	13	127	0	60	43	0	20	0	2	0
NLD	7	3	8	24	1	17	2	2	0	0
CAM	2	0	0	0	0	0	2	0	0	0

RDC

common bulls below diagonal

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0	25	9	44	10	13	22	14	7	2
CAN	25	0	7	112	60	4	33	133	3	0
DEU	9	7	0	32	0	9	3	0	9	0
DFS	30	111	21	0	43	70	56	65	26	0
GBR	8	59	0	40	0	0	24	48	1	0
NOR	9	4	8	48	0	0	7	0	17	0
NZL	21	31	3	53	21	6	0	21	2	2
USA	13	127	0	60	43	0	20	0	2	0
NLD	7	3	9	26	1	17	2	2	0	0
CAM	2	0	0	0	0	0	2	0	0	0

RDC

common bulls below diagonal

	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM
AUS	0	25	9	44	10	13	14	7	2
CAN	25	0	7	112	60	4	130	3	0
DEU	9	7	0	32	0	9	0	9	0
DFS	30	111	21	0	43	80	65	26	0
GBR	8	59	0	40	0	0	48	1	0
NOR	9	4	8	55	0	0	0	17	0
USA	13	126	0	60	43	0	0	2	0
NLD	7	3	9	26	1	17	2	0	0
CAM	2	0	0	0	0	0	0	0	0

RDC

common bulls below diagonal

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0	25	9	44	10	13	22	14	7	2
CAN	25	0	7	112	60	4	33	133	3	0
DEU	9	7	0	32	0	9	3	0	9	0
DFS	30	111	21	0	43	77	54	65	25	0
GBR	8	59	0	40	0	0	24	48	1	0
NOR	9	4	8	53	0	0	7	0	17	0
NZL	21	31	3	51	21	6	0	21	2	2
USA	13	127	0	60	43	0	20	0	2	0
NLD	7	3	9	25	1	17	2	2	0	0
CAM	2	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   25   9   44   10  13  14   7   2
CAN  25   0   7  112   60   4  131   3   0
DEU   9   7   0   32   0   9   0   9   0
DFS  30  111  21   0   43  74   65  26   0
GBR   8   59   0   40   0   0   47   1   0
NOR   9   4   8   50   0   0   0   17   0
USA  13  126   0   60   42   0   0   2   0
NLD   7   3   9   26   1  17   2   0   0
CAM   2   0   0   0   0   0   0   0   0
-----

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RDC

```

-----
common bulls below diagonal
common three quarter sib group above diagonal
      AUS  CAN  DEU  DFS  NOR  NZL  NLD  USA  CAM
-----
AUS   0   17   9   36   13  18   7   9   2
CAN  17   0   6  106   4  33   3  133   0
DEU   9   6   0   25   9   3   7   0   0
DFS  25  104  18   0   69  49  23  60   0
NOR   9   4   8   48   0   7  17   0   0
NZL  18  31   3  47   6   0   1  21   2
NLD   7   3   7   23  17   1   0   2   0
USA   9  127   0  56   0  20   2   0   0
CAM   2   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   25   9   44   9  14  22  14   7   2
CAN  25   0   7  112   57  4  33  133   3   0
DEU   9   7   0   32   0   9   3   0   9   0
DFS  30  111  21   0   43  82  56  65  26   0
GBR   7   56   0   40   0   0  21  46   1   0
NOR  10   4   8   57   0   0   7   0  17   0
NZL  21  31   3  53  18   6   0  21   2   2
USA  13  127   0  60  41   0  20   0   2   0
NLD   7   3   9   26   1  17   2   2   0   0
CAM   2   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   25   9   44   9  13  22  14   7   2
CAN  25   0   7  112   57  4  33  130   3   0
DEU   9   7   0   32   0   9   3   0   9   0
DFS  30  111  21   0   43  80  56  65  26   0
GBR   7   56   0   40   0   0  21  46   1   0
NOR   9   4   8   55   0   0   7   0  17   0
NZL  21  31   3  53  18   6   0  21   2   2
USA  13  126   0  60  41   0  20   0   2   0
NLD   7   3   9   26   1  17   2   2   0   0
CAM   2   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	24	10	48	9	14	13	9	2
CAN	24	0	7	112	57	4	133	3	0
DEU	10	7	0	33	0	9	0	9	0
DFS	36	111	22	0	43	80	65	26	0
GBR	8	56	0	40	0	0	46	1	0
NOR	10	4	8	55	0	0	0	17	0
USA	13	127	0	60	41	0	0	2	0
NLD	9	3	9	26	1	17	2	0	0
CAM	2	0	0	0	0	0	0	0	0

RDC

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