

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:

GBR (ALL) Base change from 2004/2005 to 2014/2015 affecting means and standard deviation. Drops in daughters due to minor data editings. For RDC some daughters of these bulls were duplicated with some of them having eartag numbers and herd book numbers. Data providers have now correctly eliminated the eartag numbers of these cows, so that only the herd-book numbers are now included.

NZL (HOL) First time with bcs

NZL (ALL) Results based on brand new models which are based on the most recent version of LICâ s genetic evaluation software based on a multiple trait models. The new multiple traits have caused a general drop in reliability. It contains a number of enhancements which result in more accurate genetic evaluations and reduces the time taken to compute genetic evaluations. Implementation of Parent Average Adjustment (PAA), changes to the daughter count for all traits. When the single trait models are combined into a multi trait BV the single trait daughter count that was the greatest (which is always the 2 year old daughter count) was taken into account. The old routine for Fertility and longevity were based on having a record for that trait or a production record, this is now change so that it is a count of that particular trait.

NLD (ALL) Base change, now the cows born in 2015 are the base (it was 2010), New parameters

AUS (ALL) Changed the method for calculation of reliabilities

USA (HOL) Base change

USA (OTH) Introduction of the new base, some type trait PTAs will have moderate to large standard deviation (SD) changes in breeds other than HO. The base SD set previously used an average SD across all years of data, whereas the new methodology uses only cows born 2013-17 to set the 2020 base SD

SVN (ALL) Until now the EBV were limited to the interval(52, 148). We used to reduce all EBV greater than 147 to not exceed 148. We reduced all EBV smaller than 53 to be no less than 52. From now on, we no longer apply such restriction to EBVs.

POL (HOL) Base change

PRT (HOL) Recent update on the Pedigree file as well as routine corrections on the test-day records of the daughters causes drops in information

JPN (HOL) Small decrease in information due to additional records and modification of pedigree.

BEL (HOL) Some change in type of proof due to changes in pedigree information and the fact that the program that determines the type of proof for bulls is based on pedigree information

ITA (HOL, JER) Base change for HOL cut off of 1 year of data causing decreases in information.

CHE (ALL) Base change, small drops in information due to manual editings. For the HOL evaluation we now use MiX99 for the solution of the equation system and ApaX for the approximation of the reliabilities. The change of herd-year-season assignment of certain data records might also explain small changes in EDC and reliabilities for certain bulls. BSW: few bulls missing in this evaluation due to change in status

EST (HOL) Base change

DEU (ALL) performance data: phenotypic data from 2000 onwards (used to be 1990 before), pedigree: sire and maternal grandsire of animals having own performance must be known, breed: breed of animal having own performance must be consistent with the breeds of parents, some bulls have lost daughters (and herds) due to data editing, Base change

CAN (ALL) Base change

FRA (ALL) Base change

INTERBULL CHANGES COMPARED TO THE PREVIOUS 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.

The window so far applied for MAS evaluation have been found too high compared to the within-country genetic correlation between mastitis and SCS available from the literature. It has been an ITC recommendation to adjust the windows for MAS in this test run to make them more in line with the values available from the literature. The recommendation has been approved by the Steering committee. Also, according to the decision taken by ITC in Orlando (2015) to review all windows every five (5) years, an overall review of the windows for all traits will take place during the first half of 2020 with the aim of implementation set for the September 2020 test run.

DATA AND METHOD OF ANALYSIS

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

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

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

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

SCIENTIFIC LITERATURE

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

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

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

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

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

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

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

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

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

NEXT ROUTINE INTERNATIONAL EVALUATION

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

NEXT TEST INTERNATIONAL EVALUATION

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

PUBLICATION OF INTERBULL ROUTINE RUN

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

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

PUBLICATION OF INTERBULL TEST RUN

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

^LTable 1. National evaluation data considered in the Interbull evaluation for conformation traits (April Routine Evaluation 2020).
Number of records for stature by breed

Country	BSW	GUE	HOL	JER	RDC	SIM
AUS		45	3773	721	236	
BEL			1539			
CAN	211	100	11655	730	852	
CHE	2723		3246	42		
CZE			3981			
DEA	3479					
DEU			19310		235	
DFS			11866	1963	6192	

ESP			3799		
EST			729		
FRA	350		16816		
FRM					
GBR	20	216	5914	428	309
HUN			2645		
IRL			1682		
ISR					
ITA	2073		8644	101	
JPN			5626		
KOR			1273		
LTU					
LVA					
NLD	124		14690	43	50
NOR					2366
NZL			6213	3897	587
POL			8552		
PRT			2090		
SVK					
SVN	301		504		
URY					
USA	844	692	32409	4114	253
ZAF			843	537	
HRV					
MEX					
CAM					33
=====					
No.Records	10125	1053	167799	12576	11113
Pub. Proofs	8152	901	135622	10987	11851

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	6.48								
CHE	0.95	12.38							
FRA	0.98	0.96	0.92						
ITA	0.96	0.95	0.95	14.64					
NLD	0.95	0.95	0.96	0.92	4.16				
USA	0.98	0.95	0.97	0.95	0.94	1.65			
DEA	0.97	0.98	0.97	0.96	0.96	0.97	11.31		
SVN	0.92	0.90	0.91	0.93	0.91	0.91	0.92	16.37	
GBR	0.96	0.93	0.96	0.94	0.93	0.96	0.91	0.90	0.77

BSW	cwi								
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	8.93								
CHE	0.89	10.21							
FRA	0.86	0.87	0.95						
ITA	0.81	0.85	0.86	21.95					
NLD	0.91	0.80	0.87	0.70	4.61				
USA	0.90	0.90	0.92	0.85	0.82	0.92			
DEA	0.86	0.82	0.76	0.74	0.82	0.77	11.54		
SVN	0.86	0.86	0.82	0.86	0.80	0.87	0.87	22.90	
GBR	0.91	0.84	0.82	0.72	0.90	0.81	0.77	0.81	1.44

BSW	bde								
	CAN	CHE	FRA	ITA	NLD	DEA	SVN	GBR	USA

CAN	6.74								
CHE	0.85	10.27							
FRA	0.74	0.88	0.90						
ITA	0.78	0.91	0.91	18.14					
NLD	0.83	0.85	0.86	0.85	4.32				
DEA	0.83	0.90	0.92	0.90	0.84	11.28			
SVN	0.79	0.76	0.77	0.84	0.80	0.74	25.66		
GBR	0.86	0.89	0.81	0.85	0.90	0.87	0.85	1.54	
USA	0.73	0.75	0.85	0.78	0.87	0.78	0.79	0.86	0.85

BSW ang

	CAN	CHE	FRA	NLD	USA	GBR			
CAN	8.42								
CHE	0.70	10.95							
FRA	0.88	0.67	0.87						
NLD	0.80	0.68	0.71	3.83					
USA	0.89	0.67	0.78	0.78	1.09				
GBR	0.89	0.77	0.80	0.83	0.90	0.73			

BSW ran

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	6.95								
CHE	0.94	10.65							
FRA	0.97	0.96	0.94						
ITA	0.94	0.93	0.94	23.18					
NLD	0.95	0.92	0.96	0.93	4.45				
USA	0.97	0.94	0.97	0.92	0.95	1.36			
DEA	0.96	0.94	0.95	0.94	0.91	0.97	11.96		
SVN	0.92	0.91	0.92	0.91	0.92	0.92	0.91	21.37	
GBR	0.96	0.94	0.97	0.94	0.97	0.97	0.92	0.93	1.98

BSW rwi

	CAN	CHE	FRA	NLD	USA	DEA	GBR	SVN	ITA
CAN	7.21								
CHE	0.89	10.12							
FRA	0.96	0.86	0.95						
NLD	0.92	0.86	0.93	4.00					
USA	0.91	0.84	0.87	0.81	0.97				
DEA	0.93	0.89	0.93	0.81	0.89	13.36			
GBR	0.93	0.87	0.93	0.89	0.93	0.85	1.36		
SVN	0.91	0.84	0.94	0.87	0.83	0.90	0.88	27.13	
ITA	0.88	0.80	0.89	0.81	0.85	0.86	0.89	0.84	20.17

BSW rls

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	7.38								
CHE	0.92	13.01							
FRA	0.91	0.91	1.03						
ITA	0.91	0.85	0.93	23.81					
NLD	0.88	0.83	0.88	0.85	5.11				
USA	0.94	0.93	0.90	0.86	0.86	0.82			
DEA	0.93	0.92	0.93	0.89	0.82	0.91	12.31		
SVN	0.87	0.83	0.88	0.86	0.83	0.87	0.89	22.20	
GBR	0.84	0.87	0.91	0.82	0.86	0.83	0.89	0.83	1.25

BSW fan

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	8.37								
CHE	0.70	13.77							
FRA	0.75	0.72	1.09						
ITA	0.71	0.85	0.80	22.12					
NLD	0.73	0.69	0.84	0.70	5.24				
USA	0.80	0.72	0.85	0.85	0.81	0.88			
DEA	0.66	0.91	0.66	0.89	0.67	0.66	11.73		
SVN	0.70	0.83	0.71	0.85	0.67	0.70	0.94	24.83	
GBR	0.81	0.70	0.90	0.74	0.88	0.83	0.71	0.70	1.21

BSW hde

	CAN	CHE	FRA	ITA	NLD	DEA	SVN	USA
CAN	8.48							
CHE	0.88	12.61						
FRA	0.81	0.80	1.16					
ITA	0.79	0.83	0.85	22.72				
NLD	0.77	0.74	0.84	0.75	5.24			
DEA	0.78	0.86	0.83	0.92	0.78	12.29		
SVN	0.77	0.76	0.83	0.89	0.75	0.90	30.46	
USA	0.85	0.75	0.86	0.89	0.81	0.76	0.83	0.88

BSW fua

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	7.10								
CHE	0.86	11.82							
FRA	0.89	0.87	0.90						
ITA	0.90	0.83	0.84	20.89					
NLD	0.91	0.85	0.90	0.84	4.55				
USA	0.94	0.86	0.87	0.93	0.87	1.32			
DEA	0.86	0.85	0.94	0.83	0.83	0.85	11.23		
SVN	0.81	0.75	0.84	0.86	0.79	0.79	0.89	21.62	
GBR	0.93	0.85	0.88	0.89	0.91	0.92	0.77	0.72	1.29

BSW ruh

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	7.64								
CHE	0.91	11.76							
FRA	0.87	0.84	0.94						
ITA	0.78	0.86	0.85	13.18					
NLD	0.78	0.85	0.87	0.86	4.22				
USA	0.84	0.84	0.88	0.87	0.87	1.10			
DEA	0.83	0.86	0.89	0.93	0.91	0.86	11.85		
SVN	0.82	0.84	0.80	0.86	0.88	0.81	0.90	19.43	
GBR	0.76	0.81	0.87	0.85	0.88	0.91	0.79	0.79	1.53

BSW ruw

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN
CAN	8.11							
CHE	0.91	11.75						
FRA	0.86	0.86	0.85					
ITA	0.81	0.88	0.79	13.56				
NLD	0.71	0.66	0.79	0.70	4.22			
USA	0.86	0.89	0.85	0.89	0.79	1.03		
DEA	0.84	0.91	0.76	0.95	0.55	0.90	12.36	
SVN	0.81	0.80	0.73	0.83	0.72	0.81	0.81	17.87

BSW	usu								
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	8.06								
CHE	0.90	11.97							
FRA	0.84	0.91	0.90						
ITA	0.89	0.89	0.88	18.75					
NLD	0.83	0.83	0.90	0.83	4.16				
USA	0.84	0.89	0.87	0.87	0.90	1.01			
DEA	0.92	0.92	0.88	0.94	0.78	0.83	11.56		
SVN	0.84	0.83	0.72	0.83	0.69	0.74	0.84	24.24	
GBR	0.81	0.79	0.87	0.88	0.91	0.93	0.75	0.68	3.05

BSW	ude								
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	6.52								
CHE	0.96	12.01							
FRA	0.95	0.95	0.98						
ITA	0.94	0.97	0.95	21.09					
NLD	0.96	0.94	0.95	0.94	3.98				
USA	0.96	0.95	0.96	0.95	0.95	1.23			
DEA	0.93	0.98	0.92	0.97	0.94	0.93	12.05		
SVN	0.93	0.95	0.91	0.97	0.95	0.93	0.95	21.43	
GBR	0.96	0.95	0.96	0.94	0.97	0.96	0.92	0.92	1.80

BSW	ftp								
	CAN	CHE	FRA	NLD	USA	DEA	SVN	GBR	ITA
CAN	7.33								
CHE	0.97	14.00							
FRA	0.97	0.95	0.94						
NLD	0.96	0.95	0.95	5.04					
USA	0.92	0.90	0.88	0.91	1.33				
DEA	0.96	0.99	0.95	0.95	0.90	11.08			
SVN	0.94	0.93	0.92	0.93	0.90	0.92	18.03		
GBR	0.96	0.93	0.90	0.94	0.95	0.91	0.93	1.42	
ITA	0.87	0.85	0.85	0.86	0.88	0.85	0.86	0.88	22.32

BSW	ftl								
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	6.30								
CHE	0.91	14.69							
FRA	0.94	0.95	0.96						
ITA	0.92	0.94	0.95	18.67					
NLD	0.92	0.96	0.92	0.92	4.95				
USA	0.94	0.96	0.95	0.93	0.96	1.77			
DEA	0.90	0.98	0.98	0.96	0.94	0.96	11.12		
SVN	0.91	0.93	0.90	0.93	0.95	0.91	0.93	17.96	
GBR	0.95	0.94	0.93	0.95	0.97	0.97	0.93	0.94	1.44

BSW	rtp								
	CAN	CHE	FRA	ITA	NLD	DEA	SVN	USA	
CAN	6.69								
CHE	0.97	14.58							
FRA	0.96	0.97	0.93						
ITA	0.92	0.95	0.93	21.31					
NLD	0.97	0.96	0.97	0.93	4.69				
DEA	0.96	0.99	0.97	0.96	0.94	12.21			
SVN	0.94	0.93	0.92	0.94	0.95	0.92	17.53		

USA 0.93 0.90 0.92 0.90 0.94 0.90 0.91 1.33

BSW ocs

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	7.81								
CHE	0.86	9.04							
FRA	0.80	0.87	0.98						
ITA	0.83	0.82	0.89	9.54					
NLD	0.76	0.79	0.82	0.78	3.39				
USA	0.85	0.78	0.85	0.83	0.83	0.54			
DEA	0.83	0.91	0.90	0.88	0.77	0.76	10.78		
SVN	0.79	0.78	0.78	0.77	0.78	0.78	0.79	21.85	
GBR	0.82	0.89	0.88	0.82	0.87	0.89	0.82	0.79	1.76

BSW ous

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	8.09								
CHE	0.89	13.51							
FRA	0.88	0.93	0.97						
ITA	0.83	0.90	0.90	10.75					
NLD	0.88	0.87	0.92	0.80	4.33				
USA	0.86	0.89	0.88	0.85	0.87	0.99			
DEA	0.87	0.96	0.90	0.91	0.86	0.90	12.39		
SVN	0.76	0.83	0.77	0.82	0.78	0.84	0.92	20.36	
GBR	0.82	0.85	0.76	0.82	0.77	0.88	0.80	0.76	1.42

BSW ofl

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	8.41								
CHE	0.86	11.45							
FRA	0.68	0.69	1.27						
ITA	0.68	0.72	0.86	16.66					
NLD	0.68	0.68	0.75	0.67	4.24				
USA	0.75	0.68	0.78	0.74	0.67	1.06			
DEA	0.68	0.85	0.69	0.81	0.66	0.66	11.40		
SVN	0.76	0.86	0.68	0.77	0.69	0.73	0.89	28.74	
GBR	0.74	0.78	0.82	0.69	0.73	0.73	0.70	0.68	1.63

BSW ofr

	CAN	CHE	DEA	ITA	SVN	USA	FRA
CAN	7.29						
CHE	0.83	12.02					
DEA	0.88	0.90	11.68				
ITA	0.84	0.91	0.95	18.23			
SVN	0.81	0.82	0.79	0.85	22.69		
USA	0.83	0.85	0.91	0.86	0.79	1.65	
FRA	0.82	0.87	0.93	0.91	0.83	0.90	0.90

BSW tpl

	CAN	CHE	DEA	ITA	SVN	FRA
CAN	6.83					
CHE	0.91	11.89				
DEA	0.92	0.91	11.78			
ITA	0.93	0.92	0.94	24.40		
SVN	0.91	0.89	0.89	0.89	23.41	
FRA	0.97	0.94	0.91	0.91	0.90	1.31

BSW		oru					
	CAN	CHE	DEA	ITA	SVN	USA	FRA
CAN	7.23						
CHE	0.77	16.15					
DEA	0.71	0.87	12.69				
ITA	0.92	0.78	0.75	18.46			
SVN	0.84	0.61	0.64	0.72	27.67		
USA	0.89	0.55	0.46	0.83	0.69	0.97	
FRA	0.90	0.89	0.82	0.89	0.72	0.85	1.09

BSW		rle					
	CHE	DEA	ITA	SVN	USA	FRA	
CHE	11.79						
DEA	0.96	12.41					
ITA	0.83	0.87	20.92				
SVN	0.81	0.83	0.83	27.41			
USA	0.54	0.51	0.78	0.73	0.97		
FRA	0.93	0.93	0.90	0.84	0.74	1.03	

BSW		thp					
	CAN	CHE	DEA	ITA	SVN	USA	FRA
CAN	7.63						
CHE	0.83	11.30					
DEA	0.76	0.85	12.24				
ITA	0.88	0.91	0.83	30.31			
SVN	0.80	0.86	0.85	0.88	37.31		
USA	0.87	0.88	0.70	0.83	0.71	1.36	
FRA	0.89	0.86	0.87	0.85	0.83	0.81	1.02

BSW		hoq					
	CAN	CHE	DEA	ITA	SVN	FRA	
CAN	6.76						
CHE	0.92	11.91					
DEA	0.92	0.89	12.55				
ITA	0.91	0.82	0.87	20.09			
SVN	0.93	0.87	0.90	0.89	22.46		
FRA	0.90	0.83	0.89	0.89	0.90	1.02	

BSW		ful					
	CHE	DEA	ITA	SVN	FRA		
CHE	11.65						
DEA	0.91	12.46					
ITA	0.91	0.96	12.74				
SVN	0.79	0.87	0.86	21.03			
FRA	0.66	0.81	0.74	0.75	0.97		

BSW		udb					
	CHE	DEA	ITA	SVN	FRA		
CHE	11.60						
DEA	0.97	13.26					
ITA	0.93	0.97	26.56				
SVN	0.81	0.85	0.80	25.83			
FRA	0.91	0.88	0.85	0.79	0.95		

BSW tdi					
	CHE	DEA	ITA	SVN	FRA
CHE	15.86				
DEA	0.96	11.41			
ITA	0.94	0.95	21.31		
SVN	0.91	0.92	0.94	17.92	
FRA	0.96	0.96	0.91	0.91	0.93

BSW tth					
	CHE	DEA	ITA	SVN	FRA
CHE	14.37				
DEA	0.97	12.98			
ITA	0.93	0.93	23.26		
SVN	0.88	0.91	0.88	20.09	
FRA	0.93	0.92	0.94	0.88	0.88

GUE sta				
	CAN	GBR	USA	AUS
CAN	6.29			
GBR	0.97	1.23		
USA	0.98	0.96	2.80	
AUS	0.91	0.94	0.91	0.84

GUE cwi				
	CAN	GBR	USA	AUS
CAN	7.00			
GBR	0.92	1.73		
USA	0.87	0.86	1.55	
AUS	0.72	0.80	0.67	0.38

GUE bde				
	CAN	GBR	USA	AUS
CAN	6.19			
GBR	0.87	1.51		
USA	0.75	0.89	1.79	
AUS	0.83	0.80	0.73	0.41

GUE ang				
	CAN	GBR	USA	AUS
CAN	7.91			
GBR	0.89	1.77		
USA	0.88	0.91	1.91	
AUS	0.66	0.77	0.69	0.41

GUE ran				
	CAN	GBR	USA	AUS
CAN	6.54			
GBR	0.97	1.63		
USA	0.97	0.97	2.02	
AUS	0.93	0.96	0.92	0.77

GUE rwi				
	CAN	GBR	USA	AUS
CAN	6.74			
GBR	0.93	1.49		
USA	0.92	0.92	1.74	
AUS	0.88	0.87	0.81	0.63

GUE rls				
	CAN	GBR	USA	AUS
CAN	7.99			
GBR	0.82	1.82		
USA	0.93	0.80	0.91	
AUS	0.75	0.83	0.74	0.35

GUE rlr				
	CAN	USA	AUS	
CAN	7.11			
USA	0.84	0.89		
AUS	0.64	0.57	0.46	

GUE fan				
	CAN	GBR	USA	AUS
CAN	7.74			
GBR	0.79	1.71		
USA	0.84	0.77	0.88	
AUS	0.66	0.79	0.68	0.35

GUE fua				
	CAN	GBR	USA	AUS
CAN	7.17			
GBR	0.94	1.68		
USA	0.92	0.91	1.85	
AUS	0.83	0.81	0.78	0.49

GUE ruh				
	CAN	GBR	USA	AUS
CAN	7.16			
GBR	0.76	2.08		
USA	0.80	0.91	1.50	
AUS	0.78	0.79	0.77	0.44

GUE usu				
	CAN	GBR	USA	AUS
CAN	7.15			
GBR	0.80	1.78		
USA	0.80	0.86	1.35	
AUS	0.81	0.79	0.77	0.38

GUE ude				
	CAN	GBR	USA	AUS

NZL	0.79	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.69	0.70	0.70	0.71	0.38								
ZAF	0.78	0.87	0.84	0.84	0.88	0.87	0.89	0.75	0.92	0.79	0.83	0.85	0.85	0.87	0.70	0.87							
JPN	0.70	0.93	0.73	0.90	0.89	0.81	0.89	0.95	0.86	0.90	0.90	0.94	0.88	0.78	0.69	0.79	1.42						
CZE	0.84	0.83	0.93	0.84	0.94	0.92	0.88	0.70	0.89	0.75	0.83	0.79	0.87	0.92	0.70	0.88	0.78	15.88					
EST	0.77	0.84	0.88	0.85	0.89	0.88	0.89	0.78	0.87	0.77	0.85	0.84	0.85	0.86	0.68	0.81	0.82	0.86	14.10				
IRL	0.82	0.86	0.85	0.88	0.90	0.89	0.88	0.76	0.94	0.83	0.86	0.84	0.83	0.84	0.73	0.89	0.80	0.87	0.80	1.18			
KOR	0.70	0.80	0.70	0.79	0.82	0.82	0.78	0.75	0.75	0.70	0.70	0.73	0.79	0.71	0.70	0.74	0.79	0.78	0.72	0.72	3.36		
PRT	0.78	0.81	0.79	0.78	0.89	0.86	0.83	0.70	0.85	0.77	0.78	0.79	0.84	0.87	0.70	0.83	0.79	0.87	0.78	0.85	0.71	2.01	
SVN	0.79	0.88	0.85	0.89	0.90	0.86	0.92	0.84	0.87	0.83	0.91	0.87	0.86	0.85	0.70	0.80	0.88	0.84	0.85	0.84	0.76	0.77	20.65

HOL ang

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	ZAF	JPN	CZE	EST	IRL	KOR	PRT	SVN	
AUS	0.44																						
BEL	0.60	1.05																					
CAN	0.66	0.75	6.52																				
CHE	0.60	0.77	0.88	11.70																			
DEU	0.64	0.73	0.84	0.77	12.74																		
DFS	0.69	0.85	0.89	0.81	0.85	10.54																	
ESP	0.66	0.76	0.88	0.78	0.73	0.84	0.73																
FRA	0.64	0.83	0.88	0.87	0.80	0.88	0.83	0.95															
GBR	0.78	0.75	0.91	0.80	0.79	0.87	0.81	0.81	1.51														
ITA	0.68	0.74	0.90	0.77	0.79	0.84	0.85	0.81	0.85	1.30													
NLD	0.73	0.61	0.81	0.75	0.60	0.71	0.78	0.67	0.83	0.78	4.47												
USA	0.69	0.76	0.93	0.81	0.86	0.90	0.84	0.85	0.90	0.86	0.75	1.38											
HUN	0.61	0.71	0.76	0.71	0.84	0.78	0.69	0.81	0.71	0.74	0.60	0.79	0.99										
POL	0.60	0.67	0.70	0.66	0.61	0.72	0.78	0.72	0.66	0.79	0.64	0.68	0.60	10.38									
ZAF	0.65	0.79	0.72	0.67	0.76	0.79	0.69	0.73	0.85	0.76	0.61	0.76	0.76	0.61	0.73								
JPN	0.68	0.80	0.90	0.80	0.80	0.90	0.88	0.85	0.86	0.91	0.77	0.88	0.74	0.76	0.77	1.57							
CZE	0.64	0.77	0.82	0.74	0.76	0.85	0.74	0.77	0.75	0.79	0.62	0.77	0.80	0.64	0.66	0.79	15.19						
EST	0.63	0.75	0.65	0.64	0.71	0.80	0.62	0.67	0.63	0.62	0.60	0.64	0.74	0.62	0.71	0.70	0.76	16.21					
IRL	0.74	0.72	0.88	0.77	0.81	0.83	0.80	0.82	0.92	0.83	0.74	0.89	0.73	0.64	0.81	0.86	0.76	0.62	0.74				
KOR	0.70	0.77	0.78	0.73	0.73	0.74	0.77	0.74	0.78	0.74	0.62	0.76	0.74	0.62	0.77	0.84	0.69	0.66	0.75	2.29			
PRT	0.60	0.69	0.78	0.63	0.76	0.78	0.75	0.73	0.78	0.79	0.60	0.80	0.69	0.65	0.69	0.80	0.70	0.62	0.74	0.77	1.26		
SVN	0.70	0.66	0.74	0.76	0.61	0.65	0.70	0.68	0.70	0.74	0.74	0.68	0.61	0.84	0.63	0.71	0.64	0.67	0.64	0.72	0.64	22.79	

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	0.62																							
BEL	0.95	1.63																						
CAN	0.93	0.97	6.11																					
CHE	0.94	0.96	0.96	11.42																				
DEU	0.93	0.97	0.98	0.95	12.20																			
DFS	0.93	0.98	0.98	0.96	0.98	11.62																		
ESP	0.93	0.97	0.97	0.97	0.97	0.96	1.14																	
FRA	0.96	0.98	0.97	0.97	0.97	0.96	0.97	1.07																
GBR	0.96	0.96	0.97	0.95	0.97	0.95	0.96	0.98	1.41															
ITA	0.90	0.95	0.95	0.93	0.96	0.94	0.96	0.96	0.95	1.51														
NLD	0.92	0.96	0.97	0.95	0.98	0.96	0.97	0.96	0.97	0.94	5.06													
USA	0.92	0.95	0.97	0.95	0.96	0.96	0.96	0.96	0.97	0.94	0.96	1.46												
HUN	0.93	0.97	0.95	0.95	0.97	0.96	0.97	0.97	0.95	0.95	0.95	0.94	1.01											
POL	0.91	0.95	0.95	0.94	0.96	0.95	0.96	0.94	0.94	0.95	0.95	0.92	0.95	11.22										
NZL	0.96	0.90	0.90	0.90	0.90	0.90	0.90	0.93	0.94	0.90	0.90	0.90	0.90	0.90	0.34									
ZAF	0.96	0.95	0.93	0.92	0.93	0.93	0.94	0.95	0.94	0.91	0.94	0.92	0.95	0.90	0.92	0.88								
JPN	0.90	0.95	0.97	0.96	0.96	0.97	0.96	0.94	0.92	0.94	0.94	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	0.96	0.94	0.96	0.96	0.95	0.94	0.89	0.90	0.93	14.44						
EST	0.89	0.92	0.93	0.88	0.94	0.93	0.91	0.91	0.92	0.92	0.95	0.91	0.89	0.92	0.86	0.88	0.90	0.93	14.26					
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	0.94	0.91	0.89	0.90	0.88	1.73				
KOR	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.87	0.89	4.90			
SVN	0.91	0.95	0.94	0.93	0.95	0.96	0.94	0.95	0.93	0.94	0.93	0.92	0.92	0.94	0.89	0.89	0.94	0.91	0.90	0.91	0.89	17.91		
PRT	0.90	0.92	0.92	0.91	0.94	0.92	0.94	0.94	0.94	0.93	0.93	0.93	0.93	0.91	0.90	0.90	0.90	0.93	0.89	0.90	0.90	0.93	1.80	

FRA	0.68	0.91	0.84	0.86	0.85	0.82	0.87	1.07														
GBR	0.54	0.65	0.69	0.56	0.65	0.61	0.70	0.64	1.51													
ITA	0.56	0.78	0.81	0.66	0.77	0.74	0.80	0.82	0.70	1.89												
NLD	0.57	0.89	0.88	0.71	0.92	0.91	0.85	0.83	0.65	0.75	4.04											
USA	0.56	0.78	0.87	0.62	0.76	0.82	0.79	0.77	0.68	0.87	0.80	1.79										
HUN	0.60	0.84	0.77	0.76	0.79	0.78	0.75	0.81	0.54	0.77	0.75	0.78	1.06									
POL	0.57	0.81	0.82	0.67	0.78	0.82	0.76	0.80	0.54	0.78	0.74	0.76	0.72	14.91								
ZAF	0.61	0.71	0.55	0.61	0.54	0.55	0.54	0.64	0.54	0.63	0.55	0.70	0.65	0.62	0.73							
JPN	0.63	0.82	0.87	0.77	0.82	0.91	0.79	0.79	0.54	0.68	0.82	0.76	0.74	0.75	0.55	1.89						
CZE	0.58	0.83	0.81	0.69	0.85	0.81	0.78	0.78	0.56	0.82	0.79	0.78	0.78	0.85	0.68	0.72	17.15					
EST	0.56	0.66	0.57	0.56	0.73	0.77	0.60	0.58	0.55	0.55	0.72	0.56	0.56	0.61	0.53	0.74	0.57	14.35				
IRL	0.54	0.55	0.58	0.54	0.55	0.54	0.60	0.56	0.72	0.68	0.56	0.55	0.54	0.55	0.54	0.55	0.54	0.55	0.56	1.67		
KOR	0.58	0.71	0.77	0.64	0.72	0.78	0.80	0.77	0.54	0.69	0.72	0.73	0.65	0.71	0.55	0.77	0.72	0.61	0.55	2.13		
SVN	0.55	0.87	0.78	0.73	0.85	0.86	0.78	0.81	0.55	0.72	0.87	0.79	0.82	0.71	0.55	0.80	0.74	0.66	0.55	0.69	25.83	
PRT	0.57	0.84	0.72	0.66	0.85	0.75	0.75	0.79	0.59	0.71	0.75	0.68	0.71	0.74	0.55	0.64	0.78	0.59	0.54	0.70	0.85	2.51

HOL fan

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT	
AUS	0.38																						
BEL	0.71	2.05																					
CAN	0.65	0.82	7.23																				
CHE	0.69	0.85	0.77	11.71																			
DEU	0.73	0.88	0.82	0.76	12.75																		
DFS	0.65	0.91	0.87	0.76	0.86	12.97																	
ESP	0.68	0.77	0.86	0.68	0.85	0.81	1.02																
FRA	0.81	0.79	0.78	0.72	0.90	0.72	0.85	1.04															
GBR	0.78	0.79	0.82	0.70	0.92	0.76	0.85	0.92	1.44														
ITA	0.65	0.69	0.76	0.66	0.75	0.71	0.75	0.72	0.75	1.62													
NLD	0.73	0.78	0.75	0.70	0.91	0.78	0.79	0.85	0.89	0.73	5.05												
USA	0.67	0.75	0.87	0.68	0.84	0.80	0.85	0.82	0.83	0.85	0.81	1.60											
HUN	0.81	0.77	0.77	0.76	0.87	0.71	0.84	0.91	0.87	0.67	0.81	0.80	1.10										
POL	0.65	0.71	0.75	0.70	0.70	0.71	0.71	0.70	0.68	0.72	0.65	0.75	0.74	12.96									
ZAF	0.87	0.77	0.77	0.75	0.83	0.71	0.79	0.86	0.87	0.71	0.75	0.80	0.87	0.66	0.89								
JPN	0.77	0.77	0.73	0.82	0.81	0.73	0.75	0.79	0.75	0.66	0.79	0.76	0.86	0.65	0.76	2.06							
CZE	0.75	0.86	0.83	0.74	0.91	0.82	0.85	0.88	0.85	0.73	0.81	0.83	0.92	0.73	0.80	0.86	15.96						
EST	0.76	0.72	0.70	0.68	0.80	0.73	0.85	0.83	0.79	0.65	0.83	0.73	0.82	0.65	0.70	0.85	0.84	15.45					
IRL	0.69	0.68	0.73	0.65	0.80	0.67	0.74	0.76	0.90	0.69	0.75	0.72	0.69	0.66	0.74	0.65	0.71	0.67	1.59				
KOR	0.65	0.65	0.72	0.64	0.72	0.65	0.77	0.74	0.72	0.66	0.67	0.74	0.76	0.66	0.66	0.65	0.72	0.66	0.65	1.57			
SVN	0.65	0.66	0.72	0.65	0.74	0.74	0.73	0.65	0.69	0.65	0.65	0.73	0.65	0.66	0.65	0.66	0.71	0.64	0.71	0.65	22.52		
PRT	0.65	0.65	0.65	0.65	0.75	0.65	0.71	0.74	0.67	0.65	0.69	0.73	0.65	0.65	0.67	0.65	0.71	0.72	0.65	0.73	0.71	2.17	

HOL fua

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT	
AUS	0.47																							
BEL	0.77	1.56																						
CAN	0.80	0.77	5.48																					
CHE	0.85	0.80	0.92	11.82																				
DEU	0.77	0.83	0.93	0.85	12.32																			
DFS	0.81	0.84	0.91	0.89	0.89	11.76																		
ESP	0.80	0.78	0.88	0.85	0.83	0.82	0.85																	
FRA	0.82	0.90	0.90	0.87	0.90	0.91	0.84	1.07																
GBR	0.80	0.78	0.95	0.87	0.96	0.87	0.87	0.90	1.35															
ITA	0.73	0.68	0.89	0.82	0.86	0.77	0.85	0.80	0.90	1.33														
NLD	0.78	0.87	0.93	0.90	0.95	0.90	0.86	0.93	0.93	0.82	4.95													
USA	0.76	0.69	0.95	0.86	0.90	0.84	0.89	0.84	0.94	0.94	0.88	1.42												
HUN	0.83	0.74	0.89	0.87	0.87	0.88	0.82	0.85	0.86	0.80	0.86	0.82	1.04											
POL	0.71	0.81	0.85	0.84	0.91	0.87	0.79	0.88	0.88	0.78	0.87	0.80	0.83	11.86										
NZL	0.78	0.77	0.83	0.79	0.84	0.79	0.79	0.86	0.88	0.78	0.84	0.84	0.73	0.77	0.42									
ZAF	0.78	0.78	0.86	0.82	0.89	0.87	0.81	0.84	0.88	0.75	0.86	0.83	0.83	0.77	0.78	0.86								
JPN	0.78	0.74	0.95	0.91	0.89	0.91	0.84	0.86	0.91	0.86	0.89	0.91	0.88	0.85	0.81	0.81	1.50							
CZE	0.81	0.85	0.89	0.86	0.94	0.91	0.80	0.91	0.90	0.77	0.91	0.80	0.92	0.90	0.77	0.91	0.87	14.42						
EST	0.68	0.74	0.80	0.76	0.78	0.83	0.68	0.82	0.78	0.68	0.81	0.70	0.78	0.79	0.70	0.74	0.73	0.80	14.09					

HUN	0.90	0.96	0.90	0.96	0.94	0.95	0.95	0.90	0.92	0.90	0.95	0.90	1.04										
POL	0.93	0.96	0.91	0.96	0.97	0.97	0.96	0.90	0.95	0.92	0.96	0.94	0.95	11.08									
ZAF	0.93	0.93	0.90	0.92	0.92	0.93	0.94	0.90	0.93	0.90	0.92	0.92	0.92	0.93	0.86								
JPN	0.95	0.98	0.94	0.97	0.98	0.98	0.98	0.92	0.97	0.93	0.98	0.97	0.95	0.97	0.95	1.43							
CZE	0.94	0.96	0.92	0.97	0.97	0.97	0.97	0.91	0.96	0.92	0.97	0.95	0.95	0.97	0.93	0.98	14.94						
EST	0.93	0.94	0.90	0.94	0.96	0.96	0.94	0.90	0.93	0.91	0.94	0.91	0.93	0.96	0.90	0.95	0.96	13.69					
IRL	0.93	0.95	0.94	0.91	0.96	0.93	0.94	0.94	0.98	0.93	0.94	0.94	0.90	0.92	0.90	0.94	0.94	0.91	1.74				
KOR	0.92	0.94	0.90	0.94	0.93	0.94	0.95	0.90	0.93	0.90	0.94	0.92	0.93	0.93	0.91	0.95	0.93	0.91	0.90	4.46			
SVN	0.90	0.94	0.90	0.95	0.95	0.94	0.95	0.90	0.95	0.92	0.95	0.92	0.95	0.92	0.90	0.95	0.94	0.93	0.92	0.91	17.84		
PRT	0.90	0.95	0.91	0.93	0.95	0.94	0.93	0.90	0.94	0.91	0.94	0.93	0.91	0.94	0.90	0.94	0.95	0.93	0.93	0.90	0.90	1.90	

HOL rtp

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	POL	NZL	JPN	CZE	EST	IRL	KOR	SVN	PRT	ZAF	HUN
AUS	0.52																						
BEL	0.94	1.39																					
CAN	0.93	0.97	6.09																				
CHE	0.94	0.97	0.98	12.02																			
DEU	0.92	0.96	0.97	0.97	14.06																		
DFS	0.90	0.95	0.95	0.95	0.95	11.02																	
ESP	0.92	0.96	0.97	0.96	0.98	0.96	0.88																
FRA	0.94	0.97	0.98	0.98	0.97	0.96	0.98	1.05															
GBR	0.94	0.96	0.97	0.97	0.97	0.95	0.97	0.98	1.49														
ITA	0.89	0.90	0.89	0.89	0.93	0.92	0.92	0.92	0.91	1.30													
NLD	0.93	0.96	0.98	0.97	0.98	0.97	0.98	0.98	0.98	0.91	5.11												
USA	0.91	0.94	0.95	0.93	0.95	0.97	0.96	0.95	0.97	0.91	0.96	1.60											
POL	0.90	0.93	0.93	0.92	0.96	0.93	0.96	0.94	0.93	0.91	0.95	0.91	11.30										
NZL	0.94	0.95	0.95	0.95	0.95	0.91	0.94	0.96	0.96	0.89	0.95	0.91	0.93	0.47									
JPN	0.94	0.97	0.98	0.97	0.96	0.96	0.97	0.97	0.96	0.91	0.98	0.96	0.93	0.94	1.51								
CZE	0.92	0.97	0.95	0.94	0.96	0.94	0.94	0.94	0.95	0.90	0.94	0.94	0.95	0.93	0.94	15.45							
EST	0.93	0.94	0.94	0.94	0.96	0.92	0.94	0.94	0.95	0.90	0.96	0.91	0.94	0.93	0.94	0.93	13.04						
IRL	0.91	0.94	0.95	0.94	0.95	0.93	0.94	0.96	0.95	0.89	0.94	0.93	0.90	0.94	0.94	0.90	0.89	1.32					
KOR	0.89	0.91	0.93	0.93	0.93	0.93	0.95	0.93	0.90	0.91	0.93	0.91	0.90	0.90	0.94	0.89	0.88	0.90	2.26				
SVN	0.89	0.93	0.94	0.94	0.96	0.92	0.96	0.95	0.94	0.91	0.95	0.92	0.94	0.92	0.91	0.92	0.92	0.91	0.92	14.81			
PRT	0.89	0.90	0.92	0.89	0.92	0.90	0.92	0.90	0.92	0.89	0.90	0.91	0.91	0.90	0.91	0.90	0.89	0.89	0.89	0.92	1.56		
ZAF	0.91	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	0.88	0.89	0.89	0.89	0.92	0.56	
HUN	0.91	0.95	0.94	0.94	0.97	0.95	0.96	0.96	0.96	0.91	0.96	0.95	0.96	0.92	0.94	0.95	0.94	0.91	0.89	0.94	0.92	0.89	1.02

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	0.65																						
BEL	0.59	1.18																					
CAN	0.58	0.75	5.63																				
CHE	0.61	0.78	0.92	11.56																			
DEU	0.58	0.75	0.84	0.85	12.99																		
DFS	0.65	0.75	0.76	0.80	0.86	10.26																	
ESP	0.66	0.75	0.79	0.80	0.85	0.86	0.79																
FRA	0.58	0.75	0.76	0.88	0.86	0.87	0.88	1.10															
GBR	0.67	0.75	0.83	0.91	0.92	0.87	0.87	0.89	1.04														
ITA	0.55	0.75	0.80	0.83	0.82	0.81	0.85	0.87	0.83	0.80													
NLD	0.58	0.75	0.76	0.82	0.89	0.88	0.85	0.85	0.88	0.79	2.88												
USA	0.61	0.75	0.82	0.86	0.88	0.87	0.85	0.87	0.90	0.84	0.86	0.90											
HUN	0.57	0.75	0.79	0.80	0.82	0.75	0.77	0.80	0.82	0.79	0.75	0.78	1.05										
POL	0.56	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	10.88									
NZL	0.78	0.56	0.63	0.63	0.63	0.58	0.61	0.56	0.72	0.56	0.64	0.67	0.57	0.56	0.31								
JPN	0.56	0.81	0.86	0.92	0.77	0.75	0.77	0.83	0.77	0.81	0.77	0.82	0.75	0.75	0.56	0.59							
CZE	0.63	0.75	0.83	0.82	0.87	0.77	0.80	0.79	0.81	0.76	0.78	0.80	0.84	0.75	0.68	0.75	13.46						
EST	0.60	0.76	0.77	0.76	0.78	0.76	0.76	0.76	0.77	0.76	0.76	0.76	0.76	0.76	0.62	0.77	0.76	12.31					
IRL	0.60	0.56	0.70	0.69	0.70	0.65	0.68	0.63	0.79	0.66	0.62	0.66	0.65	0.56	0.61	0.58	0.67	0.60	0.90				
KOR	0.56	0.75	0.74	0.75	0.74	0.74	0.75	0.74	0.75	0.75	0.75	0.74	0.75	0.75	0.56	0.75	0.75	0.77	0.56	6.54			
SVN	0.62	0.81	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.60	0.76	0.76	0.78	0.58	0.77	18.91		
PRT	0.56	0.75	0.75	0.75	0.78	0.78	0.78	0.77	0.80	0.78	0.79	0.76	0.75	0.75	0.56	0.75	0.75	0.76	0.62	0.75	0.76	0.29	

CZE	0.51	0.61	0.59	0.66	0.60	0.65	0.65	0.66	0.72	0.50	0.66	20.61								
IRL	0.58	0.57	0.51	0.66	0.53	0.64	0.69	0.73	0.62	0.64	0.56	0.50	1.67							
KOR	0.57	0.72	0.54	0.54	0.63	0.70	0.67	0.52	0.61	0.58	0.57	0.59	0.51	11.22						
SVN	0.68	0.64	0.57	0.63	0.63	0.65	0.74	0.67	0.62	0.58	0.58	0.66	0.53	0.58	29.35					
PRT	0.50	0.50	0.53	0.61	0.50	0.59	0.53	0.61	0.58	0.52	0.50	0.65	0.51	0.56	0.59	2.31				
EST	0.55	0.54	0.53	0.52	0.53	0.53	0.54	0.54	0.52	0.52	0.52	0.54	0.53	0.57	0.68	0.53	14.22			
HUN	0.69	0.70	0.52	0.68	0.72	0.59	0.75	0.68	0.65	0.65	0.62	0.83	0.51	0.67	0.64	0.58	0.64	1.15		

HOL bcs

	BEL	CHE	DEU	DFS	FRA	GBR	ITA	NLD	USA	CZE	JPN	IRL	KOR	CAN	PRT	ESP	SVN	EST	HUN	NZL
BEL	1.02																			
CHE	0.75	11.74																		
DEU	0.75	0.90	13.36																	
DFS	0.76	0.89	0.95	12.18																
FRA	0.75	0.92	0.94	0.95	1.00															
GBR	0.76	0.91	0.90	0.90	0.93	1.54														
ITA	0.75	0.90	0.95	0.95	0.96	0.90	6.66													
NLD	0.75	0.93	0.95	0.96	0.95	0.91	0.93	5.01												
USA	0.77	0.75	0.77	0.78	0.77	0.75	0.76	0.75	1.38											
CZE	0.76	0.86	0.96	0.95	0.92	0.89	0.94	0.93	0.75	14.49										
JPN	0.81	0.92	0.96	0.96	0.96	0.92	0.96	0.95	0.82	0.94	1.82									
IRL	0.75	0.87	0.81	0.85	0.87	0.93	0.82	0.86	0.75	0.78	0.86	1.02								
KOR	0.76	0.76	0.84	0.86	0.86	0.81	0.84	0.79	0.75	0.85	0.87	0.76	2.49							
CAN	0.75	0.92	0.95	0.94	0.94	0.95	0.93	0.95	0.79	0.94	0.97	0.88	0.84	6.08						
PRT	0.75	0.83	0.87	0.86	0.87	0.87	0.83	0.86	0.75	0.83	0.87	0.78	0.82	0.87	1.94					
ESP	0.76	0.88	0.93	0.94	0.95	0.93	0.92	0.92	0.75	0.92	0.95	0.84	0.87	0.95	0.88	1.06				
SVN	0.76	0.85	0.90	0.91	0.86	0.79	0.88	0.92	0.76	0.90	0.89	0.76	0.79	0.85	0.77	0.86	22.89			
EST	0.77	0.83	0.87	0.87	0.85	0.77	0.87	0.89	0.78	0.84	0.88	0.78	0.78	0.83	0.77	0.77	0.87	12.97		
HUN	0.76	0.87	0.94	0.92	0.92	0.88	0.93	0.90	0.75	0.95	0.92	0.76	0.84	0.92	0.83	0.91	0.85	0.81	0.99	
NZL	0.76	0.88	0.89	0.90	0.90	0.90	0.91	0.86	0.75	0.86	0.91	0.85	0.76	0.89	0.81	0.84	0.81	0.83	0.86	0.15

JER sta

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.55									
CAN	0.89	6.65								
DFS	0.90	0.96	11.76							
GBR	0.91	0.96	0.94	1.08						
ITA	0.89	0.94	0.92	0.94	1.32					
NZL	0.89	0.86	0.88	0.92	0.88	0.36				
USA	0.91	0.97	0.95	0.96	0.93	0.89	1.69			
ZAF	0.88	0.87	0.86	0.93	0.87	0.92	0.87	8.91		
NLD	0.90	0.95	0.97	0.94	0.92	0.87	0.94	0.87	4.69	
CHE	0.90	0.96	0.96	0.95	0.92	0.87	0.94	0.88	0.97	11.25

JER cwi

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.30									
CAN	0.75	6.86								
DFS	0.76	0.85	15.60							
GBR	0.83	0.92	0.84	1.83						
ITA	0.67	0.81	0.71	0.73	1.44					
NZL	0.81	0.69	0.69	0.80	0.67	0.38				
USA	0.76	0.91	0.81	0.84	0.87	0.67	1.04			
ZAF	0.71	0.82	0.72	0.84	0.72	0.80	0.78	8.74		
NLD	0.75	0.91	0.89	0.90	0.71	0.71	0.84	0.81	4.53	
CHE	0.69	0.89	0.87	0.83	0.83	0.69	0.88	0.73	0.86	12.47

JER bde

	AUS	CAN	DFS	GBR	ITA	NZL	ZAF	NLD	USA	CHE
AUS	0.34									
CAN	0.78	5.71								
DFS	0.83	0.86	13.57							
GBR	0.76	0.86	0.84	1.54						
ITA	0.71	0.73	0.75	0.83	1.46					
NZL	0.78	0.71	0.72	0.72	0.72	0.38				
ZAF	0.83	0.75	0.84	0.82	0.74	0.80	8.98			
NLD	0.71	0.83	0.84	0.90	0.87	0.72	0.79	4.19		
USA	0.70	0.72	0.75	0.78	0.90	0.71	0.73	0.87	1.04	
CHE	0.79	0.87	0.89	0.89	0.83	0.74	0.83	0.91	0.86	13.44

JER ang

	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE
AUS	0.35								
CAN	0.65	7.66							
DFS	0.70	0.80	13.21						
GBR	0.79	0.78	0.86	1.23					
ITA	0.67	0.82	0.79	0.85	1.29				
USA	0.72	0.83	0.88	0.84	0.77	1.04			
ZAF	0.62	0.63	0.70	0.81	0.70	0.69	8.87		
NLD	0.71	0.81	0.71	0.82	0.77	0.74	0.65	5.93	
CHE	0.63	0.80	0.71	0.72	0.72	0.73	0.64	0.74	10.16

JER ran

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.37									
CAN	0.91	5.83								
DFS	0.92	0.97	11.43							
GBR	0.96	0.95	0.96	1.16						
ITA	0.91	0.96	0.94	0.94	1.28					
NZL	0.94	0.90	0.90	0.93	0.90	0.30				
USA	0.91	0.95	0.96	0.97	0.93	0.90	1.23			
ZAF	0.91	0.91	0.91	0.93	0.91	0.91	0.90	9.16		
NLD	0.92	0.96	0.96	0.96	0.94	0.90	0.95	0.93	4.85	
CHE	0.93	0.96	0.95	0.94	0.94	0.91	0.93	0.91	0.95	13.00

JER rwi

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.33									
CAN	0.85	6.38								
DFS	0.83	0.91	12.10							
GBR	0.83	0.93	0.86	1.43						
ITA	0.81	0.85	0.83	0.86	1.63					
NZL	0.90	0.85	0.81	0.82	0.81	0.30				
USA	0.80	0.84	0.83	0.86	0.86	0.80	1.02			
ZAF	0.81	0.81	0.81	0.83	0.81	0.80	0.81	9.34		
NLD	0.87	0.94	0.92	0.88	0.81	0.85	0.81	0.81	4.79	
CHE	0.86	0.92	0.85	0.86	0.82	0.82	0.81	0.81	0.92	12.15

JER rls

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.18									
CAN	0.74	5.97								
DFS	0.74	0.95	12.70							
GBR	0.78	0.84	0.80	1.69						
ITA	0.74	0.84	0.83	0.79	1.59					
NZL	0.73	0.73	0.73	0.77	0.74	0.13				

USA	0.73	0.93	0.94	0.89	0.82	0.74	0.96			
ZAF	0.75	0.74	0.73	0.81	0.74	0.90	0.77	12.12		
NLD	0.77	0.91	0.92	0.86	0.86	0.73	0.88	0.77	3.58	
CHE	0.81	0.92	0.86	0.83	0.81	0.75	0.86	0.76	0.90	9.47

JER rlr

	AUS	CAN	DFS	ITA	ZAF	NLD	USA	CHE		
AUS	0.22									
CAN	0.55	6.65								
DFS	0.56	0.75	13.17							
ITA	0.56	0.80	0.66	1.06						
ZAF	0.56	0.58	0.57	0.59	12.85					
NLD	0.56	0.86	0.88	0.73	0.64	4.61				
USA	0.55	0.76	0.67	0.81	0.57	0.75	0.96			
CHE	0.66	0.70	0.65	0.64	0.59	0.71	0.60	12.01		

JER fan

	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE	
AUS	0.23									
CAN	0.66	5.95								
DFS	0.66	0.87	12.72							
GBR	0.76	0.78	0.73	1.46						
ITA	0.66	0.74	0.69	0.74	1.74					
USA	0.65	0.86	0.78	0.85	0.82	0.93				
ZAF	0.71	0.68	0.68	0.89	0.68	0.77	9.82			
NLD	0.70	0.74	0.79	0.87	0.73	0.79	0.72	3.96		
CHE	0.68	0.76	0.79	0.69	0.67	0.69	0.69	0.72	12.28	

JER fua

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.38									
CAN	0.79	5.59								
DFS	0.81	0.86	12.58							
GBR	0.80	0.94	0.85	1.65						
ITA	0.72	0.87	0.79	0.87	1.44					
NZL	0.82	0.73	0.73	0.81	0.74	0.43				
USA	0.78	0.94	0.88	0.92	0.91	0.73	1.63			
ZAF	0.76	0.91	0.86	0.92	0.83	0.75	0.90	11.82		
NLD	0.78	0.92	0.89	0.92	0.83	0.84	0.87	0.87	4.48	
CHE	0.83	0.92	0.84	0.87	0.82	0.75	0.87	0.88	0.90	10.90

JER ruh

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.36									
CAN	0.77	7.05								
DFS	0.77	0.87	10.92							
GBR	0.84	0.81	0.84	1.30						
ITA	0.76	0.79	0.82	0.86	1.38					
NZL	0.76	0.76	0.79	0.80	0.80	0.43				
USA	0.78	0.84	0.90	0.91	0.83	0.78	1.26			
ZAF	0.85	0.75	0.82	0.89	0.81	0.76	0.86	9.36		
NLD	0.76	0.77	0.91	0.88	0.84	0.83	0.86	0.78	4.00	
CHE	0.81	0.91	0.85	0.84	0.79	0.79	0.83	0.78	0.83	12.64

JER usu

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
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AUS	0.40									
CAN	0.81	6.44								
DFS	0.72	0.85	12.97							
GBR	0.83	0.88	0.84	1.82						
ITA	0.70	0.77	0.72	0.80	1.56					
NZL	0.64	0.65	0.65	0.66	0.66	0.42				
USA	0.74	0.85	0.87	0.84	0.79	0.64	0.98			
ZAF	0.78	0.81	0.75	0.82	0.67	0.64	0.79	10.33		
NLD	0.82	0.84	0.88	0.91	0.81	0.65	0.88	0.79	4.85	
CHE	0.77	0.90	0.88	0.80	0.78	0.66	0.84	0.76	0.86	9.77

JER ude

	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE
AUS	0.36								
CAN	0.95	5.38							
DFS	0.94	0.94	12.12						
GBR	0.94	0.97	0.94	1.45					
ITA	0.94	0.94	0.93	0.93	1.37				
USA	0.92	0.96	0.95	0.94	0.95	1.81			
ZAF	0.91	0.91	0.92	0.93	0.91	0.91	10.62		
NLD	0.91	0.96	0.96	0.96	0.94	0.95	0.92	3.94	
CHE	0.95	0.95	0.94	0.94	0.95	0.94	0.91	0.96	9.11

JER ftp

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.47									
CAN	0.91	6.30								
DFS	0.88	0.95	12.87							
GBR	0.92	0.93	0.91	1.35						
ITA	0.86	0.87	0.86	0.86	1.77					
NZL	0.90	0.93	0.87	0.87	0.86	0.31				
USA	0.87	0.96	0.95	0.93	0.87	0.89	1.33			
ZAF	0.87	0.93	0.91	0.93	0.86	0.90	0.90	10.32		
NLD	0.93	0.97	0.94	0.94	0.85	0.90	0.90	0.90	5.59	
CHE	0.93	0.95	0.92	0.92	0.86	0.88	0.90	0.88	0.96	10.37

JER ftl

	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE
AUS	0.34								
CAN	0.92	5.78							
DFS	0.92	0.92	13.99						
GBR	0.93	0.92	0.94	1.43					
ITA	0.91	0.91	0.91	0.93	1.68				
USA	0.92	0.92	0.94	0.97	0.92	1.12			
ZAF	0.94	0.90	0.91	0.94	0.91	0.97	10.98		
NLD	0.94	0.93	0.97	0.97	0.92	0.96	0.93	4.56	
CHE	0.93	0.92	0.94	0.96	0.91	0.94	0.93	0.96	11.87

JER rtp

	AUS	CAN	DFS	NZL	ZAF	NLD	USA	CHE
AUS	0.33							
CAN	0.89	6.39						
DFS	0.90	0.95	12.99					
NZL	0.90	0.96	0.92	0.41				
ZAF	0.89	0.94	0.90	0.90	9.60			
NLD	0.91	0.97	0.96	0.94	0.90	4.89		
USA	0.89	0.91	0.94	0.90	0.89	0.94	1.39	
CHE	0.91	0.98	0.96	0.95	0.93	0.97	0.92	11.61

JER	ocs								
	AUS	CAN	DFS	GBR	ITA	NZL	USA	NLD	CHE
AUS	0.81								
CAN	0.57	6.25							
DFS	0.61	0.76	12.76						
GBR	0.64	0.84	0.84	2.64					
ITA	0.57	0.81	0.79	0.82	0.74				
NZL	0.64	0.59	0.58	0.64	0.59	0.32			
USA	0.65	0.79	0.81	0.87	0.81	0.63	0.88		
NLD	0.60	0.77	0.87	0.88	0.80	0.64	0.84	2.74	
CHE	0.63	0.90	0.79	0.91	0.81	0.63	0.84	0.83	7.66

JER	ous								
	AUS	CAN	DFS	GBR	NZL	USA	NLD	CHE	
AUS	0.81								
CAN	0.69	6.48							
DFS	0.57	0.84	12.87						
GBR	0.76	0.88	0.72	1.42					
NZL	0.81	0.72	0.62	0.74	0.46				
USA	0.66	0.90	0.78	0.85	0.66	1.04			
NLD	0.64	0.88	0.89	0.78	0.75	0.89	4.34		
CHE	0.72	0.92	0.81	0.86	0.69	0.88	0.93	10.64	

JER	ofl								
	AUS	CAN	DFS	GBR	ITA	USA	NLD	CHE	
AUS	6.33								
CAN	0.52	6.01							
DFS	0.42	0.81	13.63						
GBR	0.58	0.72	0.67	1.34					
ITA	0.43	0.73	0.65	0.72	1.10				
USA	0.65	0.82	0.67	0.72	0.76	1.62			
NLD	0.42	0.68	0.66	0.73	0.67	0.67	4.51		
CHE	0.48	0.87	0.72	0.73	0.69	0.74	0.69	10.75	

RDC	sta									
	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0.63									
CAN	0.89	6.35								
DEU	0.90	0.97	13.55							
DFS	0.89	0.97	0.97	8.63						
GBR	0.93	0.96	0.96	0.93	1.30					
NOR	0.92	0.94	0.96	0.98	0.93	13.39				
NZL	0.90	0.90	0.87	0.91	0.92	0.93	0.48			
USA	0.91	0.97	0.95	0.94	0.97	0.93	0.89	2.37		
NLD	0.89	0.95	0.97	0.97	0.94	0.96	0.86	0.93	4.43	
CAM	0.93	0.92	0.92	0.92	0.92	0.93	0.92	0.92	0.92	6.07

RDC	cwi									
	AUS	CAN	DEU	DFS	GBR	NZL	USA	NLD	CAM	NOR
AUS	0.42									
CAN	0.74	7.38								
DEU	0.72	0.87	11.36							
DFS	0.79	0.83	0.89	12.76						
GBR	0.83	0.88	0.89	0.87	1.62					
NZL	0.80	0.70	0.72	0.69	0.82	0.35				

USA	0.69	0.85	0.82	0.83	0.84	0.71	1.29			
NLD	0.75	0.92	0.92	0.89	0.91	0.70	0.82	5.13		
CAM	0.81	0.81	0.81	0.81	0.81	0.82	0.82	0.81	7.05	
NOR	0.83	0.82	0.80	0.83	0.83	0.83	0.83	0.87	0.82	15.16

RDC bde

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0.44									
CAN	0.83	6.16								
DEU	0.80	0.87	9.85							
DFS	0.83	0.84	0.92	11.78						
GBR	0.78	0.86	0.92	0.89	1.57					
NOR	0.83	0.83	0.80	0.89	0.83	14.66				
NZL	0.80	0.71	0.74	0.76	0.75	0.82	0.35			
USA	0.72	0.76	0.88	0.83	0.89	0.83	0.74	1.29		
NLD	0.71	0.83	0.90	0.85	0.91	0.82	0.71	0.90	4.17	
CAM	0.85	0.83	0.84	0.84	0.84	0.84	0.86	0.84	0.84	4.88

RDC ang

	AUS	CAN	DEU	DFS	GBR	USA	NLD	CAM		
AUS	0.49									
CAN	0.65	7.11								
DEU	0.65	0.83	12.73							
DFS	0.67	0.80	0.84	9.11						
GBR	0.77	0.81	0.78	0.83	1.39					
USA	0.69	0.86	0.86	0.85	0.85	1.22				
NLD	0.73	0.81	0.62	0.74	0.83	0.75	4.78			
CAM	0.78	0.76	0.76	0.77	0.75	0.77	0.78	7.10		

RDC ran

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0.42									
CAN	0.92	6.03								
DEU	0.93	0.97	8.99							
DFS	0.92	0.94	0.95	10.04						
GBR	0.95	0.97	0.97	0.95	1.58					
NOR	0.92	0.94	0.92	0.91	0.95	12.16				
NZL	0.94	0.93	0.91	0.91	0.94	0.93	0.28			
USA	0.92	0.98	0.96	0.94	0.97	0.95	0.92	1.69		
NLD	0.92	0.97	0.98	0.96	0.97	0.95	0.90	0.96	5.90	
CAM	0.94	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	5.56

RDC rwi

	AUS	CAN	DEU	DFS	GBR	NZL	USA	NLD	CAM	NOR
AUS	0.41									
CAN	0.88	6.07								
DEU	0.85	0.94	9.69							
DFS	0.87	0.93	0.93	10.48						
GBR	0.88	0.92	0.90	0.88	1.41					
NZL	0.86	0.88	0.82	0.89	0.91	0.33				
USA	0.81	0.91	0.84	0.88	0.94	0.87	1.41			
NLD	0.88	0.94	0.95	0.93	0.89	0.85	0.81	5.96		
CAM	0.89	0.88	0.87	0.89	0.88	0.89	0.88	0.88	6.50	
NOR	0.87	0.89	0.87	0.95	0.88	0.90	0.88	0.90	0.89	13.95

RDC rls

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0.26									
CAN	0.76	6.36								
DEU	0.78	0.94	9.34							
DFS	0.74	0.97	0.94	9.23						
GBR	0.81	0.80	0.86	0.79	1.63					
NOR	0.78	0.90	0.90	0.96	0.83	13.49				
NZL	0.74	0.74	0.74	0.74	0.76	0.78	0.13			
USA	0.73	0.93	0.93	0.94	0.82	0.87	0.74	0.91		
NLD	0.77	0.92	0.92	0.89	0.86	0.81	0.73	0.90	5.15	
CAM	0.83	0.84	0.84	0.83	0.84	0.84	0.82	0.84	0.84	6.39

RDC rlr

	AUS	CAN	DEU	DFS	NOR	NLD	USA	CAM
AUS	0.31							
CAN	0.60	6.48						
DEU	0.61	0.88	9.98					
DFS	0.60	0.84	0.91	10.73				
NOR	0.65	0.77	0.85	0.89	15.15			
NLD	0.56	0.87	0.91	0.89	0.86	4.66		
USA	0.56	0.73	0.76	0.70	0.74	0.80	0.91	
CAM	0.79	0.75	0.74	0.74	0.74	0.74	0.75	6.88

RDC fan

	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM
AUS	0.30								
CAN	0.66	6.35							
DEU	0.72	0.81	14.14						
DFS	0.66	0.73	0.80	9.33					
GBR	0.75	0.79	0.91	0.72	1.63				
NOR	0.71	0.74	0.84	0.66	0.76	14.42			
USA	0.69	0.84	0.84	0.74	0.84	0.76	1.06		
NLD	0.70	0.75	0.89	0.77	0.88	0.69	0.80	4.57	
CAM	0.75	0.76	0.76	0.76	0.76	0.76	0.76	0.76	7.79

RDC fua

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0.45									
CAN	0.78	5.61								
DEU	0.78	0.91	12.42							
DFS	0.78	0.82	0.83	11.69						
GBR	0.79	0.88	0.95	0.87	1.62					
NOR	0.85	0.83	0.76	0.87	0.83	12.84				
NZL	0.76	0.82	0.82	0.73	0.80	0.77	0.36			
USA	0.76	0.93	0.90	0.84	0.92	0.83	0.87	1.51		
NLD	0.79	0.93	0.93	0.89	0.92	0.88	0.84	0.88	4.18	
CAM	0.81	0.83	0.83	0.83	0.83	0.83	0.84	0.84	0.83	6.58

RDC ruh

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0.51									
CAN	0.79	5.69								
DEU	0.82	0.87	14.88							
DFS	0.78	0.88	0.89	10.63						
GBR	0.80	0.77	0.86	0.86	1.46					
NOR	0.79	0.84	0.87	0.87	0.83	12.89				
NZL	0.81	0.76	0.82	0.79	0.92	0.80	0.33			
USA	0.77	0.85	0.89	0.91	0.89	0.85	0.85	1.39		

CAN	0.92	6.20								
DEU	0.91	0.96	14.46							
DFS	0.90	0.94	0.96	12.15						
NOR	0.91	0.93	0.91	0.90	13.71					
NZL	0.93	0.96	0.94	0.90	0.92	0.35				
NLD	0.91	0.98	0.97	0.96	0.91	0.95	5.63			
USA	0.91	0.92	0.95	0.93	0.94	0.91	0.96	1.45		
CAM	0.93	0.94	0.94	0.94	0.94	0.93	0.94	0.94	6.21	

RDC ocs

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0.70									
CAN	0.61	5.35								
DEU	0.60	0.83	20.45							
DFS	0.68	0.76	0.82	10.44						
GBR	0.68	0.81	0.92	0.83	1.60					
NOR	0.66	0.84	0.81	0.76	0.86	11.73				
NZL	0.74	0.61	0.64	0.60	0.68	0.71	0.28			
USA	0.64	0.82	0.89	0.82	0.89	0.86	0.72	0.57		
NLD	0.61	0.76	0.88	0.85	0.88	0.79	0.65	0.86	3.01	
CAM	0.77	0.86	0.86	0.86	0.86	0.86	0.80	0.87	0.86	6.09

RDC ous

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0.67									
CAN	0.72	5.47								
DEU	0.73	0.89	17.33							
DFS	0.60	0.81	0.82	10.99						
GBR	0.84	0.83	0.85	0.74	1.58					
NOR	0.60	0.84	0.83	0.82	0.88	11.24				
NZL	0.83	0.79	0.77	0.71	0.78	0.61	0.36			
USA	0.75	0.91	0.90	0.89	0.88	0.88	0.84	1.01		
NLD	0.67	0.88	0.91	0.89	0.77	0.82	0.79	0.88	4.02	
CAM	0.72	0.89	0.88	0.88	0.89	0.88	0.72	0.90	0.90	6.48

RDC of1

	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM	
AUS	7.30									
CAN	0.42	5.63								
DEU	0.43	0.83	15.93							
DFS	0.42	0.80	0.79	13.26						
GBR	0.43	0.74	0.74	0.69	1.40					
NOR	0.49	0.72	0.75	0.66	0.74	14.83				
USA	0.46	0.75	0.75	0.67	0.72	0.74	1.33			
NLD	0.42	0.69	0.75	0.66	0.74	0.72	0.67	6.41		
CAM	0.56	0.74	0.74	0.74	0.74	0.74	0.74	0.74	6.90	

^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	117	72	116	39	137	103	26	16
CHE	98	0	152	444	63	260	498	56	14
FRA	61	112	0	170	54	90	168	41	13
ITA	97	387	132	0	84	195	535	73	15

NLD	32	59	43	66	0	55	79	28	10
USA	121	231	61	143	41	0	213	28	16
DEA	81	405	124	452	69	171	0	71	12
SVN	23	54	39	71	27	23	66	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	111	43	116	33	137	101	25	16
CHE	95	0	89	389	58	231	435	53	14
FRA	38	61	0	97	35	54	106	32	10
ITA	97	333	73	0	76	195	500	71	15
NLD	29	56	30	62	0	41	73	28	10
USA	121	198	35	143	32	0	195	27	16
DEA	80	346	75	416	67	146	0	69	11
SVN	22	51	31	69	27	22	65	0	7
GBR	12	12	9	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	117	72	116	33	103	19	16	137
CHE	98	0	152	444	62	498	41	14	260
FRA	61	112	0	170	50	168	29	13	90
ITA	97	387	132	0	76	535	55	15	195
NLD	29	59	40	62	0	74	20	10	41
DEA	81	405	124	452	68	0	52	12	213
SVN	17	38	29	52	20	49	0	6	20
GBR	12	12	12	13	8	10	4	0	16
USA	121	231	61	143	32	171	17	14	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	CHE	FRA	NLD	USA	GBR
CAN	0	116	72	22	136	16
CHE	98	0	147	39	258	14
FRA	61	108	0	32	90	13
NLD	19	39	27	0	26	7
USA	120	231	61	21	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	117	72	116	39	137	103	26	16
CHE	98	0	152	444	63	260	498	56	14
FRA	61	112	0	170	54	90	168	41	13
ITA	97	387	132	0	84	195	535	73	15
NLD	32	59	43	66	0	55	79	28	10
USA	121	231	61	143	41	0	213	28	16
DEA	81	405	124	452	69	171	0	71	12
SVN	23	54	39	71	27	23	66	0	7
GBR	12	12	12	13	8	14	10	5	0

BSW

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common bulls below diagonal
common three quarter sib group above diagonal
  CAN  CHE  FRA  NLD  USA  DEA  GBR  SVN  ITA
-----
CAN   0  117  43  39  137  103  16  19  113
CHE  98   0  89  63  260  498  14  42  437
FRA  38  61   0  35  54  106  10  29  97
NLD  32  59  30   0  55  79  10  20  83
USA 121 231  35  41   0  213  16  20  183
DEA  81 405  75  69  171   0  12  52  529
GBR  12  12   9   8  14  10   0   6  15
SVN  17  39  29  20  17  49   4   0  55
ITA  95 381  73  66  131  445  13  52   0

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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  117  72  116  39  137  103  26  16
CHE  98   0  152  444  63  260  498  56  14
FRA  61  112   0  170  54  90  168  41  13
ITA  97 387  132   0  84  195  535  73  15
NLD  32  59  43  66   0  55  79  28  10
USA 121 231  61  143  41   0  213  28  16
DEA  81 405  124  452  69  171   0  71  12
SVN  23  54  39  71  27  23  66   0   7
GBR  12  12  12  13   8  14  10   5   0

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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  117  72  116  32  137  103  26  16
CHE  98   0  152  444  61  260  498  56  14
FRA  61  112   0  170  50  90  168  41  13
ITA  97 387  132   0  75  195  535  73  15
NLD  28  58  40  61   0  40  73  28  10
USA 121 231  61  143  30   0  213  28  16
DEA  81 405  124  452  67  171   0  71  12
SVN  23  54  39  71  27  23  66   0   7
GBR  12  12  12  13   8  14  10   5   0

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BSW

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common bulls below diagonal
common three quarter sib group above diagonal
  CAN  CHE  FRA  ITA  NLD  DEA  SVN  USA
-----
CAN   0  117  72  113  32  103  26  137
CHE  98   0  152  438  61  498  56  260
FRA  61  112   0  169  50  168  41  90
ITA  95 382  132   0  75  529  73  183
NLD  28  58  40  61   0  73  28  40
DEA  81 405  124  445  67   0  71  213
SVN  23  54  39  71  27  66   0  28
USA 121 231  61  131  30  171  23   0

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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  117  43  77  32  137  70  19  16
CHE  98   0  89 273  62  259 304  42  14
FRA  38  61   0  89  34  54  96  29  10
ITA  69 226  66   0  56  99 253  48  12
NLD  28  59  29  51   0  40  61  20  10
USA 121 231  35  72  31   0 116  20  16
DEA  58 239  68 220  56  82   0  50   9
SVN  17  39  29  46  20  17  47   0   6
GBR  12  12   9  10   8  14   8   4   0
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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  117  72 116  33  137 103  26  16
CHE  98   0 152 444  62  260 498  56  14
FRA  61 112   0 170  50  90 168  41  13
ITA  97 387 132   0  76 195 535  73  15
NLD  29  59  40  62   0  41  74  28  10
USA 121 231  61 143  32   0 213  28  16
DEA  81 405 124 452  68 171   0  71  12
SVN  23  54  39  71  27  23  66   0   7
GBR  12  12  12  13   8  14  10   5   0
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BSW

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common bulls below diagonal
common three quarter sib group above diagonal
  CAN  CHE  FRA  ITA  NLD  USA  DEA  SVN
-----
CAN   0  117  72 116  33  137 103  26
CHE  98   0 152 444  62  260 498  56
FRA  61 112   0 170  50  90 168  41
ITA  97 387 132   0  76 195 535  73
NLD  29  59  40  62   0  41  74  28
USA 121 231  61 143  32   0 213  28
DEA  81 405 124 452  68 171   0  71
SVN  23  54  39  71  27  23  66   0
-----

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BSW

```

common bulls below diagonal
common three quarter sib group above diagonal
  CAN  CHE  FRA  ITA  NLD  USA  DEA  SVN  GBR
-----
CAN   0  117  72 116  39  137 103  19  16
CHE  98   0 152 444  63  260 498  41  14
FRA  61 112   0 170  54  90 168  29  13
ITA  97 387 132   0  84 195 535  55  15
NLD  32  59  43  66   0  55  79  20  10
USA 121 231  61 143  41   0 213  20  16
DEA  81 405 124 452  69 171   0  52  12
SVN  17  38  29  52  20  17  49   0   6
GBR  12  12  12  13   8  14  10   4   0
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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
-----

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CAN	0	117	72	116	39	135	103	26	16
CHE	98	0	152	444	63	260	498	56	14
FRA	61	112	0	170	54	90	168	41	13
ITA	97	387	132	0	84	195	535	73	15
NLD	32	59	43	66	0	55	79	28	10
USA	120	231	61	143	41	0	213	28	16
DEA	81	405	124	452	69	171	0	71	12
SVN	23	54	39	71	27	23	66	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	117	72	39	137	92	25	16	105
CHE	98	0	152	63	260	466	54	14	402
FRA	61	112	0	54	90	158	40	13	157
NLD	32	59	43	0	55	73	28	10	75
USA	121	231	61	41	0	188	27	16	153
DEA	73	374	116	67	143	0	69	11	442
SVN	22	52	38	27	22	65	0	7	70
GBR	12	12	12	8	14	10	5	0	15
ITA	88	350	120	62	112	381	68	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	117	72	116	39	137	103	25	16
CHE	98	0	152	444	63	260	498	55	14
FRA	61	112	0	170	54	90	168	40	13
ITA	97	387	132	0	84	193	535	72	15
NLD	32	59	43	66	0	55	79	28	10
USA	121	231	61	142	41	0	213	27	16
DEA	81	405	124	452	69	171	0	70	12
SVN	22	53	38	70	27	22	65	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	117	72	77	28	70	25	137
CHE	98	0	149	273	58	304	54	259
FRA	61	109	0	109	47	116	40	90
ITA	69	226	80	0	55	253	58	99
NLD	25	57	38	51	0	60	27	35
DEA	58	239	79	220	56	0	62	116
SVN	22	52	38	57	27	56	0	26
USA	121	231	61	72	27	82	22	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	111	62	116	39	137	70	19	16
CHE	95	0	114	388	58	231	299	41	14

FRA	56	84	0	136	44	75	105	29	13
ITA	97	331	108	0	82	192	289	55	15
NLD	32	56	38	66	0	55	61	20	10
USA	121	198	54	143	41	0	116	20	16
DEA	58	235	76	255	56	82	0	50	9
SVN	17	38	29	52	20	17	47	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	111	62	116	39	136	103	19	16
CHE	95	0	114	389	58	231	443	41	14
FRA	56	84	0	136	44	75	137	29	13
ITA	97	333	108	0	84	195	528	55	15
NLD	32	56	38	66	0	55	79	20	10
USA	120	198	54	143	41	0	211	20	16
DEA	80	356	102	448	69	167	0	52	12
SVN	17	38	29	52	20	17	49	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	111	62	113	39	137	103	19	16
CHE	95	0	114	388	58	231	443	42	14
FRA	56	84	0	135	44	75	137	29	13
ITA	95	332	108	0	83	183	523	55	15
NLD	32	56	38	66	0	55	79	20	10
USA	121	198	54	131	41	0	211	20	16
DEA	80	356	102	442	69	167	0	52	12
SVN	17	39	29	52	20	17	49	0	6
GBR	12	12	12	13	8	14	10	4	0

BSW

BSW

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	CHE	DEA	ITA	SVN	USA	FRA
CAN	0	111	102	78	19	145	44
CHE	94	0	437	273	41	230	89
DEA	81	353	0	294	52	207	106
ITA	70	225	245	0	48	99	89
SVN	17	38	49	46	0	20	29
USA	122	198	166	72	17	0	54
FRA	39	61	75	66	29	35	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	CHE	DEA	ITA	SVN	FRA
CAN	0	118	104	120	26	75
CHE	97	0	498	444	55	152

DEA	81	405	0	534	71	168
ITA	98	387	451	0	72	170
SVN	23	54	66	71	0	41
FRA	62	112	124	132	39	0

BSW

common bulls below diagonal
 common three quarter sib group above diagonal

	CAN	CHE	DEA	ITA	SVN	USA	FRA
CAN	0	111	80	78	19	145	44
CHE	94	0	334	273	41	230	89
DEA	68	266	0	260	51	144	98
ITA	70	225	227	0	48	99	89
SVN	17	38	48	46	0	20	29
USA	122	198	106	72	17	0	54
FRA	39	61	70	66	29	35	0

BSW

common bulls below diagonal
 common three quarter sib group above diagonal

	CHE	DEA	ITA	SVN	USA	FRA
CHE	0	480	273	41	259	150
DEA	390	0	293	52	198	164
ITA	226	244	0	48	99	109
SVN	38	49	46	0	20	29
USA	231	155	72	17	0	89
FRA	111	122	80	29	61	0

BSW

common bulls below diagonal
 common three quarter sib group above diagonal

	CAN	CHE	DEA	ITA	SVN	USA	FRA
CAN	0	68	54	59	15	77	32
CHE	58	0	334	273	35	230	89
DEA	43	266	0	260	46	144	98
ITA	53	225	227	0	40	99	89
SVN	13	33	43	39	0	18	26
USA	68	198	106	72	15	0	54
FRA	27	61	70	66	26	35	0

BSW

common bulls below diagonal
 common three quarter sib group above diagonal

	CAN	CHE	DEA	ITA	SVN	FRA
CAN	0	118	104	117	25	75
CHE	97	0	498	438	53	152
DEA	81	405	0	528	70	168
ITA	96	382	444	0	70	169
SVN	22	52	65	69	0	40
FRA	62	112	124	132	38	0

BSW

common bulls below diagonal
 common three quarter sib group above diagonal

	CHE	DEA	ITA	SVN	FRA
CHE	0	497	441	41	149

DEA	404	0	534	52	167
ITA	384	451	0	54	168
SVN	39	49	52	0	29
FRA	111	123	132	29	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CHE	DEA	ITA	SVN	FRA
CHE	0	270	248	40	102
DEA	224	0	252	50	115
ITA	210	220	0	48	108
SVN	38	47	46	0	29
FRA	74	78	80	29	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CHE	DEA	ITA	SVN	FRA
CHE	0	497	435	54	149
DEA	404	0	528	70	167
ITA	379	444	0	71	167
SVN	53	65	70	0	40
FRA	111	123	132	38	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CHE	DEA	ITA	SVN	FRA
CHE	0	303	271	54	85
DEA	238	0	253	62	94
ITA	224	220	0	58	88
SVN	53	56	57	0	32
FRA	60	67	65	31	0

GUE

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	GBR	USA	AUS
CAN	0	22	63	18
GBR	19	0	74	11
USA	52	73	0	22
AUS	19	9	19	0

GUE

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	GBR	USA	AUS
CAN	0	22	63	18
GBR	19	0	74	11
USA	52	73	0	22
AUS	19	9	19	0

GUE

common bulls below diagonal

common three quarter sib group above diagonal

	CAN	GBR	USA	AUS
CAN	0	22	63	18
GBR	19	0	74	11
USA	52	73	0	22
AUS	19	9	19	0

GUE

common bulls below diagonal

common three quarter sib group above diagonal

	CAN	GBR	USA	AUS
CAN	0	22	63	18
GBR	19	0	74	11
USA	52	73	0	22
AUS	19	9	19	0

GUE

common bulls below diagonal

common three quarter sib group above diagonal

	CAN	GBR	USA	AUS
CAN	0	22	63	18
GBR	19	0	74	11
USA	52	73	0	22
AUS	19	9	19	0

GUE

common bulls below diagonal

common three quarter sib group above diagonal

	CAN	GBR	USA	AUS
CAN	0	22	63	18
GBR	19	0	74	11
USA	52	73	0	22
AUS	19	9	19	0

GUE

common bulls below diagonal

common three quarter sib group above diagonal

	CAN	GBR	USA	AUS
CAN	0	22	63	18
GBR	19	0	74	11
USA	52	73	0	22
AUS	19	9	19	0

GUE

common bulls below diagonal

common three quarter sib group above diagonal

	CAN	USA	AUS
CAN	0	35	10
USA	33	0	5
AUS	11	4	0

GUE

common bulls below diagonal

common three quarter sib group above diagonal

	CAN	GBR	USA	AUS
CAN	0	22	63	18
GBR	19	0	74	11
USA	52	73	0	22
AUS	19	9	19	0

GUE

common bulls below diagonal
 common three quarter sib group above diagonal

	CAN	GBR	USA	AUS
CAN	0	22	63	18
GBR	19	0	74	11
USA	52	73	0	22
AUS	19	9	19	0

GUE

common bulls below diagonal
 common three quarter sib group above diagonal

	CAN	GBR	USA	AUS
CAN	0	22	63	18
GBR	19	0	74	11
USA	52	73	0	22
AUS	19	9	19	0

GUE

common bulls below diagonal
 common three quarter sib group above diagonal

	CAN	GBR	USA	AUS
CAN	0	22	63	18
GBR	19	0	74	11
USA	52	73	0	22
AUS	19	9	19	0

GUE

common bulls below diagonal
 common three quarter sib group above diagonal

	CAN	GBR	USA	AUS
CAN	0	22	61	17
GBR	19	0	74	11
USA	51	73	0	22
AUS	18	9	19	0

GUE

common bulls below diagonal
 common three quarter sib group above diagonal

	CAN	GBR	USA	AUS
CAN	0	22	63	18
GBR	19	0	74	11
USA	52	73	0	22
AUS	19	9	19	0

GUE

common bulls below diagonal
 common three quarter sib group above diagonal

	CAN	GBR	USA	AUS
CAN	0	22	63	18
GBR	19	0	74	11
USA	52	73	0	22
AUS	19	9	19	0

GUE

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	AUS	USA
CAN	0	7	63
AUS	8	0	9
USA	52	8	0

GUE

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	GBR	USA	AUS
CAN	0	12	63	18
GBR	9	0	33	11
USA	52	31	0	22
AUS	19	9	19	0

GUE

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	GBR	USA	AUS
CAN	0	20	61	17
GBR	17	0	72	10
USA	51	71	0	22
AUS	18	8	19	0

GUE

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	GBR	USA	AUS
CAN	0	20	63	21
GBR	17	0	72	12
USA	52	71	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	462	817	433	728	723	582	766	818	664	835	996	440	513	480	298	526	497	81	395	288	111	471
BEL	399	0	592	483	765	621	533	711	674	638	955	703	382	507	271	241	396	488	79	380	228	141	485
CAN	733	560	0	795	1664	1083	1182	1233	1412	1588	1202	2847	833	986	359	375	1090	964	126	411	603	163	844
CHE	370	483	635	0	852	570	518	560	656	679	772	857	364	492	243	217	377	466	69	334	242	113	436
DEU	392	649	613	574	0	1824	1235	1889	1527	2069	2106	2387	906	1418	397	351	1059	1419	180	514	473	248	866
DFS	469	542	766	482	839	0	883	1380	1273	1284	1546	1585	695	1046	449	381	762	1007	137	518	400	192	749

ESP	439	510	693	411	556	604	0	1027	985	1181	972	1402	659	812	308	365	792	784	111	395	435	157	716
FRA	459	649	680	462	639	581	662	0	1343	1435	1704	2169	767	1234	475	354	1049	1071	125	511	446	158	729
GBR	677	679	1410	628	761	851	786	726	0	1441	1519	1916	738	1008	465	392	836	945	130	682	450	181	812
ITA	526	623	1267	595	1016	956	845	695	1190	0	1485	2271	868	1225	361	362	963	1152	156	470	542	214	895
NLD	683	1051	1033	728	1164	1104	809	849	1237	1199	0	2044	757	1182	577	378	856	1244	167	629	419	206	857
USA	808	597	2767	745	843	951	863	962	1709	1646	1569	0	1085	1428	528	463	1605	1406	172	527	752	188	1073
HUN	303	305	717	285	525	481	491	441	587	699	546	959	0	666	267	296	561	781	97	318	385	125	552
POL	326	402	689	343	729	655	498	620	732	869	864	1134	497	0	299	284	686	978	151	373	442	197	738
NZL	383	210	305	201	239	284	249	231	364	285	512	441	201	184	0	206	310	315	38	331	172	57	284
ZAF	274	205	348	188	247	294	331	247	362	314	339	487	248	207	186	0	304	298	47	234	220	71	308
JPN	263	212	354	198	232	278	273	248	317	324	300	409	222	216	142	189	0	690	94	314	450	119	529
CZE	311	362	638	325	827	569	526	607	659	819	1035	1011	657	653	205	219	200	0	115	376	431	182	674
EST	38	48	54	32	85	63	45	44	58	75	98	100	55	81	16	20	20	61	0	57	59	47	97
IRL	359	367	388	327	366	411	378	400	735	440	570	486	264	273	271	221	177	285	29	0	185	88	357
KOR	201	159	534	168	219	258	296	221	332	446	271	836	302	319	117	172	202	297	24	131	0	85	398
SVN	78	115	119	81	218	154	114	106	138	183	179	143	92	158	42	50	56	133	28	66	53	0	136
PRT	356	486	846	378	587	639	676	574	747	855	844	1093	527	677	220	292	250	557	61	307	335	109	0

HOL

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT
AUS	0	455	817	433	728	722	593	624	818	664	780	996	440	511	480	248	525	497	81	395	286	111	474
BEL	398	0	585	480	760	614	545	635	666	633	899	686	379	503	267	210	386	486	79	377	227	141	486
CAN	733	560	0	795	1663	1083	1191	1057	1412	1588	1128	2847	833	985	359	322	1088	964	126	411	599	163	846
CHE	370	482	635	0	852	570	526	509	656	679	749	857	364	490	243	194	376	466	69	334	241	113	437
DEU	392	649	613	574	0	1824	1259	1752	1526	2069	2065	2387	906	1412	397	316	1057	1419	180	514	470	248	866
DFS	469	541	766	482	839	0	905	1194	1271	1283	1467	1584	694	1041	448	327	761	1007	137	516	398	192	752
ESP	448	534	701	420	587	625	0	947	1006	1198	961	1421	668	828	320	320	797	800	115	408	436	161	733
FRA	413	602	620	423	566	548	654	0	1182	1371	1353	1722	713	1141	384	268	881	1017	122	451	406	157	690
GBR	677	679	1410	628	761	851	815	671	0	1441	1452	1914	738	1006	465	336	834	945	130	679	448	181	814
ITA	526	623	1267	595	1016	956	873	667	1190	0	1460	2271	868	1225	361	339	961	1152	156	470	537	214	896
NLD	651	989	976	704	1142	1080	808	716	1183	1178	0	1808	736	1158	550	315	784	1227	165	615	399	206	841
USA	808	596	2767	745	843	950	880	758	1709	1646	1325	0	1085	1426	528	394	1603	1406	172	525	746	188	1076
HUN	303	305	717	285	525	481	500	423	587	699	529	959	0	665	267	268	561	781	97	318	381	125	555
POL	326	402	689	343	729	655	516	577	731	869	853	1134	497	0	299	258	685	978	151	373	439	197	740
NZL	383	210	305	201	239	284	258	202	364	285	490	441	201	184	0	169	310	315	38	331	171	57	285
ZAF	234	188	304	172	228	270	292	207	311	302	280	402	231	199	149	0	257	277	46	197	200	71	292
JPN	260	208	350	195	229	275	271	237	311	321	291	403	220	214	141	174	0	689	94	314	446	119	530
CZE	311	362	638	325	827	569	547	572	659	819	1019	1011	657	653	205	207	198	0	115	376	429	182	676
EST	38	48	54	32	85	63	48	44	58	75	97	100	55	81	16	20	20	61	0	57	59	47	97
IRL	359	367	388	327	366	411	396	369	733	440	556	486	264	273	271	190	176	285	29	0	183	88	358
KOR	200	159	531	168	219	258	297	212	331	444	260	829	299	317	117	156	199	296	24	131	0	84	396
SVN	78	115	119	81	218	154	120	106	138	183	177	143	92	158	42	50	56	133	28	66	52	0	136
PRT	357	488	848	378	587	641	694	566	750	855	831	1093	531	680	220	282	246	559	61	308	333	109	0

HOL

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	PRT	SVN
AUS	0	461	817	433	728	720	583	765	818	664	808	995	440	512	476	298	526	497	81	395	286	474	84
BEL	399	0	592	483	765	620	536	711	674	638	931	703	382	507	271	241	396	488	79	380	227	487	109
CAN	733	560	0	795	1664	1083	1185	1233	1412	1588	1171	2847	833	986	359	375	1090	964	126	411	600	846	137
CHE	370	483	635	0	852	570	520	561	656	679	764	857	364	492	243	217	377	466	69	334	241	437	87
DEU	392	649	613	574	0	1824	1240	1890	1527	2069	2092	2387	906	1418	397	351	1059	1419	180	514	471	866	213
DFS	469	542	766	482	839	0	886	1379	1272	1283	1504	1584	694	1045	448	381	762	1007	137	517	398	753	159
ESP	440	513	694	413	563	607	0	1030	987	1184	961	1405	660	815	310	365	792	787	113	396	432	721	128
FRA	459	649	679	463	640	581	665	0	1343	1435	1589	2169	767	1234	475	354	1049	1071	125	511	443	734	133
GBR	677	679	1410	628	761	851	789	725	0	1441	1490	1915	738	1008	465	392	836	945	130	680	449	816	147
ITA	526	623	1267	595	1016	956	850	694	1190	0	1477	2271	868	1225	361	362	963	1152	156	470	539	896	182
NLD	679	1026	1026	727	1162	1103	811	826	1225	1198	0	1916	748	1173	564	368	822	1240	166	622	412	854	166
USA	807	597	2767	745	843	950	865	961	1709	1646	1527	0	1085	1428	528	463	1605	1406	172	526	748	1076	156

HUN	303	305	717	285	525	481	492	440	587	699	546	959	0	666	267	296	561	781	97	318	383	555	107
POL	326	402	689	343	729	655	500	620	732	869	863	1134	497	0	299	284	686	978	151	373	440	740	171
NZL	383	210	305	201	239	284	250	231	364	285	510	441	201	184	0	206	310	315	38	331	171	285	46
ZAF	274	205	348	188	247	294	332	247	362	314	337	487	248	207	186	0	304	298	47	234	219	308	52
JPN	261	210	352	196	230	276	271	245	314	322	296	406	220	214	141	188	0	690	94	314	448	531	95
CZE	311	362	638	325	827	569	528	607	659	819	1035	1011	657	653	205	219	198	0	115	376	430	677	153
EST	38	48	54	32	85	63	46	44	58	75	98	100	55	81	16	20	20	61	0	57	59	97	43
IRL	359	367	388	327	366	411	379	400	733	440	567	486	264	273	271	221	176	285	29	0	184	358	65
KOR	200	159	532	168	219	258	295	220	332	445	268	831	301	318	117	171	200	296	24	131	0	397	71
PRT	357	487	848	378	587	641	681	578	749	855	843	1093	530	680	220	292	248	559	61	308	334	0	109
SVN	61	88	102	66	192	128	94	90	112	156	146	121	78	138	35	37	41	113	24	52	45	89	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	447	817	417	726	722	596	624	814	663	418	993	439	507	295	525	493	79	393	286	465	83
BEL	396	0	577	456	747	603	542	631	652	630	548	670	373	493	231	381	476	77	370	222	474	108
CAN	733	555	0	758	1662	1079	1193	1056	1408	1587	748	2846	833	984	371	1087	963	125	410	599	840	137
CHE	366	458	605	0	770	556	519	504	642	658	485	800	356	470	214	375	444	66	331	239	422	86
DEU	391	646	613	522	0	1809	1266	1751	1524	2067	1250	2381	902	1407	347	1056	1411	178	513	470	848	212
DFS	469	536	766	472	835	0	907	1188	1259	1277	848	1571	689	1028	378	758	996	134	515	398	734	158
ESP	450	536	702	417	602	633	0	953	1008	1202	616	1426	669	831	368	800	800	115	409	436	730	130
FRA	413	602	620	418	566	548	665	0	1181	1370	767	1720	712	1139	299	881	1017	120	450	406	676	133
GBR	677	670	1410	617	760	851	820	671	0	1438	816	1906	734	996	387	833	938	127	671	448	799	146
ITA	526	623	1266	579	1015	956	880	667	1189	0	992	2270	868	1219	358	960	1150	154	469	537	883	181
NLD	396	600	736	449	828	772	531	530	762	903	0	950	453	810	204	413	823	126	336	263	537	157
USA	807	588	2766	690	842	950	882	758	1708	1645	812	0	1083	1421	458	1603	1397	171	522	745	1060	156
HUN	303	303	717	280	525	481	504	423	586	699	334	958	0	663	294	561	779	97	315	381	549	107
POL	326	396	689	323	728	651	524	577	728	867	682	1133	497	0	280	684	969	149	370	439	729	170
ZAF	271	203	345	184	244	291	332	214	359	311	180	483	247	204	0	301	293	45	232	217	304	50
JPN	260	208	350	195	229	275	271	237	311	321	217	403	220	214	185	0	689	94	313	446	527	95
CZE	311	357	638	312	824	563	552	572	657	819	787	1008	657	648	217	198	0	110	373	429	664	152
EST	38	47	54	32	84	62	50	44	58	75	79	100	55	80	20	20	59	0	55	59	95	42
IRL	359	365	388	323	365	411	399	369	726	440	336	486	264	272	219	176	285	29	0	183	351	65
KOR	200	159	531	167	219	258	297	212	331	444	186	828	299	317	170	199	296	24	131	0	396	71
PRT	357	482	848	368	584	633	695	566	748	853	544	1091	530	672	290	246	551	60	308	333	0	109
SVN	61	88	102	65	192	128	97	90	112	156	145	121	78	138	35	41	112	24	52	45	89	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	462	817	433	728	723	581	766	818	664	835	996	440	513	480	298	526	497	81	395	288	111	474
BEL	399	0	592	483	765	621	530	711	674	638	955	703	382	507	271	241	396	488	79	380	228	141	486
CAN	733	560	0	795	1664	1083	1180	1233	1412	1588	1202	2847	833	986	359	375	1090	964	126	411	603	163	846
CHE	370	483	635	0	852	570	517	560	656	679	772	857	364	492	243	217	377	466	69	334	242	113	437
DEU	392	649	613	574	0	1824	1229	1889	1527	2069	2106	2387	906	1418	397	351	1059	1419	180	514	473	248	866
DFS	469	542	766	482	839	0	878	1380	1273	1284	1546	1585	695	1046	449	381	762	1007	137	518	400	192	752
ESP	438	507	691	409	549	599	0	1023	980	1176	967	1397	658	809	307	365	789	782	111	394	434	157	717
FRA	459	649	679	462	639	580	656	0	1343	1435	1704	2169	767	1234	475	354	1049	1071	125	511	446	158	733
GBR	677	679	1410	628	761	851	780	725	0	1441	1519	1916	738	1008	465	392	836	945	130	682	450	181	816
ITA	526	623	1267	595	1016	956	839	694	1190	0	1485	2271	868	1225	361	362	963	1152	156	470	542	214	896
NLD	683	1051	1033	728	1164	1104	803	848	1237	1199	0	2044	757	1182	577	378	856	1244	167	629	419	206	858
USA	808	597	2767	745	843	950	858	961	1709	1646	1569	0	1085	1428	528	463	1605	1406	172	527	752	188	1075
HUN	303	305	717	285	525	481	491	440	587	699	546	959	0	666	267	296	561	781	97	318	385	125	554
POL	326	402	689	343	729	655	494	620	732	869	864	1134	497	0	299	284	686	978	151	373	442	197	739
NZL	383	210	305	201	239	284	248	231	364	285	512	441	201	184	0	206	310	315	38	331	172	57	285
ZAF	274	205	348	188	247	294	331	247	362	314	339	487	248	207	186	0	304	298	47	234	220	71	308
JPN	262	210	352	196	230	276	271	246	315	322	298	407	220	214	141	188	0	690	94	314	450	119	531
CZE	311	362	638	325	827	569	524	607	659	819	1035	1011	657	653	205	219	199	0	115	376	431	182	676
EST	38	48	54	32	85	63	45	44	58	75	98	100	55	81	16	20	20	61	0	57	59	47	97

IRL	359	367	388	327	366	411	377	400	735	440	570	486	264	273	271	221	176	285	29	0	185	88	358
KOR	201	159	534	168	219	258	294	221	332	446	271	836	302	319	117	172	201	297	24	131	0	85	398
SVN	78	115	119	81	218	154	114	106	138	183	179	143	92	158	42	50	56	133	28	66	53	0	136
PRT	357	486	848	378	587	640	675	577	749	855	845	1093	529	679	220	292	248	558	61	308	335	109	0

HOL

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	PRT	SVN
AUS	0	431	802	427	721	715	572	760	804	649	822	979	432	505	478	296	325	493	80	393	285	471	83
BEL	391	0	571	476	745	600	513	664	643	629	866	656	367	495	256	229	286	474	79	365	218	479	109
CAN	716	550	0	795	1664	1083	1181	1233	1412	1588	1199	2847	833	986	359	375	786	964	126	411	599	846	137
CHE	365	479	635	0	852	570	517	561	656	679	770	857	364	492	243	217	295	466	69	334	240	437	87
DEU	387	644	613	574	0	1824	1230	1890	1527	2069	2104	2387	906	1418	397	351	834	1419	180	514	470	866	213
DFS	464	537	766	482	839	0	880	1380	1273	1284	1538	1585	695	1046	449	381	534	1007	137	518	397	753	159
ESP	433	501	693	409	551	601	0	1024	982	1178	965	1399	659	810	307	365	609	783	111	394	431	718	128
FRA	456	637	679	463	640	581	659	0	1343	1435	1693	2169	767	1234	475	354	712	1071	125	511	442	734	133
GBR	665	662	1410	628	761	851	783	725	0	1441	1516	1916	738	1008	465	392	595	945	130	682	448	816	147
ITA	514	623	1267	595	1016	956	842	694	1190	0	1484	2271	868	1225	361	362	823	1152	156	470	538	896	182
NLD	673	954	1033	728	1163	1104	804	849	1236	1199	0	2037	757	1181	576	378	610	1244	166	628	414	859	166
USA	790	582	2767	745	843	950	861	961	1709	1646	1566	0	1085	1428	528	463	1084	1406	172	527	746	1076	156
HUN	300	301	717	285	525	481	491	440	587	699	546	959	0	666	267	296	443	781	97	318	382	555	107
POL	320	399	689	343	729	655	496	620	732	869	864	1134	497	0	299	284	581	978	151	373	439	740	171
NZL	381	204	305	201	239	284	249	231	364	285	512	441	201	184	0	206	196	315	38	331	170	285	46
ZAF	272	202	347	187	246	293	330	246	361	313	338	486	247	206	186	0	206	298	47	234	218	308	52
JPN	220	182	312	177	208	246	228	215	266	297	255	348	192	204	117	143	0	547	82	226	363	417	92
CZE	308	360	638	325	827	569	525	607	659	819	1035	1011	657	653	205	219	180	0	115	376	429	677	153
EST	38	48	54	32	85	63	45	44	58	75	98	100	55	81	16	20	20	61	0	57	59	97	43
IRL	358	361	388	327	366	411	377	400	735	440	570	486	264	273	271	220	152	285	29	0	183	358	65
KOR	199	159	533	168	219	258	295	220	332	445	271	831	301	318	117	171	185	296	24	131	0	396	71
PRT	355	484	848	378	587	641	677	578	749	855	846	1093	530	680	220	291	218	559	61	308	334	0	109
SVN	61	88	102	66	192	128	93	90	112	156	146	121	78	138	35	37	41	113	24	52	45	89	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	462	817	433	728	723	585	766	818	664	835	996	440	513	480	298	525	497	81	395	285	111	474
BEL	399	0	592	483	765	621	537	711	674	638	955	703	382	507	271	241	394	488	79	380	227	141	487
CAN	733	560	0	795	1664	1083	1186	1233	1412	1588	1202	2847	833	986	359	375	1088	964	126	411	598	163	847
CHE	370	483	635	0	852	570	520	560	656	679	772	857	364	492	243	217	376	466	69	334	241	113	437
DEU	392	649	613	574	0	1824	1242	1889	1527	2069	2106	2387	906	1418	397	351	1057	1419	180	514	470	248	867
DFS	469	542	766	482	839	0	890	1380	1273	1284	1546	1585	695	1046	449	381	761	1007	137	518	398	192	754
ESP	441	515	695	414	566	610	0	1032	990	1186	978	1406	660	816	312	366	792	788	113	397	431	158	722
FRA	459	649	679	462	639	581	668	0	1343	1435	1704	2169	767	1234	475	354	1047	1071	125	511	440	158	735
GBR	677	679	1410	628	761	851	792	725	0	1441	1519	1916	738	1008	465	392	834	945	130	682	448	181	816
ITA	526	623	1267	595	1016	956	853	694	1190	0	1485	2271	868	1225	361	362	961	1152	156	470	536	214	897
NLD	683	1051	1033	728	1164	1104	816	848	1237	1199	0	2044	757	1182	577	378	854	1244	167	629	414	206	860
USA	808	597	2767	745	843	951	867	961	1709	1646	1569	0	1085	1428	528	463	1603	1406	172	527	744	188	1077
HUN	303	305	717	285	525	481	493	440	587	699	546	959	0	666	267	296	561	781	97	318	381	125	556
POL	326	402	689	343	729	655	501	620	732	869	864	1134	497	0	299	284	686	978	151	373	439	197	741
NZL	383	210	305	201	239	284	252	231	364	285	512	441	201	184	0	206	310	315	38	331	171	57	285
ZAF	274	205	348	188	247	294	333	247	362	314	339	487	248	207	186	0	303	298	47	234	219	71	308
JPN	260	208	350	195	229	275	269	243	311	321	294	403	220	214	141	186	0	689	94	314	446	119	531
CZE	311	362	638	325	827	569	530	607	659	819	1035	1011	657	653	205	219	198	0	115	376	429	182	677
EST	38	48	54	32	85	63	46	44	58	75	98	100	55	81	16	20	20	61	0	57	59	47	97
IRL	359	367	388	327	366	411	380	400	735	440	570	486	264	273	271	221	176	285	29	0	183	88	358
KOR	200	159	531	168	219	258	294	218	331	444	269	828	299	317	117	171	199	296	24	131	0	84	395
SVN	78	115	119	81	218	154	116	106	138	183	179	143	92	158	42	50	56	133	28	66	52	0	136
PRT	357	488	848	378	587	641	684	578	751	857	848	1096	533	681	220	292	246	560	61	308	334	109	0

HOL

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common bulls below diagonal
common three quarter sib group above diagonal

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	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT
AUS	0	410	703	418	695	669	539	485	752	645	702	880	417	457	246	462	374	79	371	199	108	457
BEL	389	0	542	465	721	571	504	544	613	619	807	624	357	463	201	351	398	76	342	173	138	469
CAN	655	539	0	760	1603	987	1118	907	1318	1565	1064	2653	811	935	312	965	831	123	381	496	160	829
CHE	367	469	620	0	852	569	522	470	656	679	739	857	362	467	195	368	389	69	325	193	110	433
DEU	388	627	611	574	0	1823	1246	1545	1525	2070	2043	2386	902	1382	318	1031	1226	180	497	406	245	865
DFS	464	528	763	482	839	0	886	982	1267	1282	1430	1583	690	992	329	718	822	137	491	313	191	748
ESP	432	502	684	415	572	615	0	825	989	1192	928	1406	661	787	321	758	686	113	386	355	159	725
FRA	354	519	550	389	529	493	572	0	974	1250	1157	1381	632	1068	227	729	842	111	368	326	150	610
GBR	651	641	1337	627	761	849	799	571	0	1440	1403	1907	735	963	338	787	793	129	637	363	178	810
ITA	522	618	1263	595	1016	956	860	616	1189	0	1455	2271	866	1200	340	947	1046	156	462	468	211	894
NLD	612	892	956	699	1143	1075	781	655	1159	1181	0	1713	719	1108	311	752	1078	165	566	329	203	831
USA	747	572	2654	745	843	950	870	627	1708	1646	1292	0	1082	1376	397	1471	1199	172	499	613	185	1070
HUN	298	292	711	285	525	481	495	380	586	699	532	959	0	639	269	546	665	97	304	327	123	555
POL	312	385	668	330	713	631	478	570	709	859	829	1104	479	0	245	650	877	150	336	392	194	719
ZAF	236	187	303	173	229	271	293	173	314	303	281	405	232	191	0	250	237	46	194	155	70	292
JPN	255	207	348	195	229	274	265	215	307	321	288	396	219	208	174	0	578	92	287	360	119	524
CZE	258	307	560	269	723	489	435	462	547	739	924	859	548	597	171	183	0	108	297	359	173	605
EST	38	47	54	32	85	63	46	40	58	75	97	100	55	80	20	20	56	0	55	54	47	97
IRL	350	352	385	324	364	409	383	311	701	438	540	480	262	260	191	175	230	29	0	130	87	344
KOR	141	135	443	142	188	215	232	193	257	384	214	676	251	295	114	167	252	22	97	0	76	339
SVN	77	112	118	80	216	154	117	102	137	181	176	142	91	157	50	56	129	28	66	50	0	135
PRT	354	478	827	375	588	639	687	521	748	856	826	1092	532	669	282	245	500	61	305	289	109	0

HOL

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common bulls below diagonal
common three quarter sib group above diagonal

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	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT
AUS	0	434	817	433	476	721	593	761	818	664	799	996	438	511	298	525	496	79	394	286	109	478
BEL	396	0	568	474	575	595	528	656	641	628	857	654	366	493	229	371	472	77	364	219	140	482
CAN	733	550	0	794	1287	1083	1191	1217	1412	1588	1156	2847	830	982	375	1088	959	124	411	599	161	850
CHE	370	479	635	0	642	569	526	554	655	677	759	856	363	490	217	375	464	69	334	241	112	440
DEU	315	522	531	459	0	1232	991	1290	1092	1686	1517	1708	680	1147	231	755	1061	154	353	380	225	664
DFS	469	536	766	482	701	0	905	1352	1271	1282	1490	1583	691	1041	381	761	1002	135	517	398	190	757
ESP	448	526	701	420	453	625	0	1037	1006	1198	975	1421	665	825	370	796	797	113	408	436	159	737
FRA	458	632	679	462	481	580	697	0	1328	1433	1534	2128	763	1224	353	1033	1066	123	505	437	157	736
GBR	677	662	1410	628	603	851	815	725	0	1441	1473	1913	736	1003	391	833	941	129	676	448	180	818
ITA	526	623	1267	594	854	956	873	694	1190	0	1469	2271	867	1223	362	961	1152	156	470	537	213	898
NLD	674	950	1020	725	927	1100	834	806	1216	1196	0	1872	739	1157	366	812	1231	164	615	408	204	853
USA	807	582	2767	745	671	950	880	925	1709	1646	1511	0	1082	1422	463	1602	1402	171	525	744	186	1078
HUN	303	300	717	285	402	479	500	440	587	699	543	959	0	663	295	560	777	95	317	381	123	556
POL	326	398	689	342	633	652	515	620	730	869	855	1134	495	0	283	684	972	148	371	438	194	741
ZAF	274	203	348	188	165	294	335	247	362	314	333	487	248	207	0	302	297	47	234	219	71	312
JPN	260	208	350	195	195	275	270	242	310	321	291	402	220	214	185	0	686	93	314	447	117	534
CZE	311	358	638	324	653	568	547	607	658	819	1032	1011	655	650	219	198	0	112	376	429	180	676
EST	38	47	54	32	72	62	48	44	57	75	97	100	54	78	20	20	59	0	56	59	46	96
IRL	359	361	388	327	280	411	396	400	729	440	566	486	264	273	221	176	285	29	0	183	87	359
KOR	200	159	531	168	192	258	295	218	331	444	265	822	299	317	171	199	296	24	131	0	84	397
SVN	78	114	119	81	207	152	120	106	138	183	178	143	91	156	50	56	132	27	66	52	0	135
PRT	359	488	851	381	492	644	699	580	755	858	846	1100	535	683	293	246	562	60	309	335	109	0

HOL

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common bulls below diagonal
common three quarter sib group above diagonal

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	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	455	817	433	728	722	593	715	818	664	780	996	440	512	480	298	525	497	81	395	286	111	474
BEL	398	0	587	482	761	616	547	686	668	635	901	688	379	504	267	239	387	486	79	378	227	141	487
CAN	733	560	0	795	1663	1083	1191	1155	1412	1588	1128	2847	833	986	359	375	1088	964	126	411	601	163	847

CHE	370	482	635	0	852	570	526	553	656	679	749	857	364	492	243	217	376	466	69	334	241	113	437
DEU	392	649	613	574	0	1824	1259	1871	1527	2069	2066	2387	906	1417	397	351	1057	1419	180	514	472	248	867
DFS	469	541	766	482	839	0	905	1301	1272	1283	1467	1584	694	1045	448	381	761	1007	137	517	399	192	754
ESP	448	534	701	420	587	625	0	1011	1007	1198	962	1421	668	829	320	370	797	800	115	408	437	161	733
FRA	457	645	676	462	638	578	697	0	1288	1426	1499	1969	753	1223	442	339	969	1062	124	493	426	158	727
GBR	677	679	1410	628	761	851	815	720	0	1441	1453	1915	738	1008	465	392	834	945	130	680	449	181	816
ITA	526	623	1267	595	1016	956	873	693	1190	0	1460	2271	868	1225	361	362	961	1152	156	470	540	214	897
NLD	651	989	977	704	1142	1079	808	795	1184	1178	0	1810	736	1160	550	359	784	1227	165	615	401	206	842
USA	808	596	2767	745	843	951	880	890	1709	1646	1325	0	1085	1428	528	463	1603	1406	172	526	749	188	1077
HUN	303	305	717	285	525	481	500	439	587	699	529	959	0	666	267	296	561	781	97	318	384	125	556
POL	326	402	689	343	729	655	516	620	732	869	855	1134	497	0	299	284	686	978	151	373	441	197	741
NZL	383	210	305	201	239	284	258	229	364	285	490	441	201	184	0	206	310	315	38	331	171	57	285
ZAF	274	205	348	188	247	294	335	245	362	314	319	487	248	207	186	0	303	298	47	234	219	71	308
JPN	260	208	350	195	229	275	271	243	311	321	291	403	220	214	141	186	0	689	94	314	447	119	531
CZE	311	362	638	325	827	569	547	605	659	819	1019	1011	657	653	205	219	198	0	115	376	430	182	677
EST	38	48	54	32	85	63	48	44	58	75	97	100	55	81	16	20	20	61	0	57	59	47	97
IRL	359	367	388	327	366	411	396	398	733	440	555	486	264	273	271	221	176	285	29	0	184	88	358
KOR	200	159	532	168	219	258	297	219	332	445	261	831	301	318	117	171	199	296	24	131	0	84	397
SVN	78	115	119	81	218	154	120	106	138	183	177	143	92	158	42	50	56	133	28	66	52	0	136
PRT	357	488	848	378	587	641	694	576	750	856	832	1094	532	681	220	292	246	559	61	308	334	109	0

HOL

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT
AUS	0	455	817	433	728	676	586	762	818	664	809	996	440	513	480	298	526	497	81	395	286	111	473
BEL	398	0	587	482	761	605	536	697	668	635	916	688	379	504	267	239	388	486	79	378	227	141	486
CAN	733	560	0	795	1664	1005	1187	1218	1412	1588	1171	2847	833	986	359	375	1089	964	126	411	601	163	844
CHE	370	482	635	0	852	551	522	558	656	679	764	857	364	492	243	217	376	466	69	334	241	113	437
DEU	392	649	613	574	0	1773	1244	1885	1527	2069	2092	2387	906	1418	397	351	1058	1419	180	514	472	248	864
DFS	469	541	766	482	839	0	849	1270	1214	1270	1470	1491	678	1025	421	354	708	977	135	500	386	192	743
ESP	441	516	696	415	567	611	0	1022	992	1187	965	1408	661	818	313	368	794	789	113	398	434	158	721
FRA	459	648	679	462	638	580	670	0	1330	1433	1582	2130	765	1231	471	353	1035	1068	124	506	440	158	730
GBR	677	678	1409	628	760	850	791	724	0	1441	1490	1915	738	1008	465	392	835	945	130	680	449	181	814
ITA	526	623	1267	595	1016	955	854	694	1189	0	1477	2271	868	1225	361	362	962	1152	156	470	540	214	895
NLD	679	1021	1026	727	1162	1103	815	824	1224	1198	0	1916	748	1173	564	368	821	1240	166	622	413	206	853
USA	808	596	2767	745	843	950	868	926	1709	1646	1527	0	1085	1428	528	463	1604	1406	172	526	750	188	1074
HUN	303	305	717	285	525	481	494	440	587	699	546	959	0	666	267	296	561	781	97	318	384	125	555
POL	326	402	689	343	729	655	503	620	732	869	863	1134	497	0	299	284	686	978	151	373	441	197	738
NZL	383	210	305	201	239	284	252	231	364	285	510	441	201	184	0	206	310	315	38	331	171	57	285
ZAF	274	205	348	188	247	294	334	247	362	314	337	487	248	207	186	0	304	298	47	234	219	71	307
JPN	260	209	351	195	230	276	271	244	312	322	294	404	220	214	141	187	0	690	94	314	448	119	531
CZE	311	362	638	325	827	569	531	607	659	819	1035	1011	657	653	205	219	198	0	115	376	430	182	676
EST	38	48	54	32	85	63	46	44	58	75	98	100	55	81	16	20	20	61	0	57	59	47	96
IRL	359	367	388	327	366	411	381	400	733	440	567	486	264	273	271	221	176	285	29	0	184	88	358
KOR	200	159	533	168	219	258	296	220	332	445	268	832	301	318	117	172	200	296	24	131	0	84	397
SVN	78	115	119	81	218	154	116	106	138	183	179	143	92	158	42	50	56	133	28	66	52	0	136
PRT	357	487	848	378	587	638	683	578	749	855	843	1093	530	680	220	292	247	559	61	308	334	109	0

HOL

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT
AUS	0	455	817	433	728	723	596	766	818	664	835	996	440	513	480	298	525	497	81	395	285	111	474
BEL	398	0	587	482	761	617	549	700	668	635	924	688	379	504	267	239	387	486	79	378	227	141	487
CAN	733	560	0	795	1664	1083	1193	1233	1412	1588	1202	2847	833	986	359	375	1088	964	126	411	598	163	847
CHE	370	482	635	0	852	570	526	560	656	679	772	857	364	492	243	217	376	466	69	334	241	113	437
DEU	392	649	613	574	0	1824	1267	1889	1527	2069	2106	2387	906	1418	397	351	1057	1419	180	514	470	248	867
DFS	469	541	767	482	839	0	911	1380	1273	1284	1546	1585	695	1046	449	381	761	1007	137	518	398	192	754
ESP	449	537	702	420	600	632	0	1055	1011	1202	1007	1426	670	836	322	370	800	804	116	410	435	161	737
FRA	459	648	679	462	639	581	709	0	1343	1435	1704	2169	767	1234	475	354	1047	1071	125	511	440	158	735
GBR	677	679	1410	628	761	851	820	725	0	1441	1519	1916	738	1008	465	392	834	945	130	682	448	181	816

ITA	526	623	1267	595	1016	956	880	694	1190	0	1485	2271	868	1225	361	362	961	1152	156	470	536	214	897
NLD	683	1028	1033	728	1164	1104	850	848	1237	1199	0	2044	757	1182	577	378	854	1244	167	629	414	206	860
USA	808	596	2767	745	843	952	882	961	1709	1646	1569	0	1085	1428	528	463	1603	1406	172	527	743	188	1077
HUN	303	305	717	285	525	482	503	440	587	699	546	959	0	666	267	296	561	781	97	318	381	125	556
POL	326	402	689	343	729	655	523	620	732	869	864	1134	497	0	299	284	686	978	151	373	439	197	741
NZL	383	210	305	201	239	284	259	231	364	285	512	441	201	184	0	206	310	315	38	331	171	57	285
ZAF	274	205	348	188	247	295	335	247	362	314	339	487	248	207	186	0	303	298	47	234	219	71	308
JPN	260	208	350	195	229	275	271	243	311	321	294	403	220	214	141	186	0	689	94	314	446	119	531
CZE	311	362	638	325	827	569	550	607	659	819	1035	1011	657	653	205	219	198	0	115	376	429	182	677
EST	38	48	54	32	85	63	49	44	58	75	98	100	55	81	16	20	20	61	0	57	59	47	97
IRL	359	367	388	327	366	411	398	400	735	440	570	486	264	273	271	221	176	285	29	0	183	88	358
KOR	200	159	531	168	219	258	296	218	331	444	269	827	299	317	117	171	199	296	24	131	0	84	395
SVN	78	115	119	81	218	154	120	106	138	183	179	143	92	158	42	50	56	133	28	66	52	0	136
PRT	357	488	848	378	587	641	697	578	751	857	848	1096	533	681	220	292	246	560	61	308	334	109	0

HOL

common bulls below diagonal																						
common three quarter											sib group above diagonal											
AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT	
AUS	0	458	817	433	728	722	583	766	818	664	835	996	440	513	298	526	497	81	394	286	111	474
BEL	397	0	587	481	759	616	532	704	668	637	947	697	379	504	238	392	486	79	375	224	141	486
CAN	733	556	0	795	1664	1083	1183	1233	1412	1588	1202	2847	833	986	375	1090	964	126	411	600	163	846
CHE	370	481	635	0	852	570	518	560	656	679	772	857	364	492	217	377	466	69	334	241	113	437
DEU	392	648	613	574	0	1824	1235	1889	1527	2069	2106	2387	906	1418	351	1059	1419	180	514	471	248	866
DFS	469	541	767	482	839	0	884	1380	1273	1284	1546	1585	695	1046	381	762	1007	137	518	398	192	753
ESP	439	509	693	411	557	604	0	1027	986	1181	973	1402	659	813	365	792	785	112	396	432	157	720
FRA	459	647	679	462	639	581	661	0	1343	1435	1704	2169	767	1234	354	1049	1071	125	511	443	158	734
GBR	677	675	1410	628	761	851	786	725	0	1441	1519	1916	738	1008	392	836	945	130	679	449	181	816
ITA	526	623	1267	595	1016	956	846	694	1190	0	1485	2271	868	1225	362	963	1152	156	470	539	214	896
NLD	683	1040	1033	728	1164	1104	809	848	1237	1199	0	2044	757	1182	378	856	1244	167	629	416	206	859
USA	807	593	2767	745	843	952	863	961	1709	1646	1569	0	1085	1428	463	1605	1406	172	527	748	188	1076
HUN	303	304	717	285	525	482	491	440	587	699	546	959	0	666	296	561	781	97	318	383	125	555
POL	326	402	689	343	729	655	498	620	732	869	864	1134	497	0	284	686	978	151	373	440	197	740
ZAF	274	205	348	188	247	295	331	247	362	314	339	487	248	207	0	304	298	47	234	219	71	308
JPN	262	210	352	196	230	276	271	246	315	322	298	407	220	214	188	0	690	94	314	448	119	531
CZE	311	362	638	325	827	569	526	607	659	819	1035	1011	657	653	219	199	0	115	376	430	182	677
EST	38	48	54	32	85	63	45	44	58	75	98	100	55	81	20	20	61	0	57	59	47	97
IRL	359	366	388	327	366	411	378	400	732	440	570	486	264	273	221	176	285	29	0	184	88	358
KOR	200	159	533	168	219	258	295	220	332	445	271	832	301	318	172	200	296	24	131	0	84	397
SVN	78	115	119	81	218	154	114	106	138	183	179	143	92	158	50	56	133	28	66	52	0	136
PRT	357	486	848	378	587	641	679	578	749	855	846	1093	530	680	292	248	559	61	308	334	109	0

HOL

common bulls below diagonal																							
common three quarter											sib group above diagonal												
AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT	
AUS	0	455	817	433	728	723	586	766	818	664	835	996	440	513	480	298	526	497	81	395	286	109	474
BEL	398	0	587	482	761	617	536	700	668	635	924	688	379	504	267	239	389	486	79	378	227	139	487
CAN	733	560	0	795	1664	1083	1186	1233	1412	1589	1202	2847	833	986	359	375	1090	964	126	411	601	161	846
CHE	370	482	635	0	852	570	521	560	656	679	772	857	364	492	243	217	377	466	69	334	241	111	437
DEU	392	649	613	574	0	1824	1243	1889	1527	2070	2106	2387	906	1418	397	351	1059	1419	180	514	472	246	866
DFS	469	541	767	482	839	0	890	1380	1273	1284	1546	1585	695	1046	449	381	762	1007	137	518	399	191	753
ESP	441	516	695	414	566	610	0	1033	991	1186	979	1407	660	817	313	367	793	788	113	397	433	157	722
FRA	459	648	679	462	639	581	669	0	1343	1436	1704	2169	767	1234	475	354	1049	1071	125	511	444	156	734
GBR	677	679	1410	628	761	851	792	725	0	1442	1519	1916	738	1008	465	392	836	945	130	682	449	179	816
ITA	526	623	1267	595	1016	956	853	694	1190	0	1485	2272	868	1225	361	362	963	1152	156	470	540	212	896
NLD	683	1028	1033	728	1164	1104	816	848	1237	1199	0	2044	757	1182	577	378	856	1244	167	629	418	204	859
USA	808	596	2767	745	843	951	867	961	1709	1646	1569	0	1085	1428	528	463	1605	1406	172	527	750	186	1076
HUN	303	305	717	285	525	482	493	440	587	699	546	959	0	666	267	296	561	781	97	318	384	123	555
POL	326	402	689	343	729	655	502	620	732	869	864	1134	497	0	299	284	686	978	151	373	441	195	740
NZL	383	210	305	201	239	284	252	231	364	285	512	441	201	184	0	206	310	315	38	331	171	57	285
ZAF	274	205	348	188	247	295	333	247	362	314	339	487	248	207	186	0	304	298	47	234	219	70	308

JPN	261	210	352	196	230	276	271	245	314	322	297	406	220	214	141	188	0	690	94	314	448	118	531
CZE	311	362	638	325	827	569	530	607	659	819	1035	1011	657	653	205	219	198	0	115	376	430	180	677
EST	38	48	54	32	85	63	46	44	58	75	98	100	55	81	16	20	20	61	0	57	59	46	97
IRL	359	367	388	327	366	411	380	400	735	440	570	486	264	273	271	221	176	285	29	0	184	87	358
KOR	200	159	533	168	219	258	295	220	332	445	271	832	301	318	117	172	200	296	24	131	0	83	397
SVN	78	114	119	81	217	154	116	106	138	182	178	142	91	157	42	50	56	133	28	66	52	0	135
PRT	357	487	848	378	587	641	682	578	749	855	846	1093	530	680	220	292	248	559	61	308	334	109	0

HOL

common bulls below diagonal

common three quarter sib group above diagonal

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT
AUS	0	462	817	433	728	722	583	766	818	664	835	996	427	513	298	518	497	81	394	288	109	474
BEL	399	0	592	483	765	621	535	711	674	638	955	703	375	507	241	395	488	79	380	228	139	487
CAN	733	560	0	795	1664	1083	1184	1233	1412	1590	1202	2847	819	986	375	1082	963	126	411	603	161	846
CHE	370	483	635	0	852	570	519	560	656	679	772	857	358	492	217	377	466	69	334	242	111	437
DEU	392	649	613	574	0	1824	1236	1889	1527	2071	2106	2387	896	1418	351	1057	1419	180	514	473	246	866
DFS	469	542	767	482	839	0	885	1380	1273	1284	1546	1585	680	1046	381	756	1007	137	518	400	191	753
ESP	439	512	694	412	559	605	0	1028	986	1182	974	1403	649	814	365	782	786	112	396	435	156	720
FRA	459	649	679	462	639	581	662	0	1343	1436	1704	2169	749	1234	354	1036	1071	125	511	446	156	734
GBR	677	679	1410	628	761	851	787	725	0	1443	1519	1916	723	1008	392	831	945	130	679	450	179	816
ITA	526	623	1267	595	1016	956	848	694	1190	0	1485	2274	865	1226	362	961	1152	156	470	542	212	896
NLD	683	1051	1033	728	1164	1104	811	848	1237	1199	0	2044	739	1182	378	850	1244	167	629	419	204	859
USA	807	597	2767	745	843	952	864	961	1709	1646	1569	0	1055	1428	463	1585	1405	172	527	752	186	1076
HUN	291	296	703	281	518	473	477	432	571	694	533	933	0	660	287	551	768	97	311	383	123	553
POL	326	402	689	343	729	655	499	620	732	869	864	1134	493	0	284	684	978	151	373	442	195	740
ZAF	274	205	348	188	247	295	331	247	362	314	339	487	237	207	0	301	298	47	234	220	70	308
JPN	261	210	352	196	230	276	271	245	314	322	297	406	214	214	188	0	689	93	312	450	118	531
CZE	311	362	638	325	827	569	527	607	659	819	1035	1011	645	653	219	198	0	115	376	431	180	677
EST	38	48	54	32	85	63	45	44	58	75	98	100	55	81	20	20	61	0	57	59	46	97
IRL	359	367	388	327	366	411	379	400	732	440	570	486	256	273	221	176	285	29	0	185	87	358
KOR	201	159	534	168	219	258	296	221	332	446	271	836	300	319	172	201	297	24	131	0	84	398
SVN	78	114	119	81	217	154	114	106	138	182	178	142	91	157	50	56	133	28	66	53	0	135
PRT	357	487	848	378	587	641	680	578	749	855	846	1093	527	680	292	248	559	61	308	335	109	0

HOL

common bulls below diagonal

common three quarter sib group above diagonal

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	POL	NZL	JPN	CZE	EST	IRL	KOR	SVN	PRT	ZAF	HUN
AUS	0	412	671	391	637	551	509	617	644	611	624	659	385	394	312	358	75	317	166	106	370	157	276
BEL	388	0	579	457	749	561	537	685	588	631	809	584	419	262	287	402	79	318	146	139	415	139	267
CAN	633	555	0	759	1658	926	1187	1231	1232	1587	1050	2434	881	353	786	834	125	345	421	161	727	223	661
CHE	359	458	605	0	769	507	516	546	602	658	645	745	406	237	294	375	68	287	165	109	369	129	270
DEU	380	647	612	522	0	1683	1246	1865	1372	2069	1965	2077	1290	390	834	1222	179	443	345	246	758	209	693
DFS	423	503	736	440	806	0	786	1150	1029	1225	1325	1189	888	360	521	794	131	403	253	187	628	209	490
ESP	413	520	697	412	571	562	0	1039	882	1190	883	1237	720	314	612	683	112	328	303	158	627	216	500
FRA	423	645	679	453	624	542	680	0	1059	1432	1306	1473	1072	465	712	892	123	397	298	156	610	188	563
GBR	578	613	1252	572	709	747	684	617	0	1370	1221	1542	863	357	580	765	119	488	299	177	673	218	524
ITA	512	623	1266	579	1016	912	860	694	1134	0	1422	2109	1137	355	823	1043	155	421	393	212	799	238	712
NLD	560	884	917	615	1107	1005	740	731	1005	1157	0	1434	1021	452	601	1058	161	491	272	201	708	207	543
USA	618	557	2495	664	791	851	761	695	1488	1599	1123	0	1232	354	1045	1147	162	401	508	183	871	253	786
POL	271	338	630	279	641	575	411	534	638	800	756	1013	0	220	559	844	139	289	340	185	638	181	523
NZL	327	208	303	198	238	253	254	231	296	284	413	312	140	0	194	225	37	266	102	56	217	102	147
JPN	221	182	312	177	208	245	229	215	266	297	255	348	191	117	0	520	81	209	291	106	395	159	388
CZE	251	307	560	260	722	484	435	478	540	738	917	843	577	155	176	0	106	283	302	173	568	197	580
EST	38	48	54	32	85	60	46	44	55	75	94	97	72	16	20	55	0	50	50	46	89	39	85
IRL	311	328	345	290	339	349	329	334	505	403	473	411	221	228	152	227	29	0	103	85	286	123	208
KOR	127	116	377	124	160	180	192	166	213	323	178	571	261	76	143	210	21	79	0	71	272	116	259
SVN	77	114	119	80	217	152	117	106	136	182	177	142	147	42	52	129	28	66	47	0	129	61	114
PRT	296	410	705	312	509	529	562	480	605	758	689	886	594	168	205	470	56	249	237	103	0	197	407
ZAF	151	126	205	108	144	180	184	148	192	202	178	254	150	92	116	147	18	115	82	43	187	0	166
HUN	208	211	577	212	392	354	340	331	409	554	385	707	403	110	168	487	48	179	200	84	397	142	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	462	817	433	728	723	583	643	818	664	835	993	440	512	480	526	497	81	395	288	84	474
BEL	399	0	590	481	764	619	539	655	672	636	953	698	382	506	271	395	488	79	379	228	109	486
CAN	733	560	0	795	1664	1083	1177	1074	1412	1588	1202	2832	833	985	359	1090	964	126	411	605	137	846
CHE	370	483	635	0	852	570	522	525	656	679	772	853	364	490	243	377	466	69	334	242	87	437
DEU	392	648	613	574	0	1824	1246	1772	1527	2069	2106	2380	906	1414	397	1059	1419	180	514	473	212	866
DFS	469	542	767	482	839	0	889	1217	1273	1284	1546	1583	695	1043	449	762	1007	137	517	401	158	752
ESP	443	522	697	415	573	615	0	960	993	1192	986	1403	664	822	318	790	793	113	402	437	129	729
FRA	442	623	647	448	591	573	673	0	1206	1386	1423	1744	722	1152	396	895	1028	122	466	417	133	694
GBR	677	679	1410	628	761	851	800	714	0	1441	1519	1910	738	1007	465	836	945	130	681	450	147	814
ITA	526	623	1267	595	1016	956	860	687	1190	0	1485	2265	868	1225	361	963	1152	156	470	543	181	896
NLD	683	1051	1033	728	1164	1104	826	780	1237	1199	0	2038	757	1180	577	856	1244	167	629	419	165	859
USA	805	595	2743	740	836	949	867	804	1701	1639	1562	0	1082	1423	527	1601	1401	171	524	754	156	1073
HUN	303	305	717	285	525	482	495	438	587	699	546	957	0	665	267	561	781	97	318	385	107	555
POL	326	402	689	343	729	655	506	588	732	869	864	1130	497	0	299	685	978	151	373	442	171	740
NZL	383	210	305	201	239	284	255	225	364	285	512	439	201	184	0	310	315	38	331	173	46	285
JPN	261	209	351	196	230	276	271	245	314	322	297	406	220	214	141	0	690	94	314	451	95	531
CZE	311	362	638	325	827	569	536	591	659	819	1035	1006	657	653	205	199	0	115	376	431	152	676
EST	38	48	54	32	85	63	46	44	58	75	98	100	55	81	16	20	61	0	57	59	43	97
IRL	359	367	388	327	366	411	387	396	735	440	570	485	264	273	271	176	285	29	0	185	65	358
KOR	201	159	534	168	219	258	298	218	332	446	271	836	302	319	117	201	297	24	131	0	72	398
SVN	61	88	102	66	191	127	95	90	112	155	145	121	78	138	35	41	112	24	52	46	0	109
PRT	357	487	848	378	587	641	688	569	749	855	846	1086	530	680	220	247	559	61	308	335	89	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	462	817	433	728	723	589	766	818	664	835	996	440	513	480	526	497	81	382	84	474
BEL	399	0	592	483	765	621	543	711	674	638	955	703	382	507	271	396	488	79	368	109	487
CAN	733	560	0	795	1664	1083	1188	1233	1412	1588	1202	2847	833	986	359	1090	964	126	397	137	846
CHE	370	483	635	0	852	570	523	560	656	679	772	857	364	492	243	377	466	69	325	88	437
DEU	392	649	613	574	0	1824	1249	1889	1527	2069	2106	2386	906	1418	397	1059	1419	180	497	213	866
DFS	469	542	767	482	839	0	896	1380	1273	1284	1546	1585	695	1046	449	762	1007	137	494	159	753
ESP	443	522	697	415	573	615	0	1041	999	1192	989	1413	664	824	319	796	794	113	389	129	729
FRA	459	649	680	462	639	581	681	0	1343	1435	1704	2169	767	1234	475	1049	1071	125	482	133	734
GBR	677	677	1409	628	759	850	797	725	0	1441	1519	1916	738	1008	465	836	945	130	644	148	816
ITA	526	623	1267	595	1016	956	860	695	1188	0	1485	2270	868	1225	361	963	1152	156	462	182	896
NLD	683	1051	1033	728	1164	1104	826	849	1235	1199	0	2043	757	1182	577	856	1244	167	593	166	859
USA	808	597	2767	745	842	952	873	962	1709	1646	1568	0	1085	1427	528	1605	1405	172	501	156	1076
HUN	303	305	717	285	525	482	495	441	587	699	546	959	0	666	267	561	781	97	307	107	555
POL	326	402	689	343	729	655	506	620	732	869	864	1134	497	0	299	686	978	151	362	172	740
NZL	383	210	305	201	239	284	256	231	364	285	512	441	201	184	0	310	315	38	317	46	285
JPN	261	209	351	196	230	276	271	246	314	322	297	406	220	214	141	0	690	94	300	95	531
CZE	311	362	638	325	827	569	536	607	658	819	1035	1011	657	653	205	199	0	115	361	153	677
EST	38	48	54	32	85	63	46	44	58	75	98	100	55	81	16	20	61	0	56	43	97
IRL	357	366	387	325	364	410	384	395	711	438	562	480	262	273	267	176	284	29	0	65	347
SVN	61	88	102	66	191	127	95	90	112	156	146	120	78	138	35	41	112	24	52	0	109
PRT	357	488	848	378	587	641	689	578	749	855	847	1093	531	680	220	247	559	61	308	89	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	415	742	394	680	670	525	581	740	599	746	908	395	466	479	466	71	357	71	443
BEL	344	0	584	478	758	614	540	635	665	632	906	681	371	501	382	485	79	365	109	488

CAN	650	559	0	795	1664	1083	1189	1057	1412	1588	1171	2839	819	985	1073	963	126	397	137	853
CHE	318	480	635	0	852	570	524	509	656	679	761	854	358	490	375	466	69	325	87	442
DEU	339	648	613	574	0	1824	1252	1752	1527	2069	2083	2387	896	1413	1054	1419	180	497	212	873
DFS	404	540	767	482	839	0	899	1195	1273	1284	1518	1571	680	1043	751	1007	137	494	158	760
ESP	377	527	698	417	577	619	0	942	1000	1195	974	1412	654	825	785	795	114	390	129	737
FRA	366	602	620	423	566	548	643	0	1183	1371	1377	1715	707	1142	875	1017	122	441	133	694
GBR	579	676	1409	628	759	850	802	670	0	1441	1494	1909	723	1007	824	945	130	641	147	820
ITA	436	623	1267	595	1016	956	865	667	1188	0	1471	2268	865	1225	959	1152	156	462	181	900
NLD	562	992	986	706	1144	1081	802	718	1197	1179	0	1934	732	1169	818	1234	166	587	165	855
USA	687	592	2767	745	843	952	873	758	1708	1646	1359	0	1055	1426	1552	1403	172	499	156	1083
HUN	254	296	703	281	518	473	482	419	571	694	517	933	0	659	550	768	97	302	107	556
POL	277	401	689	343	729	655	508	577	732	869	856	1134	493	0	683	978	151	362	171	745
JPN	234	209	351	195	230	276	272	238	312	322	293	404	214	214	0	687	93	296	95	535
CZE	272	361	638	325	827	569	538	572	658	819	1019	1010	645	653	198	0	115	361	152	679
EST	32	48	54	32	85	63	47	44	58	75	97	100	55	81	20	61	0	56	43	97
IRL	324	366	387	325	364	410	386	367	708	438	552	480	255	273	176	284	29	0	65	349
SVN	52	88	102	66	191	127	95	90	112	155	145	121	78	138	41	112	24	52	0	109
PRT	319	491	851	382	591	647	698	570	756	858	838	1099	532	685	247	563	61	309	89	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
BEL	0	539	385	604	567	482	595	610	497	751	623	388	340	133	89	403	47	265
CAN	539	0	649	1349	987	1076	1027	1316	1326	982	2650	813	381	361	115	712	78	658
CHE	391	526	0	621	452	423	438	537	533	560	680	344	260	144	71	340	46	261
DEU	541	547	431	0	1380	1035	1381	1186	1438	1602	1856	1086	386	285	162	649	117	653
DFS	524	764	394	737	0	808	1190	1261	922	1285	1564	802	491	222	130	623	85	494
ESP	476	629	321	467	570	0	888	899	943	834	1285	671	352	263	109	608	72	497
FRA	584	618	359	485	548	617	0	1181	977	1182	1714	862	440	260	109	590	76	561
GBR	640	1336	497	631	848	697	671	0	1097	1227	1900	774	636	258	120	679	84	529
ITA	505	1108	470	728	752	660	562	941	0	1045	1699	842	337	327	139	672	101	644
NLD	822	884	527	956	1000	676	676	1006	918	0	1457	1025	508	238	131	681	104	534
USA	572	2652	583	708	951	739	758	1706	1361	1095	0	1164	498	429	132	888	99	798
CZE	304	548	241	665	475	433	463	532	615	889	830	0	286	251	122	547	66	576
IRL	352	384	251	298	410	344	367	702	338	484	480	222	0	93	51	284	31	210
KOR	106	333	112	141	162	172	151	185	279	159	488	175	73	0	56	233	28	222
SVN	73	88	54	147	108	82	75	97	121	113	102	90	42	39	0	95	25	87
PRT	401	699	291	478	524	545	476	597	647	663	883	452	246	206	75	0	53	402
EST	28	32	19	46	37	26	28	39	44	57	43	34	16	12	11	32	0	56
HUN	210	572	204	381	354	338	329	405	521	380	704	481	178	173	63	391	28	0

HOL

common bulls below diagonal

common three quarter sib group above diagonal

	BEL	CHE	DEU	DFS	FRA	GBR	ITA	NLD	USA	CZE	JPN	IRL	KOR	CAN	PRT	ESP	SVN	EST	HUN	NZL
BEL	0	442	592	300	445	612	514	808	621	355	230	311	143	439	289	490	108	59	224	195
CHE	448	0	699	261	399	618	595	709	811	350	240	283	165	616	266	488	87	57	233	184
DEU	527	492	0	771	1173	1190	1575	1658	1866	1022	642	341	328	1200	520	1042	208	143	572	228
DFS	240	205	321	0	425	627	528	789	686	436	220	275	132	324	262	414	83	60	225	198
FRA	420	331	440	173	0	772	950	921	1115	670	517	265	261	749	404	709	127	93	465	175
GBR	641	590	634	352	482	0	1182	1377	1865	707	471	575	300	1011	483	929	147	104	463	318
ITA	518	518	751	360	521	990	0	1156	1863	871	637	337	383	1271	552	1012	171	125	605	210
NLD	887	674	986	504	565	1128	976	0	1668	982	468	499	270	838	492	883	166	132	463	387
USA	561	714	710	343	533	1696	1435	1239	0	1073	849	454	508	2019	651	1337	156	126	712	318
CZE	279	247	636	231	381	491	631	855	779	0	421	236	295	685	412	617	150	86	494	170
JPN	149	147	174	107	177	224	252	215	296	153	0	147	269	598	276	512	86	61	325	125
IRL	325	285	275	205	240	637	332	473	443	183	112	0	92	272	172	337	61	36	161	217
KOR	113	124	160	77	163	213	319	177	574	206	142	71	0	390	245	299	69	44	246	95
CAN	464	535	534	249	486	1077	1092	832	2221	503	266	296	363	0	502	885	134	91	560	193
PRT	286	226	378	192	352	425	527	461	676	341	162	150	211	507	0	441	103	69	314	136
ESP	492	387	461	272	496	749	702	736	815	386	194	340	191	568	379	0	129	90	442	212

SVN	85	66	192	58	88	112	150	146	121	112	40	48	45	102	82	95	0	40	102	46
EST	38	26	64	25	37	48	62	80	64	47	18	21	21	47	49	39	23	0	72	28
HUN	177	177	333	147	284	358	475	325	630	413	143	133	192	522	316	296	76	42	0	112
NZL	166	166	177	128	133	265	192	355	276	126	93	182	75	198	116	182	35	14	88	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	137	74	90	44	147	232	124	16	11
CAN	142	0	63	117	48	73	381	137	13	15
DFS	48	47	0	85	52	76	123	104	16	29
GBR	88	120	77	0	50	74	147	100	13	29
ITA	43	46	49	50	0	36	64	57	14	16
NZL	148	74	54	75	32	0	147	100	16	15
USA	229	379	87	154	68	154	0	241	29	28
ZAF	126	135	83	98	57	96	246	0	25	21
NLD	12	8	11	11	11	13	30	20	0	3
CHE	9	13	28	27	17	13	28	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	137	74	90	44	147	232	117	16	19
CAN	142	0	63	117	48	73	381	126	13	21
DFS	48	47	0	85	52	76	123	95	16	40
GBR	88	120	77	0	50	74	147	95	13	37
ITA	43	46	49	50	0	36	64	57	14	24
NZL	148	74	54	75	32	0	147	91	16	22
USA	229	379	87	154	68	154	0	221	29	36
ZAF	120	126	77	94	57	88	228	0	25	34
NLD	12	8	11	11	11	13	30	20	0	7
CHE	16	19	38	35	24	19	36	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	137	74	90	44	147	117	16	232	23
CAN	142	0	63	117	48	73	126	13	381	25
DFS	48	47	0	85	52	76	95	16	123	42
GBR	88	120	77	0	50	74	95	13	147	40
ITA	43	46	49	50	0	36	57	14	64	27
NZL	148	74	54	75	32	0	91	16	147	26
ZAF	120	126	77	94	57	88	0	25	221	38
NLD	12	8	11	11	11	13	20	0	29	9
USA	229	379	87	154	68	154	228	30	0	40
CHE	19	21	40	38	26	23	36	6	40	0

JER

common bulls below diagonal

common	three	quarter	sib	group	above	diagonal				
	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE	
AUS	0	137	71	89	44	232	123	4	23	
CAN	142	0	63	117	48	381	137	5	25	
DFS	46	47	0	83	52	123	103	6	42	
GBR	87	120	75	0	50	147	100	7	40	

ITA	43	46	49	50	0	64	57	5	27
USA	229	379	87	154	68	0	240	12	40
ZAF	125	135	82	98	57	245	0	10	38
NLD	1	3	6	6	4	11	8	0	4
CHE	19	21	40	38	26	40	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	137	74	90	44	147	232	124	16	23
CAN	142	0	63	117	48	73	381	137	13	25
DFS	48	47	0	85	52	76	123	104	16	42
GBR	88	120	77	0	50	74	147	100	13	40
ITA	43	46	49	50	0	36	64	57	14	27
NZL	148	74	54	75	32	0	147	100	16	26
USA	229	379	87	154	68	154	0	241	29	40
ZAF	126	135	83	98	57	96	246	0	25	38
NLD	12	8	11	11	11	13	30	20	0	9
CHE	19	21	40	38	26	23	40	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	137	74	90	44	147	232	124	16	23
CAN	142	0	63	117	48	73	381	137	13	25
DFS	48	47	0	85	52	76	123	104	16	42
GBR	88	120	77	0	50	74	147	100	13	40
ITA	43	46	49	50	0	36	64	57	14	27
NZL	148	74	54	75	32	0	147	100	16	26
USA	229	379	87	154	68	154	0	241	29	40
ZAF	126	135	83	98	57	96	246	0	25	38
NLD	12	8	11	11	11	13	30	20	0	9
CHE	19	21	40	38	26	23	40	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	137	74	90	44	147	232	124	16	23
CAN	142	0	63	117	48	73	381	137	13	25
DFS	48	47	0	85	52	76	123	104	16	42
GBR	88	120	77	0	50	74	147	100	13	40
ITA	43	46	49	50	0	36	64	57	14	27
NZL	148	74	54	75	32	0	147	100	16	26
USA	229	379	87	154	68	154	0	241	29	40
ZAF	126	135	83	98	57	96	246	0	25	38
NLD	12	8	11	11	11	13	30	20	0	9
CHE	19	21	40	38	26	23	40	36	6	0

JER

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	CAN	DFS	ITA	ZAF	NLD	USA	CHE
AUS	0	137	71	44	95	16	232	23
CAN	142	0	63	48	112	13	381	25
DFS	46	47	0	52	74	16	123	42

ITA	43	46	49	0	51	14	64	27
ZAF	95	106	59	49	0	22	186	38
NLD	12	8	11	11	15	0	29	9
USA	229	379	87	68	182	30	0	40
CHE	19	21	40	26	36	6	40	0

JER

common bulls below diagonal

common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE
AUS	0	137	71	89	44	232	123	16	23
CAN	142	0	63	117	48	381	137	13	25
DFS	46	47	0	83	52	123	103	16	42
GBR	87	120	75	0	50	147	100	13	40
ITA	43	46	49	50	0	64	57	14	27
USA	229	379	87	154	68	0	240	29	40
ZAF	125	135	82	98	57	245	0	25	38
NLD	12	8	11	11	11	30	20	0	9
CHE	19	21	40	38	26	40	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	137	74	90	44	147	232	124	16	23
CAN	142	0	63	117	48	73	381	137	13	25
DFS	48	47	0	85	52	76	123	104	16	42
GBR	88	120	77	0	50	74	147	100	13	40
ITA	43	46	49	50	0	36	64	57	14	27
NZL	148	74	54	75	32	0	147	100	16	26
USA	229	379	87	154	68	154	0	241	29	40
ZAF	126	135	83	98	57	96	246	0	25	38
NLD	12	8	11	11	11	13	30	20	0	9
CHE	19	21	40	38	26	23	40	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	137	71	90	44	147	232	124	16	23
CAN	142	0	57	117	48	73	381	137	13	25
DFS	46	45	0	76	52	69	116	97	16	42
GBR	88	120	72	0	50	73	147	99	13	40
ITA	43	46	49	50	0	36	64	57	14	27
NZL	148	74	48	74	32	0	147	99	16	26
USA	229	379	82	154	68	154	0	241	29	40
ZAF	126	135	80	97	57	95	246	0	25	38
NLD	12	8	11	11	11	13	30	20	0	9
CHE	19	21	40	38	26	23	40	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	137	74	90	44	147	232	124	16	23
CAN	142	0	63	117	48	73	381	137	13	25
DFS	48	47	0	85	52	76	123	104	16	42
GBR	88	120	77	0	50	74	147	100	13	40

ITA	43	46	49	50	0	36	64	57	14	27
NZL	148	74	54	75	32	0	147	100	16	26
USA	229	379	87	154	68	154	0	241	29	40
ZAF	126	135	83	98	57	96	246	0	25	38
NLD	12	8	11	11	11	13	30	20	0	9
CHE	19	21	40	38	26	23	40	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	137	71	89	44	232	123	16	23
CAN	142	0	63	116	48	378	137	13	25
DFS	46	47	0	83	52	123	103	16	42
GBR	87	119	75	0	50	147	100	13	40
ITA	43	46	49	50	0	64	57	14	27
USA	229	377	87	154	68	0	240	29	40
ZAF	125	135	82	98	57	245	0	25	38
NLD	12	8	11	11	11	30	20	0	9
CHE	19	21	40	38	26	40	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	137	74	90	44	147	232	124	16	23
CAN	142	0	63	117	48	73	381	137	13	25
DFS	48	47	0	85	52	76	123	104	16	42
GBR	88	120	77	0	50	74	147	100	13	40
ITA	43	46	49	50	0	36	64	57	14	27
NZL	148	74	54	75	32	0	147	100	16	26
USA	229	379	87	154	68	154	0	241	29	40
ZAF	126	135	83	98	57	96	246	0	25	38
NLD	12	8	11	11	11	13	30	20	0	9
CHE	19	21	40	38	26	23	40	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	137	71	89	44	232	116	16	23
CAN	142	0	63	117	48	381	126	13	25
DFS	46	47	0	83	52	123	94	16	42
GBR	87	120	75	0	50	147	95	13	40
ITA	43	46	49	50	0	64	57	14	27
USA	229	379	87	154	68	0	220	29	40
ZAF	119	126	76	94	57	227	0	25	38
NLD	12	8	11	11	11	30	20	0	9
CHE	19	21	40	38	26	40	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	137	64	147	114	16	232	23
CAN	142	0	53	73	123	13	381	25
DFS	41	42	0	62	86	16	109	42
NZL	148	74	44	0	86	16	147	26

ZAF	115	120	69	79	0	25	216	38
NLD	12	8	11	13	20	0	29	9
USA	229	379	77	154	215	30	0	40
CHE	19	21	40	23	36	6	40	0

JER

common bulls below diagonal

common	three	quarter	sib	group	above	diagonal			
	AUS	CAN	DFS	GBR	ITA	NZL	USA	NLD	CHE
AUS	0	137	74	35	44	147	232	16	19
CAN	142	0	63	38	48	73	381	13	21
DFS	48	47	0	30	52	76	123	16	40
GBR	40	43	28	0	14	37	37	4	3
ITA	43	46	49	15	0	36	64	14	24
NZL	148	74	54	41	32	0	147	16	22
USA	229	379	87	40	68	154	0	29	36
NLD	12	8	11	5	11	13	30	0	7
CHE	16	19	38	4	24	19	36	5	0

JER

common bulls below diagonal

common	three	quarter	sib	group	above	diagonal			
	AUS	CAN	DFS	GBR	NZL	USA	NLD	CHE	
AUS	0	137	71	90	147	232	16	19	
CAN	142	0	57	116	73	378	13	21	
DFS	46	45	0	76	69	116	16	40	
GBR	88	119	72	0	71	147	13	37	
NZL	148	74	48	72	0	147	16	22	
USA	229	377	82	154	154	0	29	36	
NLD	12	8	11	11	13	30	0	7	
CHE	16	19	38	35	19	36	5	0	

JER

common bulls below diagonal

common	three	quarter	sib	group	above	diagonal			
	AUS	CAN	DFS	GBR	ITA	USA	NLD	CHE	
AUS	0	125	64	82	40	211	15	18	
CAN	129	0	63	116	48	381	13	21	
DFS	41	47	0	83	52	123	16	40	
GBR	80	119	75	0	50	147	13	37	
ITA	38	46	49	50	0	64	14	24	
USA	201	379	87	154	68	0	29	36	
NLD	11	8	11	11	11	30	0	7	
CHE	16	19	38	35	24	36	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	23	9	39	9	12	20	13	7	2
CAN	23	0	7	121	61	4	33	136	3	0
DEU	9	7	0	30	1	8	4	1	8	0
DFS	28	120	20	0	43	70	56	68	29	0
GBR	8	59	1	40	0	0	24	48	1	0

NOR	8	4	7	48	0	0	7	0	19	0
NZL	19	31	4	53	21	6	0	21	2	3
USA	13	130	1	64	43	0	20	0	2	0
NLD	7	3	8	28	1	19	2	2	0	0
CAM	2	0	0	0	0	0	3	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	23	9	39	9	20	13	7	2	4
CAN	23	0	7	121	61	33	136	3	0	1
DEU	9	7	0	30	1	4	1	8	0	3
DFS	28	120	20	0	43	54	68	27	0	28
GBR	8	59	1	40	0	24	48	1	0	0
NZL	19	31	4	51	21	0	21	2	3	2
USA	13	130	1	64	43	20	0	2	0	0
NLD	7	3	8	26	1	2	2	0	0	8
CAM	2	0	0	0	0	3	0	0	0	0
NOR	3	1	2	14	0	2	0	8	0	0

RDC

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0	23	9	39	9	4	20	13	7	2
CAN	23	0	7	121	61	1	33	134	3	0
DEU	9	7	0	30	1	3	4	1	8	0
DFS	28	120	20	0	43	44	54	68	27	0
GBR	8	59	1	40	0	0	24	47	1	0
NOR	3	1	2	26	0	0	3	0	14	0
NZL	19	31	4	51	21	3	0	21	2	3
USA	13	129	1	64	42	0	20	0	2	0
NLD	7	3	8	26	1	14	2	2	0	0
CAM	2	0	0	0	0	0	3	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	23	9	39	9	13	7	2
CAN	23	0	7	121	61	136	3	0
DEU	9	7	0	30	1	1	8	0
DFS	28	120	20	0	43	68	25	0
GBR	8	59	1	40	0	48	1	0
USA	13	130	1	64	43	0	2	0
NLD	7	3	8	25	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	23	9	39	9	12	20	13	7	2
CAN	23	0	7	121	61	4	33	136	3	0
DEU	9	7	0	30	1	9	4	1	8	0
DFS	28	120	20	0	43	79	53	68	28	0
GBR	8	59	1	40	0	0	24	48	1	0

NOR	8	4	8	55	0	0	7	0	19	0
NZL	19	31	4	48	21	6	0	21	2	3
USA	13	130	1	64	43	0	20	0	2	0
NLD	7	3	8	27	1	19	2	2	0	0
CAM	2	0	0	0	0	0	3	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	23	9	39	9	20	13	7	2	4
CAN	23	0	7	121	61	33	136	3	0	1
DEU	9	7	0	30	1	4	1	8	0	3
DFS	28	120	20	0	43	54	68	28	0	28
GBR	8	59	1	40	0	24	48	1	0	0
NZL	19	31	4	51	21	0	21	2	3	2
USA	13	130	1	64	43	20	0	2	0	0
NLD	7	3	8	27	1	2	2	0	0	8
CAM	2	0	0	0	0	3	0	0	0	0
NOR	3	1	2	14	0	2	0	8	0	0

RDC

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0	23	9	39	9	12	20	13	7	2
CAN	23	0	7	121	61	4	33	136	3	0
DEU	9	7	0	30	1	9	4	1	8	0
DFS	28	120	20	0	43	82	56	68	29	0
GBR	8	59	1	40	0	0	24	48	1	0
NOR	8	4	8	57	0	0	7	0	19	0
NZL	19	31	4	53	21	6	0	21	2	3
USA	13	130	1	64	43	0	20	0	2	0
NLD	7	3	8	28	1	19	2	2	0	0
CAM	2	0	0	0	0	0	3	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	20	9	38	12	7	11	2
CAN	20	0	7	120	4	3	136	0
DEU	9	7	0	30	9	8	1	0
DFS	27	119	20	0	79	26	68	0
NOR	8	4	8	55	0	19	0	0
NLD	7	3	8	25	19	0	2	0
USA	11	130	1	64	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	23	6	39	9	12	13	7	2
CAN	23	0	5	121	61	4	136	3	0
DEU	6	5	0	22	1	7	1	8	0
DFS	28	120	15	0	43	79	68	27	0
GBR	8	59	1	40	0	0	48	1	0

NOR	8	4	6	55	0	0	0	19	0
USA	13	130	1	64	43	0	0	2	0
NLD	7	3	8	26	1	19	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	23	9	39	9	12	20	13	7	2
CAN	23	0	7	121	61	4	33	136	3	0
DEU	9	7	0	30	1	9	4	1	8	0
DFS	28	120	20	0	43	82	56	68	27	0
GBR	8	59	1	40	0	0	24	48	1	0
NOR	8	4	8	57	0	0	7	0	19	0
NZL	19	31	4	53	21	6	0	21	2	3
USA	13	130	1	64	43	0	20	0	2	0
NLD	7	3	8	26	1	19	2	2	0	0
CAM	2	0	0	0	0	0	3	0	0	0

RDC

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0	23	9	39	9	12	20	13	7	2
CAN	23	0	7	121	61	4	33	136	3	0
DEU	9	7	0	30	1	9	4	1	8	0
DFS	28	120	20	0	43	79	54	68	27	0
GBR	8	59	1	40	0	0	24	48	1	0
NOR	8	4	8	55	0	0	7	0	19	0
NZL	19	31	4	50	21	6	0	21	2	3
USA	13	130	1	64	43	0	20	0	2	0
NLD	7	3	8	26	1	19	2	2	0	0
CAM	2	0	0	0	0	0	3	0	0	0

RDC

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0	23	9	39	9	12	20	13	7	2
CAN	23	0	7	121	61	4	33	136	3	0
DEU	9	7	0	30	1	9	4	1	8	0
DFS	28	120	20	0	43	72	56	68	29	0
GBR	8	59	1	40	0	0	24	48	1	0
NOR	8	4	8	50	0	0	7	0	19	0
NZL	19	31	4	53	21	6	0	21	2	3
USA	13	130	1	64	43	0	20	0	2	0
NLD	7	3	8	28	1	19	2	2	0	0
CAM	2	0	0	0	0	0	3	0	0	0

RDC

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM
AUS	0	23	9	39	9	12	13	7	2
CAN	23	0	7	121	61	4	133	3	0
DEU	9	7	0	30	1	9	1	8	0
DFS	28	120	20	0	43	82	68	29	0

GBR	8	59	1	40	0	0	48	1	0
NOR	8	4	8	57	0	0	0	19	0
USA	13	129	1	64	43	0	0	2	0
NLD	7	3	8	28	1	19	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	23	9	39	9	12	20	13	7	2
CAN	23	0	7	121	61	4	33	136	3	0
DEU	9	7	0	30	1	9	4	1	8	0
DFS	28	120	20	0	43	79	54	68	28	0
GBR	8	59	1	40	0	0	24	48	1	0
NOR	8	4	8	55	0	0	7	0	19	0
NZL	19	31	4	51	21	6	0	21	2	3
USA	13	130	1	64	43	0	20	0	2	0
NLD	7	3	8	27	1	19	2	2	0	0
CAM	2	0	0	0	0	0	3	0	0	0

RDC

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM
AUS	0	23	9	39	9	12	13	7	2
CAN	23	0	7	121	61	4	134	3	0
DEU	9	7	0	30	1	9	1	8	0
DFS	28	120	20	0	43	76	68	29	0
GBR	8	59	1	40	0	0	47	1	0
NOR	8	4	8	52	0	0	0	19	0
USA	13	129	1	64	42	0	0	2	0
NLD	7	3	8	28	1	19	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	NOR	NZL	NLD	USA	CAM
AUS	0	16	9	32	12	16	7	9	2
CAN	16	0	7	115	4	33	3	136	0
DEU	9	7	0	27	9	4	8	1	0
DFS	23	113	20	0	71	49	26	63	0
NOR	8	4	8	50	0	7	19	0	0
NZL	16	31	4	47	6	0	1	21	3
NLD	7	3	8	25	19	1	0	2	0
USA	9	130	1	60	0	20	2	0	0
CAM	2	0	0	0	0	3	0	0	0

RDC

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0	23	9	39	8	12	20	13	7	2
CAN	23	0	7	121	58	4	33	136	3	0
DEU	9	7	0	30	1	9	4	1	8	0
DFS	28	120	20	0	43	88	56	68	29	0
GBR	7	56	1	40	0	0	21	46	1	0

NOR	8	4	8	63	0	0	7	0	19	0
NZL	19	31	4	53	18	6	0	21	2	3
USA	13	130	1	64	41	0	20	0	2	0
NLD	7	3	8	28	1	19	2	2	0	0
CAM	2	0	0	0	0	0	3	0	0	0

RDC

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0	23	9	39	8	12	20	13	7	2
CAN	23	0	7	121	58	4	33	133	3	0
DEU	9	7	0	30	1	9	4	1	8	0
DFS	28	120	20	0	43	82	56	68	29	0
GBR	7	56	1	40	0	0	21	46	1	0
NOR	8	4	8	57	0	0	7	0	19	0
NZL	19	31	4	53	18	6	0	21	2	3
USA	13	129	1	64	41	0	20	0	2	0
NLD	7	3	8	28	1	19	2	2	0	0
CAM	2	0	0	0	0	0	3	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	11	47	9	14	13	9	3
CAN	25	0	7	121	58	4	136	3	0
DEU	11	7	0	31	1	9	1	8	0
DFS	36	120	21	0	43	82	68	29	0
GBR	8	56	1	40	0	0	46	1	0
NOR	10	4	8	57	0	0	0	19	0
USA	13	130	1	64	41	0	0	2	0
NLD	9	3	8	28	1	19	2	0	0
CAM	3	0	0	0	0	0	0	0	0

RDC

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