

Introduction

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

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

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

For a full list of trait definitions applied by countries please refer to the file confdoc_DEFINITION{runid}.itb
Changes in national procedures

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

POL (HOL)	Drops in information due to the pedigree verification
JPN (HOL)	Slight drops in information due to pedigree verification
DEA (BSW)	Some bulls with missing pedigree due to some discrepancies in the categorisation of AI/natural service bulls between the different data senders
FRA (ALL)	Drops in information due to the pedigree verification. BSW: weight associated to the elementary traits have been updated for udder and rump overall score
CHE (ALL)	Drops in information due due to database edits and change of herd-year-season assignment of certain data records
ITA (HOL)	Drops in information and some missing bulls due to a four months cut-off
AUS (ALL)	Drops in information due to the pedigree verification. Corrected a small bug in the variable HDCLASSROUND (a contemporary group that consisted of Herd, classifier and Round of classification which is based on season) affecting all breeds except JER.
ISR (HOL)	Drops in information due to the pedigree verification and closing or combining of herds.
EST (HOL)	Drops in information due to the pedigree verification
ESP (HOL)	Base change. Some change in information due to changes in the database, in some cases there is even a change to non official proof.
ZAF (ALL)	Base change
USA (ALL)	Drops in information due to the pedigree verification and herd-year minimum edits
DFS (ALL)	RDC: The composition of OUS has changed a bit with more weight on teat size traits and less on udder depth. HOL: no longer participating to the BCS evaluation
LVA (ALL)	Decrease in EDC due to update in the recording system
NLD (ALL)	Some changes in Type of Proofs due to harmonisation of this record, changes in EDC due to an update of the EDC software
IRL (HOL)	An error was detected in current data going back to the data submitted in April. For this evaluation IRL is participating with the data provided for the 2412r (and 2501t) evaluation.
NZL (ALL)	Base change, drops in information due to a continuos parenting testing and herds records being updated
DEU (ALL)	overall base change: cowbase previous routine run 2504r: 201901 - 202112; cowbase current routine run 2508r: 201905 - 202204

INTERBULL CHANGES COMPARED TO THE PREVIOUS ROUTINE RUN

A new document called confdoc_DEFINITION{runid}.itb has been introduced reporting all the trait definitions applied by countries as reported in the PREP.

During 2023-2024, Interbull Centre and the Interbull Technical Committee (ITC) have worked on developing a new procedures for adjusting of the international correlations after a given test run in case countries would decide NOT TO implement the changes tested in the next routine run. Until now, the relative difference between the previous routineâ\200\231s and test runâ\200\231s correlations, for each pair of countries, was assessed and the average value of the two was used whenever such difference did exceed a threshold of 0.01. Otherwise, correlations from the latest test run were used. However, in some cases, the difference in correlations between routine/test runs were way above a 1% difference so that by using the average value the newly derived correlations would still be greatly affected by the changes tested but not implemented. This remark has been made in few occasions by some participating countries. A new approach proposed by Peter Sullivan, was developed and extensively tested. The new approach is based on first identifying the relative impact of the changes tested by a country during the test run (but not implemented in a routine run) and then correcting the whole correlation matrix detracting such estimated impact. This new approach would assure that the new correlations would be free from any effect from any changes tested but not implemented. The new procedure has been fully developed during 2023 and extensively tested during 2024 and introduced officially in the April 2025 routine evaluation.

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 <https://interbull.org/ib/servicecalendar>

NEXT TEST INTERNATIONAL EVALUATION

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

From 2025 an extra MACE test run has been scheduled in May, data submissions' deadline and target for distribution of results are all reported in the above link.

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 (August Routine Evaluation 2025).
Number of records for stature by breed

Country	BSW	GUE	HOL	JER	RDC	SIM
AUS		50	4081	789	267	
BEL			1803			
CAN	260	107	13145	888	925	
CHE	1666		3264	57		
CZE			4641			
DEA	3894					
DEU			22049		291	
DFS			12597	2157	6554	
ESP			4753			
EST			989			
FRA	462		16440			
FRM						
GBR	26	237	6741	482	357	
HUN			2714			
IRL			1990			
ISR						
ITA	2331		8555	74		
JPN			6578			
KOR			1713			
LTU						
LVA			1534		623	
NLD	156		15885	61	62	
NOR					2607	
NZL			7302	4411	614	
POL			9783			
PRT			2727			
SVK						
SVN	272		673			
URY						
USA	980	748	34831	4715	292	
ZAF			851	566		
HRV						
CAM					40	
=====						
No.Records	10047	1142	185639	14200	12632	
Pub. Proofs	9048	966	142723	12261	13173	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	6.23								
CHE	0.95	12.85							
FRA	0.98	0.97	0.94						
ITA	0.96	0.95	0.95	13.77					
NLD	0.94	0.96	0.96	0.91	4.31				
USA	0.98	0.95	0.97	0.95	0.93	1.84			
DEA	0.96	0.98	0.98	0.95	0.95	0.96	11.14		
SVN	0.93	0.92	0.91	0.94	0.90	0.91	0.91	16.74	
GBR	0.96	0.92	0.95	0.93	0.93	0.96	0.90	0.90	0.85

BSW	cwi								
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	7.54								
CHE	0.90	9.73							
FRA	0.87	0.91	0.82						
ITA	0.79	0.84	0.84	21.15					
NLD	0.92	0.84	0.89	0.70	4.82				
USA	0.88	0.88	0.91	0.86	0.84	1.07			
DEA	0.85	0.81	0.86	0.72	0.73	0.79	11.35		
SVN	0.89	0.90	0.91	0.82	0.85	0.85	0.89	24.59	
GBR	0.91	0.83	0.81	0.69	0.90	0.80	0.82	0.82	1.50

BSW	bde								
	CAN	CHE	FRA	ITA	NLD	DEA	SVN	GBR	USA
CAN	7.04								
CHE	0.83	10.18							
FRA	0.72	0.87	0.90						
ITA	0.79	0.91	0.90	17.78					
NLD	0.80	0.85	0.84	0.83	4.75				
DEA	0.80	0.89	0.91	0.87	0.77	10.98			
SVN	0.78	0.73	0.78	0.78	0.78	0.70	24.92		
GBR	0.87	0.88	0.79	0.83	0.89	0.87	0.84	1.74	
USA	0.73	0.75	0.84	0.77	0.85	0.81	0.78	0.86	0.99

BSW	ang					
	CAN	CHE	FRA	NLD	USA	GBR
CAN	8.81					
CHE	0.69	10.75				
FRA	0.86	0.67	0.83			
NLD	0.79	0.69	0.67	3.83		
USA	0.85	0.68	0.75	0.78	1.22	
GBR	0.88	0.77	0.78	0.82	0.90	0.73

BSW	ran								
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	7.12								
CHE	0.94	10.55							
FRA	0.97	0.96	0.92						
ITA	0.93	0.93	0.93	23.15					
NLD	0.95	0.91	0.95	0.91	4.58				
USA	0.97	0.93	0.96	0.91	0.94	1.58			
DEA	0.97	0.94	0.96	0.94	0.90	0.97	11.76		
SVN	0.91	0.88	0.89	0.89	0.90	0.90	0.88	22.77	
GBR	0.96	0.94	0.97	0.93	0.96	0.96	0.91	0.92	1.97

BSW rwi

	CAN	CHE	FRA	NLD	USA	DEA	GBR	SVN	ITA
CAN	7.33								
CHE	0.89	10.17							
FRA	0.95	0.87	0.96						
NLD	0.93	0.85	0.93	4.20					
USA	0.91	0.86	0.86	0.80	1.00				
DEA	0.90	0.88	0.92	0.77	0.88	13.24			
GBR	0.92	0.84	0.90	0.88	0.92	0.81	1.17		
SVN	0.89	0.79	0.93	0.86	0.81	0.88	0.86	25.68	
ITA	0.87	0.79	0.90	0.78	0.88	0.87	0.86	0.90	19.13

BSW	rls								
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	7.87								
CHE	0.92	12.71							
FRA	0.92	0.93	0.96						
ITA	0.91	0.86	0.92	23.67					
NLD	0.87	0.85	0.88	0.83	5.05				
USA	0.95	0.90	0.90	0.86	0.85	1.05			
DEA	0.91	0.91	0.93	0.89	0.79	0.90	12.11		
SVN	0.86	0.80	0.88	0.83	0.80	0.86	0.88	22.36	
GBR	0.85	0.85	0.90	0.83	0.86	0.82	0.86	0.79	1.50

BSW	fan								
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	8.74								
CHE	0.68	13.85							
FRA	0.74	0.74	1.04						
ITA	0.69	0.84	0.81	21.23					
NLD	0.72	0.67	0.81	0.70	5.07				
USA	0.81	0.73	0.81	0.86	0.80	0.96			
DEA	0.62	0.87	0.68	0.88	0.64	0.63	11.53		
SVN	0.69	0.76	0.71	0.77	0.67	0.75	0.78	24.56	
GBR	0.79	0.72	0.84	0.72	0.87	0.82	0.68	0.74	1.26

BSW	hde							
	CAN	CHE	FRA	ITA	NLD	DEA	SVN	USA
CAN	8.19							
CHE	0.84	11.97						
FRA	0.79	0.81	1.08					
ITA	0.79	0.83	0.82	20.78				
NLD	0.74	0.73	0.80	0.71	5.07			
DEA	0.75	0.87	0.86	0.93	0.76	11.92		
SVN	0.79	0.86	0.85	0.88	0.74	0.91	31.47	
USA	0.83	0.72	0.80	0.89	0.79	0.80	0.81	0.96

BSW	fua								
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	6.59								
CHE	0.85	12.23							
FRA	0.89	0.88	0.84						
ITA	0.88	0.85	0.86	19.11					
NLD	0.89	0.84	0.86	0.86	4.70				
USA	0.93	0.85	0.86	0.92	0.88	1.52			
DEA	0.82	0.85	0.90	0.82	0.76	0.83	11.00		
SVN	0.72	0.70	0.77	0.80	0.77	0.72	0.88	21.25	
GBR	0.91	0.83	0.87	0.87	0.90	0.90	0.70	0.58	1.50

BSW	ruh
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	CAN	CHE	DEA	ITA	SVN	USA	FRA
CAN	7.25						
CHE	0.80	11.39					
DEA	0.80	0.88	11.32				
ITA	0.74	0.90	0.88	15.89			
SVN	0.73	0.80	0.78	0.82	22.79		
USA	0.75	0.80	0.89	0.84	0.78	1.84	
FRA	0.74	0.89	0.91	0.90	0.82	0.88	0.85

BSW tpl

	CAN	CHE	DEA	ITA	SVN	FRA
CAN	7.29					
CHE	0.87	12.12				
DEA	0.87	0.88	11.79			
ITA	0.91	0.91	0.88	23.56		
SVN	0.88	0.86	0.84	0.87	24.40	
FRA	0.96	0.92	0.92	0.90	0.87	1.26

BSW oru

	CAN	CHE	DEA	ITA	SVN	USA	FRA
CAN	7.71						
CHE	0.75	15.85					
DEA	0.74	0.86	12.45				
ITA	0.80	0.76	0.72	13.56			
SVN	0.82	0.57	0.71	0.79	26.43		
USA	0.89	0.57	0.50	0.75	0.66	1.00	
FRA	0.82	0.86	0.79	0.90	0.69	0.82	1.23

BSW rle

	CHE	DEA	ITA	SVN	USA	FRA
CHE	11.66					
DEA	0.94	12.19				
ITA	0.82	0.85	19.08			
SVN	0.78	0.77	0.82	24.41		
USA	0.55	0.51	0.77	0.71	1.00	
FRA	0.93	0.94	0.87	0.79	0.73	1.03

BSW thp

	CAN	CHE	DEA	ITA	SVN	USA	FRA
CAN	7.45						
CHE	0.84	10.83					
DEA	0.80	0.81	11.94				
ITA	0.87	0.90	0.85	29.91			
SVN	0.76	0.85	0.85	0.88	34.82		
USA	0.89	0.86	0.71	0.82	0.73	1.58	
FRA	0.88	0.82	0.85	0.83	0.76	0.78	0.98

BSW hoq

	CAN	CHE	DEA	ITA	SVN	FRA
CAN	7.19					
CHE	0.91	12.03				
DEA	0.91	0.89	12.61			
ITA	0.91	0.85	0.85	19.37		
SVN	0.94	0.89	0.91	0.90	21.63	
FRA	0.91	0.85	0.88	0.87	0.89	1.00

BSW ful

	CHE	DEA	ITA	SVN	FRA
CHE	11.60				
DEA	0.92	12.08			
ITA	0.92	0.95	12.75		
SVN	0.82	0.91	0.84	20.89	
FRA	0.76	0.85	0.78	0.75	0.87

BSW udb

	CHE	DEA	ITA	SVN	FRA
CHE	12.14				
DEA	0.95	13.31			
ITA	0.92	0.95	26.30		
SVN	0.82	0.85	0.83	24.09	
FRA	0.92	0.88	0.85	0.82	0.90

BSW tdi

	CHE	DEA	ITA	SVN	FRA
CHE	15.67				
DEA	0.96	11.28			
ITA	0.94	0.94	20.36		
SVN	0.90	0.93	0.91	18.75	
FRA	0.97	0.97	0.91	0.92	0.86

BSW tth

	CHE	DEA	ITA	SVN	FRA
CHE	14.34				
DEA	0.98	12.85			
ITA	0.94	0.95	23.02		
SVN	0.88	0.87	0.88	20.65	
FRA	0.93	0.94	0.95	0.87	0.90

GUE sta

	CAN	GBR	USA	AUS
CAN	6.75			
GBR	0.97	1.22		
USA	0.98	0.96	2.78	
AUS	0.90	0.92	0.91	0.82

GUE cwi

	CAN	GBR	USA	AUS
CAN	6.85			
GBR	0.92	1.87		
USA	0.85	0.84	1.60	
AUS	0.71	0.80	0.64	0.36

GUE bde

	CAN	GBR	USA	AUS
CAN	6.41			
GBR	0.88	1.58		
USA	0.75	0.88	1.73	
AUS	0.80	0.77	0.69	0.42

GUE ang

	CAN	GBR	USA	AUS
CAN	7.91			

GBR	0.88	1.67		
USA	0.87	0.91	1.99	
AUS	0.67	0.77	0.67	0.40

GUE	ran			
	CAN	GBR	USA	AUS
CAN	6.44			
GBR	0.97	1.70		
USA	0.97	0.97	2.33	
AUS	0.90	0.93	0.89	0.73

GUE	rwi			
	CAN	GBR	USA	AUS
CAN	7.09			
GBR	0.93	1.63		
USA	0.92	0.91	1.89	
AUS	0.84	0.84	0.77	0.63

GUE	rls			
	CAN	GBR	USA	AUS
CAN	8.48			
GBR	0.82	1.86		
USA	0.93	0.79	1.07	
AUS	0.71	0.79	0.71	0.30

GUE	rlr			
	CAN	USA	AUS	
CAN	7.15			
USA	0.84	0.95		
AUS	0.60	0.54	0.19	

GUE	fan			
	CAN	GBR	USA	AUS
CAN	9.03			
GBR	0.78	1.76		
USA	0.84	0.75	1.01	
AUS	0.62	0.75	0.64	0.27

GUE	fua			
	CAN	GBR	USA	AUS
CAN	7.28			
GBR	0.94	1.44		
USA	0.92	0.92	2.21	
AUS	0.78	0.77	0.75	0.34

GUE	ruh			
	CAN	GBR	USA	AUS
CAN	6.96			
GBR	0.72	2.03		
USA	0.80	0.91	1.84	
AUS	0.76	0.76	0.75	0.39

GUE	usu			
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	CAN	GBR	USA	AUS
CAN	6.93			
GBR	0.78	1.63		
USA	0.79	0.86	1.58	
AUS	0.75	0.78	0.75	0.31

GUE ude

	CAN	GBR	USA	AUS
CAN	6.37			
GBR	0.97	1.46		
USA	0.95	0.94	2.27	
AUS	0.89	0.90	0.88	0.51

GUE ftp

	CAN	GBR	USA	AUS
CAN	5.83			
GBR	0.95	1.28		
USA	0.92	0.92	1.92	
AUS	0.92	0.91	0.86	0.40

GUE ftl

	CAN	GBR	USA	AUS
CAN	4.88			
GBR	0.94	1.95		
USA	0.94	0.97	2.08	
AUS	0.94	0.95	0.94	0.82

GUE rtp

	CAN	AUS	USA
CAN	5.36		
AUS	0.88	0.33	
USA	0.93	0.88	1.92

GUE ocs

	CAN	GBR	USA	AUS
CAN	7.96			
GBR	0.77	2.19		
USA	0.74	0.86	0.91	
AUS	0.58	0.64	0.57	0.79

GUE ous

	CAN	GBR	USA	AUS
CAN	8.13			
GBR	0.78	1.62		
USA	0.87	0.83	1.01	
AUS	0.69	0.81	0.73	1.14

GUE ofl

	CAN	GBR	USA	AUS
CAN	7.41			
GBR	0.66	1.67		
USA	0.64	0.67	0.97	
AUS	0.45	0.53	0.57	0.63

GBR	0.78	0.90	0.88	0.91	0.92	0.91	0.92	0.78	1.30																
ITA	0.68	0.87	0.70	0.83	0.86	0.78	0.84	0.89	0.84	1.24															
NLD	0.68	0.88	0.82	0.90	0.91	0.85	0.90	0.85	0.91	0.88	4.78														
USA	0.68	0.91	0.74	0.88	0.89	0.81	0.88	0.89	0.87	0.91	0.90	1.13													
HUN	0.69	0.88	0.84	0.89	0.90	0.87	0.92	0.78	0.89	0.82	0.85	0.88	1.04												
POL	0.75	0.83	0.83	0.83	0.92	0.90	0.86	0.71	0.87	0.81	0.84	0.81	0.85	15.79											
NZL	0.78	0.68	0.68	0.68	0.68	0.69	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.73	0.39										
ZAF	0.73	0.88	0.83	0.83	0.87	0.86	0.88	0.72	0.91	0.72	0.82	0.84	0.85	0.86	0.70	0.87									
JPN	0.68	0.93	0.76	0.90	0.92	0.84	0.89	0.92	0.87	0.89	0.90	0.94	0.88	0.81	0.68	0.80	1.37								
CZE	0.80	0.83	0.93	0.86	0.93	0.93	0.89	0.69	0.91	0.78	0.84	0.81	0.89	0.91	0.70	0.86	0.80	15.39							
EST	0.79	0.82	0.93	0.89	0.90	0.92	0.89	0.71	0.89	0.76	0.85	0.82	0.87	0.87	0.67	0.81	0.82	0.91	18.06						
IRL	0.81	0.84	0.85	0.87	0.88	0.89	0.87	0.72	0.93	0.78	0.83	0.81	0.82	0.84	0.75	0.86	0.80	0.87	0.82	1.17					
KOR	0.68	0.83	0.72	0.80	0.84	0.83	0.79	0.75	0.75	0.69	0.73	0.76	0.80	0.72	0.68	0.74	0.83	0.77	0.76	0.75	3.09				
PRT	0.75	0.81	0.81	0.81	0.90	0.87	0.84	0.68	0.87	0.78	0.79	0.80	0.87	0.87	0.72	0.82	0.82	0.88	0.80	0.85	0.71	1.94			
SVN	0.73	0.90	0.85	0.89	0.90	0.89	0.92	0.83	0.89	0.82	0.91	0.87	0.86	0.81	0.67	0.81	0.89	0.85	0.86	0.86	0.79	0.76	19.39		
LVA	0.70	0.70	0.77	0.77	0.77	0.79	0.71	0.67	0.77	0.68	0.71	0.68	0.78	0.74	0.68	0.69	0.69	0.81	0.74	0.78	0.70	0.77	0.68	0.34	

HOL	ang																								
	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	ZAF	JPN	CZE	EST	IRL	KOR	PRT	SVN	LVA		
AUS	0.42																								
BEL	0.60	1.10																							
CAN	0.66	0.73	6.50																						
CHE	0.60	0.76	0.86	11.15																					
DEU	0.61	0.61	0.60	0.61	9.24																				
DFS	0.70	0.76	0.80	0.81	0.60	8.94																			
ESP	0.63	0.75	0.84	0.78	0.60	0.80	0.64																		
FRA	0.61	0.81	0.86	0.85	0.60	0.71	0.80	0.87																	
GBR	0.78	0.74	0.90	0.79	0.61	0.83	0.80	0.78	1.45																
ITA	0.68	0.73	0.87	0.81	0.60	0.84	0.88	0.79	0.82	1.29															
NLD	0.71	0.62	0.83	0.77	0.60	0.78	0.78	0.70	0.83	0.80	4.52														
USA	0.67	0.76	0.92	0.81	0.60	0.86	0.81	0.81	0.90	0.82	0.76	1.35													
HUN	0.60	0.71	0.77	0.72	0.61	0.78	0.71	0.77	0.73	0.73	0.60	0.82	1.02												
POL	0.60	0.74	0.70	0.71	0.60	0.80	0.81	0.67	0.68	0.85	0.71	0.70	0.61	12.04											
ZAF	0.64	0.80	0.71	0.69	0.63	0.74	0.68	0.72	0.84	0.70	0.61	0.77	0.76	0.65	0.72										
JPN	0.67	0.80	0.90	0.82	0.61	0.87	0.87	0.83	0.86	0.89	0.79	0.87	0.80	0.78	1.42										
CZE	0.68	0.75	0.80	0.75	0.61	0.83	0.74	0.73	0.77	0.76	0.63	0.77	0.83	0.68	0.68	0.80	13.85								
EST	0.62	0.69	0.61	0.62	0.62	0.62	0.61	0.64	0.62	0.61	0.61	0.61	0.70	0.61	0.75	0.69	0.66	23.25							
IRL	0.74	0.71	0.85	0.72	0.61	0.79	0.77	0.78	0.91	0.78	0.71	0.85	0.72	0.65	0.79	0.84	0.75	0.64	0.71						
KOR	0.67	0.78	0.77	0.73	0.61	0.69	0.77	0.74	0.80	0.74	0.64	0.78	0.78	0.69	0.75	0.83	0.72	0.67	0.76	2.15					
PRT	0.60	0.69	0.76	0.66	0.61	0.75	0.74	0.70	0.77	0.75	0.60	0.81	0.73	0.68	0.69	0.80	0.72	0.62	0.72	0.75	1.13				
SVN	0.66	0.62	0.66	0.64	0.61	0.65	0.70	0.61	0.65	0.71	0.61	0.61	0.61	0.84	0.62	0.63	0.61	0.63	0.62	0.74	0.61	18.50			
LVA	0.61	0.61	0.60	0.61	0.61	0.63	0.60	0.61	0.61	0.60	0.60	0.60	0.61	0.60	0.61	0.61	0.60	0.62	0.61	0.61	0.60	0.62	0.34		

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	LVA	
AUS	0.61																								
BEL	0.94	1.44																							
CAN	0.90	0.97	6.16																						
CHE	0.92	0.96	0.97	11.24																					
DEU	0.91	0.97	0.98	0.96	12.17																				
DFS	0.91	0.98	0.97	0.96	0.98	11.51																			
ESP	0.90	0.97	0.97	0.97	0.97	0.96	1.14																		
FRA	0.94	0.98	0.97	0.97	0.97	0.96	0.97	1.03																	
GBR	0.93	0.96	0.97	0.95	0.97	0.95	0.95	0.98	1.40																
ITA	0.87	0.94	0.95	0.92	0.95	0.93	0.95	0.95	0.94	1.45															
NLD	0.90	0.96	0.97	0.95	0.98	0.96	0.96	0.96	0.97	0.94	5.01														
USA	0.89	0.94	0.97	0.94	0.96	0.96	0.95	0.96	0.97	0.93	0.96	1.43													
HUN	0.91	0.96	0.95	0.95	0.97	0.95	0.97	0.97	0.95	0.95	0.95	0.94	1.05												
POL	0.87	0.94	0.94	0.93	0.94	0.94	0.94	0.93	0.92	0.94	0.93	0.90	0.94	14.52											
NZL	0.94	0.89	0.88	0.89	0.88	0.87	0.87	0.93	0.93	0.87	0.88	0.89	0.89	0.87	0.34										
ZAF	0.94	0.94	0.91	0.91	0.91	0.92	0.92	0.94	0.93	0.87	0.92	0.91	0.93	0.87	0.89	0.88									
JPN	0.87	0.95	0.97	0.95	0.96	0.96	0.96	0.94	0.92	0.93	0.95	0.94	0.94	0.94			1.43								
CZE	0.87	0.95	0.97	0.92	0.98	0.96	0.95	0.95	0.96	0.95	0.96	0.96	0.96	0.93	0.87	0.90	0.93	14.47							
EST	0.87	0.91	0.94	0.90	0.94	0.94	0.93	0.90	0.91	0.91	0.94	0.92	0.91	0.93	0.84	0.87	0.93	0.94	18.87						
IRL	0.92	0.91	0.92	0.92	0.93	0.90	0.90	0.94	0.98	0.91	0.93	0.93	0.90	0.87	0.93	0.89	0.87	0.91	0.86	1.83					

[illegible]

ZAF	0.74	0.77	0.86	0.82	0.86	0.86	0.82	0.83	0.89	0.71	0.83	0.82	0.83	0.80	0.79	0.85									
JPN	0.74	0.76	0.94	0.91	0.89	0.91	0.85	0.87	0.90	0.85	0.88	0.91	0.88	0.88	0.81	0.81	1.44								
CZE	0.72	0.85	0.86	0.85	0.92	0.90	0.79	0.88	0.89	0.75	0.87	0.78	0.92	0.89	0.76	0.90	0.85	14.27							
EST	0.64	0.77	0.80	0.77	0.80	0.86	0.67	0.81	0.77	0.60	0.78	0.70	0.83	0.80	0.67	0.73	0.72	0.81	18.34						
IRL	0.76	0.73	0.82	0.80	0.82	0.72	0.85	0.81	0.91	0.84	0.83	0.88	0.70	0.80	0.83	0.77	0.77	0.72	0.63	1.17					
KOR	0.68	0.76	0.68	0.73	0.70	0.78	0.75	0.74	0.68	0.57	0.66	0.63	0.78	0.73	0.68	0.79	0.72	0.81	0.64	0.65	3.15				
SVN	0.50	0.75	0.50	0.56	0.68	0.53	0.63	0.60	0.50	0.47	0.65	0.50	0.54	0.60	0.55	0.50	0.56	0.63	0.46	0.51	0.66	17.92			
PRT	0.56	0.73	0.66	0.63	0.62	0.69	0.72	0.66	0.63	0.55	0.64	0.63	0.59	0.62	0.71	0.65	0.69	0.61	0.58	0.63	0.68	0.62	1.35		
LVA	0.66	0.84	0.77	0.74	0.79	0.78	0.69	0.79	0.75	0.63	0.76	0.70	0.81	0.79	0.76	0.71	0.75	0.84	0.73	0.64	0.72	0.62	0.60	0.34	

HOL	ruh																							
	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT	LVA
AUS	0.39																							
BEL	0.83	1.24																						
CAN	0.76	0.90	5.60																					
CHE	0.82	0.91	0.93	11.30																				
DEU	0.80	0.89	0.88	0.89	12.99																			
DFS	0.77	0.90	0.85	0.91	0.95	11.54																		
ESP	0.80	0.87	0.85	0.88	0.91	0.90	0.68																	
FRA	0.77	0.88	0.83	0.87	0.91	0.93	0.89	1.01																
GBR	0.76	0.82	0.71	0.79	0.84	0.89	0.84	0.88	1.38															
ITA	0.69	0.74	0.69	0.70	0.80	0.83	0.84	0.81		1.23														
NLD	0.73	0.84	0.75	0.83	0.92	0.92	0.89	0.89	0.88	0.82	4.12													
USA	0.75	0.85	0.81	0.84	0.90	0.93	0.88	0.88	0.92	0.87	0.88	1.45												
HUN	0.79	0.82	0.80	0.78	0.87	0.84	0.88	0.82	0.82	0.81	0.81	0.83	0.99											
POL	0.70	0.83	0.71	0.78	0.84	0.89	0.87	0.88	0.84	0.87	0.87	0.85	0.83	13.14										
NZL	0.79	0.82	0.73	0.82	0.83	0.86	0.83	0.85	0.91	0.77	0.84	0.89	0.82	0.80	0.39									
ZAF	0.69	0.74	0.69	0.79	0.76	0.82	0.79	0.75	0.86	0.75	0.77	0.81	0.77	0.70	0.81	0.79								
JPN	0.80	0.92	0.92	0.92	0.91	0.92	0.93	0.90	0.82	0.80	0.85	0.87	0.85	0.88	0.82	0.78	1.46							
CZE	0.78	0.88	0.88	0.86	0.89	0.85	0.81	0.82	0.71	0.70	0.76	0.77	0.85	0.72	0.76	0.78	0.86	14.40						
EST	0.69	0.74	0.72	0.75	0.79	0.82	0.77	0.83	0.74	0.81	0.77	0.82	0.77	0.84	0.76	0.68	0.82	0.75	17.20					
IRL	0.70	0.76	0.69	0.72	0.76	0.83	0.81	0.81	0.91	0.85	0.83	0.88	0.78	0.79	0.83	0.78	0.76	0.69	0.76	1.04				
KOR	0.71	0.80	0.84	0.79	0.74	0.71	0.77	0.70	0.69	0.69	0.69	0.69	0.71	0.69	0.72	0.70	0.83	0.78	0.69	0.70	3.29			
SVN	0.75	0.92	0.89	0.85	0.90	0.89	0.88	0.88	0.75	0.79	0.83	0.83	0.78	0.80	0.72	0.72	0.90	0.86	0.78	0.74	0.76	14.71		
PRT	0.70	0.78	0.69	0.69	0.77	0.82	0.82	0.81	0.85	0.80	0.81	0.81	0.78	0.80	0.76	0.75	0.78	0.69	0.70	0.79	0.69	0.79	1.15	
LVA	0.69	0.72	0.70	0.70	0.77	0.72	0.72	0.72	0.70	0.69	0.72	0.70	0.69	0.69	0.69	0.69	0.73	0.70	0.70	0.69	0.69	0.78	0.69	0.40

HOL	usu																							
	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT	LVA
AUS	0.35																							
BEL	0.65	1.46																						
CAN	0.78	0.77	5.39																					
CHE	0.77	0.87	0.91	11.93																				
DEU	0.74	0.80	0.93	0.94	11.51																			
DFS	0.70	0.86	0.81	0.89	0.83	11.56																		
ESP	0.78	0.68	0.82	0.81	0.80	0.79	0.66																	
FRA	0.74	0.86	0.78	0.86	0.77	0.91	0.82	1.02																
GBR	0.81	0.63	0.79	0.80	0.74	0.82	0.90	0.87	1.34															
ITA	0.69	0.66	0.75	0.77	0.77	0.75	0.88	0.80		1.39														
NLD	0.80	0.77	0.82	0.86	0.80	0.90	0.90	0.92	0.93	0.80	4.25													
USA	0.79	0.68	0.81	0.80	0.76	0.87	0.91	0.87	0.94	0.86	0.92	1.43												
HUN	0.72	0.89	0.81	0.90	0.85	0.91	0.78	0.91	0.78	0.76	0.84	0.80	1.01											
POL	0.71	0.80	0.88	0.90	0.95	0.81	0.82	0.77	0.72	0.76	0.80	0.76	0.87	15.86										
NZL	0.59	0.58	0.57	0.57	0.57	0.57	0.68	0.57	0.60	0.65	0.57	0.66	0.57	0.58	0.38									
ZAF	0.76	0.61	0.65	0.67	0.58	0.75	0.77	0.73	0.81	0.60	0.78	0.82	0.76	0.65	0.60	0.84								
JPN	0.59	0.95	0.73	0.84	0.76	0.84	0.62	0.88	0.63	0.63	0.75	0.67	0.88	0.76	0.57	0.58	1.62							
CZE	0.58	0.88	0.81	0.85	0.87	0.77	0.65	0.73	0.60	0.68	0.67	0.63	0.88	0.88	0.57	0.57	0.84	13.86						
EST	0.69	0.88	0.81	0.86	0.84	0.85	0.71	0.81	0.69	0.61	0.79	0.69	0.86	0.84	0.56	0.62	0.87	0.85	18.87					
IRL	0.78	0.67	0.81	0.79	0.78	0.75	0.87	0.80	0.90	0.86	0.84	0.87	0.75	0.77	0.71	0.73	0.62	0.66	0.66	1.07				
KOR	0.64	0.72	0.83	0.76	0.82	0.68	0.71	0.63	0.58	0.69	0.66	0.67	0.73	0.84	0.57	0.63	0.66	0.75	0.64	0.68	2.48			
SVN	0.65	0.77	0.87	0.86	0.90	0.75	0.67	0.67	0.59	0.59	0.65	0.62	0.74	0.87	0.58	0.54	0.72	0.84	0.79	0.68	0.74	19.91		
PRT	0.68	0.65	0.77	0.77	0.82	0.70	0.79	0.65	0.71	0.73	0.71	0.69	0.73	0.80	0.57	0.57	0.57	0.72	0.66	0.74	0.69	0.71	1.47	
LVA	0.57	0.58	0.61	0.64	0.62	0.64	0.72	0.69	0.71	0.65	0.63	0.66	0.66	0.64	0.63	0.59	0.58	0.59	0.58	0.71	0.57	0.61	0.63	0.29

[illegible]

ITA	0.89	0.92	0.92	0.90	0.93	0.91	0.92	0.92	0.95	1.41														
NLD	0.93	0.98	0.93	0.97	0.98	0.98	0.98	0.91	0.98	0.92	4.88													
USA	0.94	0.94	0.95	0.94	0.96	0.95	0.96	0.94	0.97	0.92	0.96	1.40												
HUN	0.89	0.96	0.89	0.96	0.95	0.95	0.95	0.89	0.92	0.89	0.95	0.90	1.10											
POL	0.92	0.97	0.91	0.97	0.98	0.98	0.97	0.90	0.96	0.92	0.98	0.94	0.96	14.86										
ZAF	0.91	0.92	0.89	0.91	0.91	0.92	0.94	0.89	0.92	0.89	0.92	0.91	0.91	0.93	0.86									
JPN	0.93	0.98	0.93	0.98	0.98	0.98	0.98	0.92	0.97	0.92	0.98	0.97	0.95	0.98	0.94	1.39								
CZE	0.92	0.97	0.92	0.97	0.98	0.97	0.97	0.91	0.96	0.92	0.97	0.95	0.95	0.98	0.92	0.98	14.24							
EST	0.90	0.94	0.89	0.95	0.96	0.96	0.94	0.89	0.93	0.91	0.95	0.92	0.95	0.97	0.88	0.95	0.96	16.44						
IRL	0.91	0.94	0.93	0.91	0.94	0.92	0.93	0.93	0.97	0.93	0.93	0.94	0.89	0.92	0.89	0.93	0.92	0.90	1.75					
KOR	0.89	0.92	0.89	0.92	0.92	0.93	0.94	0.89	0.92	0.89	0.93	0.91	0.91	0.93	0.89	0.94	0.91	0.91	0.89	4.10				
SVN	0.89	0.95	0.89	0.95	0.96	0.93	0.94	0.89	0.95	0.92	0.96	0.91	0.93	0.94	0.89	0.94	0.93	0.92	0.91	0.89	17.96			
PRT	0.89	0.95	0.91	0.94	0.95	0.94	0.93	0.89	0.93	0.92	0.95	0.92	0.91	0.94	0.89	0.94	0.94	0.92	0.91	0.89	0.94	1.84		
LVA	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	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.44	
NZL	0.96	0.93	0.96	0.92	0.94	0.92	0.93	0.95	0.95	0.91	0.94	0.94	0.90	0.93	0.89	0.94	0.93	0.88	0.92	0.90	0.88	0.89	0.87	0.52

HOL	rtp																							
	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	POL	NZL	JPN	CZE	EST	IRL	KOR	SVN	PRT	ZAF	HUN	LVA
AUS	0.43																							
BEL	0.92	1.41																						
CAN	0.89	0.97	6.09																					
CHE	0.91	0.97	0.98	11.83																				
DEU	0.89	0.96	0.97	0.97	14.05																			
DFS	0.86	0.94	0.94	0.94	0.96	11.03																		
ESP	0.89	0.96	0.97	0.96	0.97	0.95	0.82																	
FRA	0.89	0.97	0.98	0.98	0.97	0.95	0.97	0.99																
GBR	0.90	0.96	0.97	0.96	0.97	0.95	0.96	0.97	1.38															
ITA	0.86	0.90	0.89	0.89	0.92	0.91	0.92	0.92	0.91	1.24														
NLD	0.90	0.96	0.97	0.97	0.98	0.97	0.97	0.97	0.97	0.92	4.87													
USA	0.88	0.94	0.95	0.93	0.96	0.97	0.96	0.94	0.96	0.91	0.96	1.54												
POL	0.86	0.95	0.95	0.94	0.97	0.94	0.96	0.95	0.95	0.91	0.96	0.93	14.60											
NZL	0.91	0.94	0.94	0.93	0.93	0.88	0.92	0.95	0.95	0.86	0.93	0.90	0.93	0.47										
JPN	0.90	0.97	0.98	0.97	0.96	0.96	0.97	0.97	0.96	0.91	0.98	0.96	0.95	0.93	1.55									
CZE	0.89	0.96	0.95	0.95	0.96	0.94	0.94	0.94	0.95	0.90	0.95	0.94	0.95	0.91	0.95	14.29								
EST	0.91	0.95	0.94	0.95	0.96	0.92	0.94	0.94	0.95	0.90	0.96	0.92	0.94	0.90	0.94	0.94	16.13							
IRL	0.86	0.89	0.89	0.88	0.87	0.87	0.87	0.88	0.89	0.86	0.87	0.86	0.86	0.89	0.88	0.86	0.86	1.25						
KOR	0.86	0.93	0.93	0.94	0.93	0.93	0.96	0.94	0.91	0.90	0.94	0.91	0.92	0.89	0.94	0.89	0.90	0.86	2.05					
SVN	0.87	0.93	0.94	0.94	0.95	0.92	0.95	0.94	0.94	0.90	0.96	0.93	0.94	0.91	0.93	0.93	0.93	0.88	0.92	14.40				
PRT	0.86	0.90	0.90	0.88	0.91	0.89	0.92	0.89	0.92	0.86	0.90	0.90	0.92	0.88	0.90	0.89	0.89	0.86	0.86	0.91	1.42			
ZAF	0.88	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.87	0.86	0.57		
HUN	0.88	0.95	0.93	0.94	0.96	0.94	0.96	0.95	0.95	0.90	0.95	0.94	0.96	0.91	0.95	0.95	0.94	0.86	0.90	0.94	0.90	0.86	1.03	
LVA	0.86	0.91	0.89	0.89	0.88	0.89	0.91	0.91	0.90	0.86	0.90	0.86	0.89	0.88	0.89	0.89	0.89	0.86	0.88	0.89	0.88	0.86	0.91	0.43

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	0.92																							
BEL	0.63	1.21																						
CAN	0.62	0.67	4.89																					
CHE	0.62	0.78	0.83	10.94																				
DEU	0.49	0.68	0.74	0.84	12.60																			
DFS	0.60	0.62	0.69	0.81	0.78	10.32																		
ESP	0.64	0.65	0.74	0.81	0.76	0.82	0.68																	
FRA	0.55	0.75	0.71	0.88	0.82	0.86	0.88	1.03																
GBR	0.66	0.69	0.76	0.89	0.86	0.86	0.84	0.88	0.99															
ITA	0.51	0.70	0.69	0.80	0.76	0.80	0.86	0.88	0.81	0.79														
NLD	0.56	0.64	0.72	0.83	0.87	0.89	0.86	0.87	0.88	0.81	2.98													
USA	0.60	0.62	0.74	0.85	0.81	0.86	0.84	0.86	0.88	0.84	0.87	0.87												
HUN	0.57	0.70	0.69	0.80	0.81	0.72	0.77	0.77	0.81	0.79	0.73	0.76	1.01											
POL	0.57	0.81	0.68	0.79	0.78	0.71	0.75	0.79	0.80	0.80	0.75	0.76	0.75	14.93										
NZL	0.77	0.48	0.66	0.65	0.66	0.62	0.63	0.57	0.72	0.53	0.66	0.69	0.60	0.53	0.30									
JPN	0.58	0.79	0.74	0.91	0.71	0.73	0.79	0.81	0.77	0.81	0.76	0.81	0.73	0.83	0.54	0.58								
CZE	0.59	0.67	0.78	0.82	0.85	0.75	0.77	0.78	0.80	0.73	0.77	0.77	0.83	0.75	0.65	0.70	12.99							
EST	0.45	0.57	0.65	0.58	0.65	0.56	0.56	0.58	0.56	0.56	0.61	0.55	0.66	0.56	0.51	0.56	0.70	18.32						
IRL	0.57	0.48	0.65	0.67	0.62	0.63	0.63	0.63	0.79	0.62	0.60	0.64	0.63	0.65	0.58	0.57	0.60	0.49	0.89					
KOR	0.57	0.56	0.54	0.59	0.55	0.57	0.66	0.63	0.55	0.64	0.57	0.60	0.57	0.64	0.48	0.59	0.55	0.59	0.41	6.06				

SVN	0.49	0.76	0.55	0.67	0.65	0.64	0.61	0.69	0.69	0.68	0.59	0.62	0.59	0.79	0.44	0.64	0.58	0.61	0.52	0.57	14.32	
PRT	0.54	0.63	0.61	0.69	0.73	0.73	0.76	0.77	0.80	0.77	0.78	0.76	0.69	0.76	0.51	0.75	0.68	0.56	0.57	0.62	0.60	0.29

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	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	JPN	CZE	EST	IRL	SVN	PRT
AUS	1.26																				
BEL	0.67	1.28																			
CAN	0.69	0.81	6.23																		
CHE	0.79	0.84	0.92	11.66																	
DEU	0.72	0.80	0.89	0.91	13.50																
DFS	0.66	0.83	0.89	0.86	0.85	13.82															
ESP	0.74	0.68	0.75	0.86	0.82	0.70	0.71														
FRA	0.66	0.80	0.88	0.93	0.91	0.88	0.80	0.96													
GBR	0.83	0.68	0.77	0.85	0.81	0.69	0.86	0.74	1.43												
ITA	0.69	0.79	0.85	0.92	0.86	0.84	0.84	0.90	0.82	1.17											
NLD	0.68	0.81	0.90	0.94	0.91	0.85	0.81	0.91	0.78	0.85	4.75										
USA	0.74	0.71	0.87	0.89	0.83	0.72	0.84	0.78	0.87	0.85	0.85	1.16									
HUN	0.71	0.78	0.82	0.86	0.85	0.75	0.80	0.78	0.79	0.77	0.76	0.77	1.15								
POL	0.72	0.81	0.75	0.79	0.81	0.70	0.71	0.76	0.80	0.80	0.76	0.75	0.72	15.04							
NZL	0.81	0.67	0.79	0.88	0.79	0.67	0.78	0.77	0.84	0.73	0.83	0.87	0.77	0.74	0.42						
JPN	0.75	0.81	0.88	0.92	0.88	0.77	0.78	0.83	0.84	0.87	0.86	0.87	0.79	0.86	0.81	0.73					
CZE	0.67	0.86	0.88	0.90	0.91	0.88	0.77	0.90	0.74	0.85	0.86	0.77	0.88	0.77	0.74	0.83	12.86				
EST	0.68	0.83	0.87	0.88	0.84	0.93	0.76	0.88	0.75	0.86	0.84	0.73	0.82	0.70	0.73	0.77	0.87	16.07			
IRL	0.81	0.66	0.67	0.78	0.72	0.66	0.80	0.66	0.95	0.75	0.70	0.81	0.72	0.73	0.81	0.76	0.67	0.70	0.93		
SVN	0.68	0.75	0.69	0.70	0.73	0.69	0.68	0.69	0.69	0.69	0.69	0.69	0.69	0.84	0.68	0.72	0.70	0.71	0.68	14.63	
PRT	0.70	0.68	0.74	0.75	0.74	0.68	0.76	0.71	0.79	0.75	0.77	0.76	0.71	0.75	0.74	0.79	0.71	0.69	0.73	0.69	0.42

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	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	JPN	CZE	EST	IRL	SVN	PRT
AUS	0.73																			
BEL	0.66	1.70																		
CAN	0.35	0.63	4.75																	
CHE	0.57	0.75	0.83	11.38																
DEU	0.38	0.76	0.71	0.79	11.59															
DFS	0.35	0.58	0.79	0.74	0.74	12.56														
ESP	0.40	0.69	0.73	0.77	0.70	0.80	0.76													
FRA	0.56	0.80	0.67	0.77	0.76	0.57	0.75	0.96												
GBR	0.52	0.73	0.66	0.80	0.72	0.68	0.79	0.84	1.59											
ITA	0.52	0.72	0.59	0.71	0.71	0.57	0.73	0.78	0.67	1.58										
NLD	0.46	0.82	0.66	0.74	0.76	0.59	0.65	0.81	0.73	0.67	4.83									
USA	0.52	0.69	0.61	0.79	0.73	0.65	0.75	0.69	0.72	0.79	0.68	1.45								
HUN	0.60	0.75	0.56	0.62	0.68	0.56	0.57	0.76	0.62	0.71	0.67	0.68	1.17							
POL	0.49	0.67	0.56	0.69	0.66	0.56	0.62	0.66	0.56	0.73	0.56	0.78	0.72	18.92						
JPN	0.45	0.63	0.65	0.79	0.77	0.69	0.70	0.58	0.58	0.73	0.59	0.85	0.59	0.75	0.54					
CZE	0.50	0.75	0.61	0.74	0.78	0.58	0.66	0.67	0.62	0.79	0.62	0.83	0.79	0.83	0.79	17.30				
EST	0.47	0.65	0.57	0.60	0.66	0.57	0.58	0.68	0.58	0.58	0.75	0.59	0.67	0.57	0.59	0.66	19.55			
IRL	0.58	0.72	0.61	0.79	0.66	0.62	0.68	0.68	0.79	0.67	0.63	0.67	0.65	0.61	0.69	0.62	0.43	1.35		
SVN	0.40	0.77	0.57	0.65	0.66	0.58	0.57	0.71	0.57	0.67	0.67	0.69	0.81	0.73	0.70	0.72	0.69	0.60	22.02	
PRT	0.35	0.56	0.56	0.56	0.56	0.56	0.60	0.67	0.58	0.66	0.62	0.60	0.64	0.59	0.56	0.59	0.66	0.45	0.63	0.19

HOL	loc
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	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	CZE	IRL	KOR	SVN	PRT	EST	HUN	POL
BEL	1.78																		
CAN	0.85	6.64																	
CHE	0.56	0.61	12.49																
DEU	0.67	0.75	0.69	11.40															
DFS	0.88	0.91	0.51	0.69	13.18														
ESP	0.63	0.74	0.68	0.73	0.75	0.85													
FRA	0.79	0.77	0.73	0.82	0.69	0.77	0.96												
GBR	0.65	0.68	0.89	0.82	0.65	0.79	0.85	1.51											
ITA	0.59	0.68	0.64	0.74	0.60	0.77	0.76	0.73	1.90										
NLD	0.84	0.82	0.70	0.82	0.78	0.70	0.82	0.78	0.63	4.26									
USA	0.65	0.78	0.50	0.77	0.74	0.74	0.72	0.67	0.74	0.68	1.52								

CZE	0.51	0.59	0.56	0.61	0.61	0.65	0.61	0.64	0.69	0.50	0.59	20.36							
IRL	0.57	0.57	0.54	0.63	0.52	0.64	0.69	0.73	0.62	0.63	0.56	0.51	1.65						
KOR	0.55	0.53	0.51	0.51	0.51	0.53	0.57	0.51	0.51	0.51	0.50	0.51	0.51	9.86					
SVN	0.76	0.72	0.57	0.78	0.75	0.71	0.83	0.66	0.68	0.70	0.70	0.65	0.54	0.53	26.55				
PRT	0.50	0.50	0.53	0.57	0.50	0.61	0.53	0.59	0.59	0.51	0.50	0.59	0.50	0.50	0.64	1.90			
EST	0.53	0.51	0.53	0.55	0.52	0.52	0.54	0.52	0.51	0.56	0.51	0.52	0.53	0.62	0.70	0.53	22.29		
HUN	0.68	0.69	0.51	0.66	0.73	0.65	0.75	0.67	0.65	0.64	0.66	0.83	0.51	0.52	0.76	0.55	0.55	1.16	
POL	0.54	0.65	0.54	0.68	0.55	0.58	0.70	0.55	0.69	0.52	0.73	0.74	0.54	0.51	0.80	0.52	0.52	0.67	19.21

JER	sta									
	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.53									
CAN	0.90	6.84								
DFS	0.90	0.97	11.71							
GBR	0.91	0.96	0.94	1.16						
ITA	0.87	0.95	0.93	0.95	1.71					
NZL	0.87	0.84	0.86	0.90	0.88	0.37				
USA	0.89	0.97	0.95	0.96	0.94	0.89	1.39			
ZAF	0.87	0.86	0.84	0.92	0.88	0.89	0.85	8.64		
NLD	0.88	0.95	0.97	0.94	0.92	0.85	0.93	0.87	5.00	
CHE	0.89	0.96	0.96	0.94	0.93	0.85	0.94	0.86	0.97	11.46

JER	bde
AUS	0.32
CAN	
DFS	
GBR	
ITA	
NZL	
ZAF	
NLD	
USA	
CHE	

CAN	0.78	5.70								
DFS	0.75	0.86	13.78							
GBR	0.74	0.87	0.86	1.57						
ITA	0.70	0.73	0.78	0.84	1.54					
NZL	0.78	0.69	0.70	0.69	0.70	0.38				
ZAF	0.79	0.72	0.81	0.79	0.71	0.74	8.57			
NLD	0.70	0.82	0.83	0.89	0.87	0.70	0.78	4.44		
USA	0.68	0.70	0.73	0.76	0.90	0.69	0.71	0.86	0.90	
CHE	0.74	0.87	0.92	0.89	0.83	0.71	0.78	0.89	0.82	13.10

JER ang

	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE	
AUS	0.33									
CAN	0.67	7.36								
DFS	0.69	0.69	11.75							
GBR	0.81	0.83	0.70	1.38						
ITA	0.73	0.84	0.83	0.84	1.73					
USA	0.70	0.83	0.70	0.83	0.79	0.90				
ZAF	0.62	0.63	0.66	0.79	0.82	0.67	8.51			
NLD	0.72	0.82	0.76	0.81	0.80	0.74	0.65	5.59		
CHE	0.65	0.78	0.75	0.71	0.75	0.72	0.65	0.77	9.90	

JER ran

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.35									
CAN	0.88	5.82								
DFS	0.89	0.96	11.47							
GBR	0.94	0.95	0.95	1.33						
ITA	0.88	0.95	0.94	0.95	1.64					
NZL	0.90	0.88	0.88	0.92	0.90	0.31				
USA	0.89	0.96	0.96	0.97	0.94	0.91	1.14			
ZAF	0.88	0.88	0.88	0.89	0.88	0.88	0.88	8.86		
NLD	0.90	0.96	0.95	0.96	0.94	0.88	0.94	0.91	4.90	
CHE	0.91	0.96	0.95	0.95	0.94	0.91	0.94	0.89	0.95	13.29

JER rwi

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.32									
CAN	0.80	6.28								
DFS	0.81	0.91	12.02							
GBR	0.80	0.92	0.86	1.37						
ITA	0.77	0.85	0.81	0.84	1.47					
NZL	0.88	0.82	0.80	0.80	0.80	0.30				
USA	0.76	0.81	0.80	0.83	0.88	0.78	0.87			
ZAF	0.77	0.78	0.78	0.80	0.79	0.77	0.78	9.00		
NLD	0.84	0.93	0.90	0.87	0.78	0.84	0.80	0.79	4.93	
CHE	0.82	0.92	0.82	0.85	0.79	0.80	0.78	0.78	0.91	13.19

JER rls

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.18									
CAN	0.67	6.27								
DFS	0.67	0.90	12.54							
GBR	0.71	0.85	0.74	1.66						
ITA	0.67	0.86	0.81	0.80	1.91					
NZL	0.66	0.66	0.67	0.67	0.68	0.12				
USA	0.66	0.95	0.86	0.86	0.84	0.66	0.83			
ZAF	0.70	0.68	0.67	0.72	0.67	0.79	0.70	11.79		
NLD	0.72	0.91	0.91	0.84	0.84	0.67	0.87	0.73	3.88	
CHE	0.74	0.92	0.87	0.80	0.80	0.68	0.85	0.70	0.91	9.86

JER	rlr								
	AUS	CAN	DFS	ITA	ZAF	NLD	USA	CHE	
AUS	0.21								
CAN	0.52	6.45							
DFS	0.53	0.80	13.71						
ITA	0.56	0.81	0.72	1.46					
ZAF	0.51	0.52	0.52	0.55	11.93				
NLD	0.58	0.86	0.89	0.73	0.59	5.55			
USA	0.50	0.69	0.61	0.83	0.52	0.74	0.83		
CHE	0.62	0.68	0.62	0.62	0.55	0.70	0.58	12.46	

JER	fan								
	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE
AUS	0.22								
CAN	0.61	6.66							
DFS	0.62	0.88	12.73						
GBR	0.70	0.79	0.76	1.50					
ITA	0.62	0.75	0.68	0.70	1.61				
USA	0.61	0.87	0.83	0.84	0.80	0.77			
ZAF	0.66	0.64	0.66	0.81	0.65	0.73	9.46		
NLD	0.67	0.73	0.77	0.85	0.70	0.75	0.69	4.08	
CHE	0.64	0.81	0.81	0.70	0.70	0.75	0.66	0.71	11.94

JER	fua									
	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.37									
CAN	0.71	5.82								
DFS	0.68	0.86	12.71							
GBR	0.74	0.94	0.86	1.72						
ITA	0.67	0.86	0.74	0.87	1.50					
NZL	0.81	0.72	0.72	0.79	0.69	0.42				
USA	0.73	0.93	0.87	0.92	0.89	0.73	1.38			
ZAF	0.69	0.90	0.88	0.92	0.78	0.75	0.88	11.76		
NLD	0.72	0.90	0.86	0.92	0.86	0.79	0.89	0.82	5.67	
CHE	0.76	0.92	0.85	0.87	0.80	0.71	0.87	0.88	0.89	11.77

JER	ruh									
	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.35									
CAN	0.72	6.66								
DFS	0.73	0.82	10.69							
GBR	0.79	0.78	0.83	1.41						
ITA	0.71	0.72	0.79	0.82	1.36					
NZL	0.71	0.72	0.77	0.76	0.80	0.41				
USA	0.77	0.82	0.90	0.90	0.84	0.75	1.12			
ZAF	0.81	0.70	0.77	0.86	0.84	0.76	0.83	9.13		
NLD	0.74	0.76	0.92	0.87	0.82	0.81	0.89	0.76	4.44	
CHE	0.78	0.91	0.86	0.81	0.71	0.76	0.84	0.74	0.83	12.66

JER	usu									
	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.38									
CAN	0.73	6.29								
DFS	0.71	0.82	13.41							
GBR	0.78	0.85	0.85	1.74						
ITA	0.66	0.76	0.74	0.83	1.60					
NZL	0.58	0.59	0.59	0.61	0.64	0.40				
USA	0.75	0.82	0.90	0.85	0.83	0.60	0.90			
ZAF	0.73	0.75	0.71	0.79	0.63	0.59	0.72	9.83		

NLD	0.81	0.82	0.88	0.92	0.79	0.60	0.89	0.79	4.88	
CHE	0.77	0.90	0.85	0.81	0.78	0.61	0.84	0.75	0.85	11.63

JER	ude
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	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE	
AUS	0.35									
CAN	0.92	5.61								
DFS	0.88	0.93	12.25							
GBR	0.89	0.97	0.93	1.47						
ITA	0.91	0.95	0.94	0.94	1.64					
USA	0.88	0.96	0.95	0.94	0.95	1.63				
ZAF	0.87	0.88	0.88	0.89	0.88	0.88	10.26			
NLD	0.89	0.96	0.96	0.96	0.95	0.96	0.90	5.17		
CHE	0.93	0.95	0.93	0.93	0.95	0.95	0.89	0.96	9.70	

JER	ftp
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	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE	
AUS	0.46										
CAN	0.89	6.23									
DFS	0.88	0.92	12.70								
GBR	0.90	0.94	0.88	1.31							
ITA	0.87	0.87	0.87	0.87	1.62						
NZL	0.88	0.92	0.87	0.88	0.87	0.31					
USA	0.86	0.95	0.92	0.93	0.87	0.89	1.16				
ZAF	0.87	0.93	0.87	0.92	0.87	0.89	0.89	9.99			
NLD	0.92	0.97	0.94	0.93	0.87	0.90	0.91	0.90	5.25		
CHE	0.92	0.96	0.93	0.91	0.87	0.88	0.90	0.88	0.96	10.24	

JER	ftl
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	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE	NZL	
AUS	0.33										
CAN	0.91	5.51									
DFS	0.92	0.92	13.87								
GBR	0.91	0.93	0.95	1.44							
ITA	0.90	0.92	0.91	0.93	1.87						
USA	0.90	0.91	0.94	0.97	0.92	0.97					
ZAF	0.90	0.89	0.92	0.95	0.90	0.96	10.74				
NLD	0.93	0.93	0.96	0.97	0.92	0.95	0.92	4.37			
CHE	0.91	0.92	0.95	0.96	0.90	0.93	0.92	0.96	11.51		
NZL	0.92	0.96	0.93	0.95	0.91	0.94	0.93	0.93	0.94	0.51	

JER	rtp
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	AUS	CAN	DFS	NZL	ZAF	NLD	USA	CHE		
AUS	0.32									
CAN	0.87	6.15								
DFS	0.87	0.93	13.12							
NZL	0.87	0.95	0.90	0.43						
ZAF	0.87	0.88	0.87	0.87	9.16					
NLD	0.90	0.96	0.95	0.91	0.87	5.36				
USA	0.87	0.93	0.95	0.87	0.86	0.94	1.25			
CHE	0.89	0.97	0.94	0.93	0.91	0.96	0.92	11.31		

JER	ocs
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	AUS	CAN	DFS	GBR	ITA	NZL	USA	NLD	CHE	
AUS	0.77									
CAN	0.54	5.18								
DFS	0.48	0.61	15.11							
GBR	0.62	0.75	0.77	2.92						
ITA	0.49	0.70	0.71	0.79	1.26					

DEU	0.77	0.87	10.01								
DFS	0.81	0.83	0.93	11.88							
GBR	0.78	0.86	0.92	0.90	1.60						
NOR	0.75	0.80	0.82	0.89	0.83	15.38					
NZL	0.78	0.70	0.73	0.73	0.75	0.80	0.35				
USA	0.70	0.76	0.89	0.84	0.89	0.82	0.73	1.33			
NLD	0.70	0.82	0.90	0.85	0.90	0.87	0.69	0.90	4.78		
CAM	0.86	0.82	0.84	0.83	0.83	0.82	0.85	0.83	0.83	5.92	
LVA	0.75	0.77	0.80	0.81	0.78	0.80	0.76	0.69	0.75	0.83	0.34

RDC ang

	AUS	CAN	DEU	DFS	GBR	USA	NLD	CAM	NOR	LVA
AUS	0.43									
CAN	0.66	6.79								
DEU	0.65	0.61	6.97							
DFS	0.67	0.67	0.66	7.11						
GBR	0.78	0.81	0.61	0.73	1.34					
USA	0.68	0.86	0.61	0.75	0.87	1.26				
NLD	0.72	0.82	0.61	0.75	0.83	0.76	5.13			
CAM	0.84	0.77	0.79	0.77	0.78	0.79	0.79	7.24		
NOR	0.69	0.75	0.76	0.63	0.77	0.77	0.73	0.77	16.03	
LVA	0.65	0.63	0.62	0.67	0.63	0.61	0.64	0.77	0.74	0.31

RDC ran

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM	LVA
AUS	0.45										
CAN	0.90	5.65									
DEU	0.91	0.97	9.15								
DFS	0.90	0.95	0.95	9.99							
GBR	0.93	0.97	0.97	0.95	1.56						
NOR	0.89	0.94	0.90	0.92	0.93	12.16					
NZL	0.92	0.90	0.89	0.88	0.92	0.93	0.29				
USA	0.89	0.98	0.96	0.94	0.97	0.93	0.90	1.71			
NLD	0.90	0.97	0.98	0.96	0.97	0.94	0.88	0.96	5.54		
CAM	0.94	0.93	0.92	0.92	0.93	0.93	0.93	0.93	0.92	5.49	
LVA	0.89	0.92	0.92	0.91	0.90	0.89	0.89	0.89	0.90	0.92	0.43

RDC rwi

	AUS	CAN	DEU	DFS	GBR	NZL	USA	NLD	CAM	NOR	LVA
AUS	0.44										
CAN	0.84	6.52									
DEU	0.79	0.94	9.78								
DFS	0.81	0.93	0.92	10.48							
GBR	0.84	0.92	0.89	0.89	1.47						
NZL	0.83	0.88	0.81	0.87	0.91	0.33					
USA	0.77	0.91	0.85	0.89	0.93	0.88	1.43				
NLD	0.83	0.94	0.95	0.92	0.88	0.83	0.81	6.19			
CAM	0.86	0.86	0.86	0.87	0.87	0.86	0.86	0.87	6.83		
NOR	0.81	0.87	0.83	0.95	0.87	0.88	0.87	0.88	0.87	13.84	
LVA	0.79	0.81	0.80	0.86	0.78	0.81	0.77	0.81	0.86	0.85	0.41

RDC rls

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM	LVA
AUS	0.22										
CAN	0.71	6.57									
DEU	0.73	0.95	9.09								
DFS	0.69	0.97	0.94	9.30							
GBR	0.79	0.77	0.85	0.76	1.55						
NOR	0.70	0.87	0.87	0.94	0.78	11.85					
NZL	0.67	0.67	0.68	0.67	0.68	0.72	0.12				
USA	0.71	0.93	0.93	0.93	0.82	0.83	0.67	1.05			

NLD	0.73	0.92	0.92	0.88	0.86	0.80	0.66	0.89	5.30		
CAM	0.75	0.80	0.79	0.79	0.79	0.80	0.79	0.80	0.80	6.93	
LVA	0.69	0.74	0.79	0.72	0.72	0.70	0.71	0.70	0.79	0.79	0.28

IRDC	rlr										

	AUS	CAN	DEU	DFS	NOR	NLD	USA	CAM	LVA		
AUS	0.18										
CAN	0.59	6.31									
DEU	0.60	0.88	10.37								
DFS	0.55	0.83	0.90	10.87							
NOR	0.57	0.78	0.83	0.84	13.34						
NLD	0.58	0.87	0.90	0.88	0.84	4.96					
USA	0.55	0.71	0.78	0.66	0.71	0.81	1.05				
CAM	0.73	0.72	0.72	0.73	0.71	0.71	0.71	6.81			
LVA	0.57	0.66	0.70	0.76	0.61	0.69	0.61	0.72	0.24		

IRDC	fan										

	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM	LVA	
AUS	0.24										
CAN	0.64	6.62									
DEU	0.68	0.81	13.46								
DFS	0.62	0.69	0.78	9.33							
GBR	0.74	0.78	0.90	0.73	1.60						
NOR	0.67	0.75	0.85	0.62	0.77	12.84					
USA	0.67	0.82	0.83	0.70	0.84	0.77	1.11				
NLD	0.67	0.74	0.88	0.78	0.87	0.73	0.79	5.23			
CAM	0.73	0.77	0.77	0.77	0.77	0.77	0.77	0.77	7.84		
LVA	0.66	0.64	0.64	0.64	0.63	0.71	0.63	0.65	0.77	0.27	

IRDC	fua										

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM	LVA
AUS	0.37										
CAN	0.78	5.30									
DEU	0.73	0.90	12.65								
DFS	0.73	0.78	0.85	11.66							
GBR	0.76	0.87	0.94	0.86	1.50						
NOR	0.80	0.79	0.78	0.87	0.78	12.10					
NZL	0.76	0.82	0.79	0.69	0.79	0.71	0.36				
USA	0.76	0.92	0.89	0.85	0.92	0.80	0.85	1.62			
NLD	0.73	0.92	0.93	0.82	0.93	0.67	0.83	0.90	4.19		
CAM	0.81	0.80	0.79	0.80	0.79	0.80	0.79	0.80	0.79	6.51	
LVA	0.67	0.75	0.76	0.79	0.76	0.74	0.73	0.70	0.74	0.78	0.36

IRDC	ruh										

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM	LVA
AUS	0.43										
CAN	0.79	5.62									
DEU	0.78	0.87	14.41								
DFS	0.79	0.87	0.88	10.72							
GBR	0.77	0.75	0.84	0.85	1.43						
NOR	0.75	0.84	0.88	0.86	0.82	12.28					
NZL	0.81	0.73	0.80	0.76	0.91	0.76	0.33				
USA	0.77	0.84	0.90	0.94	0.90	0.84	0.84	1.45			
NLD	0.75	0.75	0.91	0.92	0.88	0.90	0.83	0.89	4.10		
CAM	0.79	0.82	0.82	0.82	0.82	0.82	0.81	0.82	0.82	6.00	
LVA	0.76	0.73	0.75	0.82	0.71	0.74	0.74	0.70	0.75	0.82	0.39

IRDC	usu										

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM	LVA

AUS	0.31										
CAN	0.75	5.92									
DEU	0.72	0.90	12.20								
DFS	0.65	0.76	0.80	13.01							
GBR	0.81	0.77	0.74	0.76	1.95						
NOR	0.64	0.70	0.68	0.75	0.76	12.16					
NZL	0.62	0.70	0.61	0.59	0.64	0.68	0.33				
USA	0.78	0.82	0.76	0.85	0.86	0.78	0.69	1.23			
NLD	0.80	0.82	0.79	0.88	0.92	0.74	0.58	0.92	4.20		
CAM	0.81	0.76	0.76	0.76	0.77	0.76	0.75	0.77	0.78	5.65	
LVA	0.63	0.63	0.63	0.60	0.71	0.65	0.67	0.66	0.66	0.76	0.32

RDCude

	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM	LVA	
AUS	0.52										
CAN	0.89	5.68									
DEU	0.89	0.97	12.96								
DFS	0.88	0.95	0.93	10.70							
GBR	0.90	0.96	0.96	0.92	1.76						
NOR	0.89	0.91	0.89	0.87	0.92	14.20					
USA	0.88	0.97	0.95	0.95	0.96	0.92	1.38				
NLD	0.89	0.97	0.97	0.94	0.97	0.88	0.96	4.19			
CAM	0.91	0.92	0.92	0.92	0.92	0.92	0.92	0.92	4.52		
LVA	0.89	0.89	0.88	0.90	0.88	0.89	0.88	0.88	0.92	0.42	

RDCftp

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM	LVA
AUS	0.51										
CAN	0.92	6.13									
DEU	0.93	0.97	12.75								
DFS	0.88	0.95	0.92	11.91							
GBR	0.91	0.93	0.93	0.89	1.51						
NOR	0.88	0.91	0.88	0.92	0.91	14.19					
NZL	0.91	0.91	0.90	0.87	0.89	0.89	0.26				
USA	0.86	0.92	0.90	0.92	0.92	0.91	0.87	1.46			
NLD	0.93	0.98	0.97	0.95	0.94	0.92	0.91	0.90	4.44		
CAM	0.90	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	6.46	
LVA	0.88	0.87	0.87	0.87	0.87	0.88	0.88	0.86	0.87	0.91	0.39

RDCftl

	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM	LVA	NZL
AUS	0.57										
CAN	0.94	5.06									
DEU	0.93	0.94	13.89								
DFS	0.92	0.90	0.97	10.58							
GBR	0.94	0.93	0.97	0.93	1.48						
NOR	0.91	0.91	0.91	0.94	0.93	12.57					
USA	0.94	0.93	0.95	0.93	0.97	0.93	1.90				
NLD	0.93	0.93	0.98	0.97	0.97	0.95	0.96	5.03			
CAM	0.92	0.93	0.93	0.93	0.93	0.93	0.93	0.93	7.27		
LVA	0.91	0.90	0.90	0.91	0.89	0.93	0.89	0.90	0.93	0.47	
NZL	0.95	0.94	0.93	0.92	0.93	0.93	0.94	0.93	0.93	0.91	0.45

RDCrtp

	AUS	CAN	DEU	DFS	NOR	NZL	NLD	USA	CAM	LVA	
AUS	0.37										
CAN	0.89	6.00									
DEU	0.89	0.96	13.72								
DFS	0.87	0.93	0.96	12.29							
NOR	0.88	0.89	0.88	0.87	13.11						
NZL	0.92	0.95	0.92	0.89	0.89	0.35					

NLD	0.90	0.97	0.98	0.96	0.87	0.93	5.04			
USA	0.88	0.91	0.95	0.91	0.91	0.89	0.96	1.46		
CAM	0.90	0.91	0.91	0.91	0.91	0.91	0.91	0.91	6.14	
LVA	0.88	0.89	0.88	0.88	0.88	0.89	0.90	0.87	0.91	0.38

RDC	ocs									
	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0.99									
CAN	0.64	4.70								
DEU	0.52	0.74	20.54							
DFS	0.58	0.59	0.70	9.10						
GBR	0.66	0.73	0.73	0.86	1.59					
NOR	0.51	0.68	0.65	0.83	0.75	16.24				
NZL	0.73	0.58	0.61	0.54	0.63	0.61	0.28			
USA	0.62	0.76	0.81	0.70	0.85	0.75	0.73	0.57		
NLD	0.59	0.72	0.86	0.86	0.88	0.73	0.66	0.86	3.51	
CAM	0.74	0.75	0.75	0.76	0.75	0.76	0.72	0.77	0.78	6.16

RDC	ous									
	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	1.36									
CAN	0.72	5.30								
DEU	0.74	0.88	17.27							
DFS	0.69	0.78	0.81	10.00						
GBR	0.83	0.78	0.81	0.71	1.55					
NOR	0.72	0.80	0.81	0.80	0.82	13.08				
NZL	0.82	0.82	0.77	0.74	0.81	0.75	0.36			
USA	0.75	0.87	0.83	0.82	0.85	0.83	0.88	1.06		
NLD	0.71	0.89	0.90	0.85	0.78	0.80	0.83	0.86	4.69	
CAM	0.84	0.83	0.82	0.83	0.83	0.82	0.85	0.84	0.83	6.45

RDC	ofl									
	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM	
AUS	0.58									
CAN	0.40	4.38								
DEU	0.41	0.73	16.35							
DFS	0.38	0.79	0.78	12.99						
GBR	0.54	0.66	0.72	0.64	1.46					
NOR	0.46	0.69	0.71	0.58	0.75	13.02				
USA	0.57	0.59	0.73	0.61	0.68	0.74	1.43			
NLD	0.48	0.66	0.76	0.61	0.73	0.75	0.69	6.66		
CAM	0.56	0.75	0.75	0.75	0.75	0.75	0.75	0.75	6.84	

^LAPPENDIX II. Number of common bulls

BSW sta

common bulls below diagonal

common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	125	87	141	43	167	126	28	23
CHE	109	0	140	368	65	196	385	63	21
FRA	80	111	0	220	65	112	216	42	17
ITA	121	322	184	0	102	229	639	82	22
NLD	35	64	54	82	0	66	95	31	13
USA	159	161	88	171	54	0	247	32	22
DEA	106	322	172	554	82	202	0	76	18
SVN	25	60	42	74	31	26	69	0	7
GBR	21	20	17	21	12	21	17	6	0

BSW cwi

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

CAN	0	137	53	141	36	167	124	28	23
CHE	120	0	122	473	72	262	507	65	21
FRA	48	92	0	135	46	70	145	43	13
ITA	121	415	113	0	94	229	603	83	22
NLD	31	71	42	78	0	52	89	32	13
USA	159	228	51	171	45	0	229	33	22
DEA	105	414	113	517	80	177	0	77	17
SVN	25	61	43	75	32	27	70	0	7
GBR	21	20	13	21	12	21	17	6	0

BSW bde

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

CAN	0	145	87	141	36	126	23	23	167
CHE	127	0	190	528	76	570	48	21	291
FRA	80	151	0	220	59	216	37	17	112
ITA	121	469	184	0	94	639	67	22	229
NLD	31	74	51	78	0	90	29	13	52
DEA	106	473	172	554	81	0	60	18	247
SVN	21	46	38	61	28	56	0	7	24
GBR	21	20	17	21	12	17	6	0	22
USA	159	262	88	171	45	202	22	21	0

BSW ang

common bulls below diagonal						
common three quarter sib group above diagonal						
	CAN	CHE	FRA	NLD	USA	GBR

CAN	0	144	86	25	166	23
CHE	127	0	185	55	289	21
FRA	79	148	0	43	111	17
NLD	22	56	39	0	37	10
USA	158	262	87	33	0	22
GBR	21	20	17	9	21	0

BSW ran

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

CAN	0	145	87	141	43	167	126	28	23
CHE	127	0	190	528	77	291	570	64	21
FRA	80	151	0	220	65	112	216	42	17
ITA	121	469	184	0	102	229	639	82	22
NLD	35	74	54	82	0	66	95	31	13
USA	159	262	88	171	54	0	247	32	22
DEA	106	473	172	554	82	202	0	76	18
SVN	25	60	42	74	31	26	69	0	7
GBR	21	20	17	21	12	21	17	6	0

BSW rwi

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

CAN	0	145	53	43	167	126	23	23	137
CHE	127	0	122	77	291	570	21	48	521
FRA	48	92	0	46	70	145	13	37	135

NLD	35	74	42	0	66	95	13	29	100
USA	159	262	51	54	0	247	22	24	215
DEA	106	473	114	82	202	0	18	60	633
GBR	21	20	13	12	21	17	0	7	22
SVN	21	46	38	28	22	56	6	0	67
ITA	118	463	113	81	157	546	21	61	0

BSW rls

common bulls below diagonal									
common	three	quarter	sib	group	above diagonal				
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	145	87	141	43	167	126	28	23
CHE	127	0	190	528	77	291	570	64	21
FRA	80	151	0	220	65	112	216	42	17
ITA	121	469	184	0	102	229	639	82	22
NLD	35	74	54	82	0	66	95	31	13
USA	159	262	88	171	54	0	247	32	22
DEA	106	473	172	554	82	202	0	76	18
SVN	25	60	42	74	31	26	69	0	7
GBR	21	20	17	21	12	21	17	6	0

BSW fan

common bulls below diagonal									
common	three	quarter	sib	group	above diagonal				
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	145	87	141	35	167	126	28	23
CHE	127	0	190	528	75	291	570	64	21
FRA	80	151	0	220	59	112	216	42	17
ITA	121	469	184	0	93	229	639	82	22
NLD	30	73	51	77	0	51	89	31	13
USA	159	262	88	171	43	0	247	32	22
DEA	106	473	172	554	80	202	0	76	18
SVN	25	60	42	74	31	26	69	0	7
GBR	21	20	17	21	12	21	17	6	0

BSW hde

common bulls below diagonal									
common	three	quarter	sib	group	above diagonal				
	CAN	CHE	FRA	ITA	NLD	DEA	SVN	USA	
CAN	0	145	87	137	35	126	28	167	
CHE	127	0	190	522	75	570	64	291	
FRA	80	151	0	219	59	216	42	112	
ITA	118	464	184	0	92	633	82	215	
NLD	30	73	51	76	0	89	31	51	
DEA	106	473	172	546	80	0	76	247	
SVN	25	60	42	74	31	69	0	32	
USA	159	262	88	157	43	202	26	0	

BSW fua

common bulls below diagonal									
common	three	quarter	sib	group	above diagonal				
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	145	53	98	35	167	93	28	23
CHE	127	0	122	357	76	290	376	64	21
FRA	48	92	0	128	45	70	135	42	13
ITA	86	308	106	0	73	131	356	76	19
NLD	30	74	41	66	0	51	77	31	13
USA	159	262	51	98	44	0	147	32	22
DEA	79	306	106	320	70	109	0	75	15
SVN	25	60	42	69	31	26	68	0	7
GBR	21	20	13	18	12	21	15	6	0

BSW ruh

common bulls below diagonal

common three quarter sib group above diagonal

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BSW ruw

common bulls below diagonal

common three quarter sib group above diagonal

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BSW usu

common bulls below diagonal

common three quarter sib group above diagonal

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BSW ude

common bulls below diagonal

common three quarter sib group above diagonal

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BSW ftp

common bulls below diagonal

common three quarter sib group above diagonal

CAN

CHE

FRA

NLD

USA

DEA

SVN

GBR

ITA

CAN	0	145	87	45	167	115	28	23	129
CHE	127	0	190	87	291	538	64	21	486
FRA	80	151	0	68	112	203	42	17	203
NLD	37	83	56	0	69	98	33	13	100
USA	159	262	88	57	0	222	32	22	185
DEA	98	442	162	86	174	0	76	17	545
SVN	25	60	42	32	26	69	0	7	81
GBR	21	20	17	12	21	17	6	0	22
ITA	111	432	170	83	138	481	73	21	0

BSW ftl

common bulls below diagonal									
common three quarter sib group above diagonal									
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	145	87	141	43	167	126	28	23
CHE	127	0	190	528	77	291	570	64	21
FRA	80	151	0	220	65	112	216	42	17
ITA	121	469	184	0	102	227	639	82	22
NLD	35	74	54	82	0	66	95	31	13
USA	159	262	88	170	54	0	247	32	22
DEA	106	473	172	554	82	202	0	76	18
SVN	25	60	42	74	31	26	69	0	7
GBR	21	20	17	21	12	21	17	6	0

BSW rtp

common bulls below diagonal								
common three quarter sib group above diagonal								
	CAN	CHE	FRA	ITA	NLD	DEA	SVN	USA
CAN	0	135	82	96	33	91	28	51
CHE	121	0	184	355	82	375	64	49
FRA	74	145	0	151	59	154	42	17
ITA	84	306	125	0	80	355	76	41
NLD	29	81	51	72	0	85	33	20
DEA	78	305	117	320	76	0	75	44
SVN	25	60	42	69	32	68	0	15
USA	50	41	12	30	19	38	11	0

BSW ocs

common bulls below diagonal									
common three quarter sib group above diagonal									
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	137	76	141	43	167	93	28	23
CHE	120	0	152	472	72	262	371	63	21
FRA	71	119	0	180	56	94	147	41	17
ITA	121	413	153	0	100	226	392	80	22
NLD	35	71	50	82	0	66	77	31	13
USA	159	228	74	171	54	0	147	32	22
DEA	79	302	116	354	70	109	0	74	15
SVN	25	59	41	72	31	26	67	0	7
GBR	21	20	17	21	12	21	15	6	0

BSW ous

common bulls below diagonal									
common three quarter sib group above diagonal									
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	137	76	141	43	166	126	28	23
CHE	120	0	152	473	72	262	515	63	21
FRA	71	119	0	181	56	94	182	42	17
ITA	121	415	153	0	102	229	632	81	22
NLD	35	71	50	82	0	66	95	31	13

USA	158	228	74	171	54	0	245	32	22
DEA	105	424	145	550	82	198	0	76	18
SVN	25	59	42	73	31	26	69	0	7
GBR	21	20	17	21	12	21	17	6	0

BSW ofl

common bulls below diagonal									
common three quarter sib group above diagonal									
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	137	76	137	43	167	126	28	23
CHE	120	0	152	472	72	262	515	64	21
FRA	71	119	0	180	56	94	182	42	17
ITA	118	414	153	0	100	215	627	82	22
NLD	35	71	50	81	0	66	95	31	13
USA	159	228	74	157	54	0	245	32	22
DEA	105	424	145	543	82	198	0	76	18
SVN	25	60	42	74	31	26	69	0	7
GBR	21	20	17	21	12	21	17	6	0

BSW loc

BSW bcs

BSW ofr

common bulls below diagonal							
common three quarter sib group above diagonal							
	CAN	CHE	DEA	ITA	SVN	USA	FRA
CAN	0	139	127	101	28	169	56
CHE	122	0	511	357	64	261	122
DEA	108	422	0	397	75	241	145
ITA	89	307	345	0	75	131	128
SVN	26	60	68	68	0	32	41
USA	160	228	197	98	26	0	70
FRA	51	92	114	106	41	51	0

BSW tpl

common bulls below diagonal						
common three quarter sib group above diagonal						
	CAN	CHE	DEA	ITA	SVN	FRA
CAN	0	146	129	144	30	90
CHE	129	0	570	527	64	190
DEA	108	473	0	637	76	215
ITA	124	469	553	0	82	218
SVN	27	61	70	75	0	43
FRA	83	151	172	183	43	0

BSW oru

common bulls below diagonal							
common three quarter sib group above diagonal							
	CAN	CHE	DEA	ITA	SVN	USA	FRA
CAN	0	139	106	101	28	169	56
CHE	122	0	407	357	64	261	122
DEA	92	334	0	364	74	178	137
ITA	89	307	327	0	75	131	128
SVN	26	60	67	68	0	32	41
USA	160	228	136	98	26	0	70
FRA	51	92	108	106	41	51	0

BSW rle

common bulls below diagonal

common three quarter sib group above diagonal						
	CHE	DEA	ITA	SVN	USA	FRA
CHE	0	552	357	48	290	189
DEA	458	0	396	59	232	210
ITA	308	344	0	60	131	152
SVN	46	55	55	0	24	36
USA	262	186	98	22	0	112
FRA	150	169	126	37	88	0

BSW thp

common bulls below diagonal							
common three quarter sib group above diagonal							
	CAN	CHE	DEA	ITA	SVN	USA	FRA
CAN	0	96	79	82	26	98	44
CHE	83	0	407	357	61	261	122
DEA	66	334	0	364	70	178	137
ITA	72	307	327	0	69	131	128
SVN	24	57	63	62	0	29	41
USA	90	228	136	98	23	0	70
FRA	39	92	108	106	41	51	0

BSW hoq

common bulls below diagonal						
common three quarter sib group above diagonal						
	CAN	CHE	DEA	ITA	SVN	FRA
CAN	0	146	129	140	29	90
CHE	129	0	570	521	63	190
DEA	108	473	0	631	75	215
ITA	121	464	545	0	81	217
SVN	26	60	69	74	0	42
FRA	83	151	172	183	42	0

BSW ful

common bulls below diagonal					
common three quarter sib group above diagonal					
	CHE	DEA	ITA	SVN	FRA
CHE	0	569	525	63	186
DEA	472	0	637	75	213
ITA	467	553	0	81	215
SVN	60	69	74	0	42
FRA	148	171	182	42	0

BSW udb

common bulls below diagonal					
common three quarter sib group above diagonal					
	CHE	DEA	ITA	SVN	FRA
CHE	0	342	331	63	137
DEA	291	0	354	74	154
ITA	292	320	0	76	149
SVN	60	68	69	0	42
FRA	108	117	124	42	0

BSW tdi

common bulls below diagonal					
common three quarter sib group above diagonal					
	CHE	DEA	ITA	SVN	FRA
CHE	0	569	518	62	186
DEA	472	0	631	75	213

	ITA	461	545	0	80	214
	SVN	59	69	73	0	42
	FRA	148	171	182	42	0

BSW tth						

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

	CHE	0	375	354	63	117
	DEA	305	0	355	74	133
	ITA	306	320	0	76	126
	SVN	60	68	69	0	42
	FRA	90	105	104	42	0

GUE sta						

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

	CAN	0	26	70	20	
	GBR	23	0	82	12	
	USA	60	80	0	25	
	AUS	21	10	23	0	

GUE cwi						

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

	CAN	0	26	70	20	
	GBR	23	0	82	12	
	USA	60	80	0	25	
	AUS	21	10	23	0	

GUE bde						

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

	CAN	0	26	70	20	
	GBR	23	0	82	12	
	USA	60	80	0	25	
	AUS	21	10	23	0	

GUE ang						

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

	CAN	0	26	70	20	
	GBR	23	0	82	12	
	USA	60	80	0	25	
	AUS	21	10	23	0	

GUE ran						

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

	CAN	0	26	70	20	
	GBR	23	0	82	12	
	USA	60	80	0	25	

AUS	21	10	23	0

GUE rwi				

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

CAN	0	26	70	20
GBR	23	0	82	12
USA	60	80	0	25
AUS	21	10	23	0

GUE rls				

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

CAN	0	26	70	20
GBR	23	0	82	12
USA	60	80	0	25
AUS	21	10	23	0

GUE rlr				

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

CAN	0	43	20	
USA	41	0	9	
AUS	21	8	0	

GUE fan				

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

CAN	0	26	70	20
GBR	23	0	82	12
USA	60	80	0	25
AUS	21	10	23	0

GUE fua				

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

CAN	0	26	70	20
GBR	23	0	82	12
USA	60	80	0	25
AUS	21	10	23	0

GUE ruh				

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

CAN	0	26	70	20
GBR	23	0	82	12
USA	60	80	0	25
AUS	21	10	23	0

GUE usu				

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

CAN	0	26	70	20
GBR	23	0	82	12
USA	60	80	0	25
AUS	21	10	23	0

GUE ude

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

CAN	0	26	68	19
GBR	23	0	82	12
USA	59	80	0	25
AUS	20	10	23	0

GUE ftp

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

CAN	0	26	70	20
GBR	23	0	82	12
USA	60	80	0	25
AUS	21	10	23	0

GUE ftl

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

CAN	0	26	70	20
GBR	23	0	82	12
USA	60	80	0	25
AUS	21	10	23	0

GUE rtp

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

CAN	0	20	70
AUS	21	0	25
USA	60	23	0

GUE ocs

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

CAN	0	12	70	20
GBR	9	0	34	9
USA	60	32	0	24
AUS	21	8	22	0

GUE ous

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

CAN	0	24	68	19
GBR	21	0	80	11
USA	59	78	0	25
AUS	20	9	23	0

GUE ofl

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

CAN	0	24	70	20
GBR	21	0	80	11
USA	60	78	0	25
AUS	21	9	23	0

GUE loc

GUE bcs

HOL sta

common bulls below diagonal																								
common three quarter			sib group			above diagonal																		
	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT	LVA
AUS	0	526	969	492	921	805	677	878	956	644	945	1161	473	623	519	310	598	570	109	444	364	116	586	266
BEL	460	0	733	570	982	712	650	894	811	688	1120	840	438	644	296	248	458	573	112	427	302	143	614	273
CAN	901	700	0	917	2210	1239	1447	1508	1775	1909	1506	3535	995	1322	397	376	1241	1202	219	490	788	209	1131	569
CHE	448	567	821	0	1054	620	603	721	775	740	882	968	393	576	260	218	416	510	107	383	303	124	529	271
DEU	642	930	1400	905	0	2187	1579	2380	1971	2300	2759	2970	1123	1927	472	372	1235	1737	298	627	625	344	1197	819
DFS	546	622	933	561	1307	0	1023	1600	1398	1215	1738	1720	749	1207	475	384	826	1112	226	565	482	214	879	456
ESP	527	629	970	503	915	749	0	1308	1166	1344	1207	1678	776	1066	343	366	894	947	165	445	560	186	925	426
FRA	633	889	1078	673	1290	922	1022	0	1603	1475	1985	2371	871	1607	519	381	1132	1286	182	585	572	203	983	473
GBR	823	809	1812	773	1363	981	952	1123	0	1551	1797	2295	836	1287	505	395	952	1115	208	790	568	209	1022	500
ITA	554	702	1722	679	1595	998	1019	1047	1370	0	1523	2474	980	1494	296	288	948	1257	243	470	639	275	1061	618
NLD	800	1225	1374	869	2073	1294	1046	1339	1542	1374	0	2341	853	1483	663	382	971	1465	258	713	539	245	1078	545
USA	994	733	3609	901	1707	1083	1162	1337	2119	2156	1922	0	1259	1784	569	467	1783	1711	272	630	961	234	1415	786
HUN	342	355	893	320	786	549	592	598	674	856	660	1158	0	834	267	279	611	890	152	339	476	151	714	383
POL	414	518	1027	423	1294	792	728	1038	1007	1210	1159	1522	667	0	333	292	806	1230	239	446	562	242	957	570
NZL	421	231	341	217	329	308	280	308	400	250	593	484	195	210	0	205	336	353	57	352	201	65	326	145
ZAF	287	212	349	192	293	302	339	317	368	251	345	495	236	218	186	0	309	303	54	238	232	56	331	138
JPN	321	261	478	245	384	332	354	354	405	411	396	547	256	292	166	197	0	785	127	352	558	133	656	350
CZE	374	429	851	367	1167	649	667	842	805	994	1253	1330	756	877	234	225	265	0	183	432	527	212	835	475
EST	54	66	130	56	181	146	74	90	117	146	171	191	86	137	29	23	37	102	0	81	91	62	143	134
IRL	406	408	454	375	505	448	418	513	841	436	649	581	272	329	287	226	203	321	41	0	226	95	419	197
KOR	256	214	724	215	385	316	405	353	430	534	376	1079	369	405	139	179	275	370	37	156	0	109	521	288
SVN	80	112	161	89	325	166	128	153	154	241	208	184	114	187	48	38	57	152	33	75	68	0	157	114
PRT	458	614	1150	477	986	767	900	870	933	1062	1071	1475	676	881	256	312	326	691	84	352	448	122	0	463
LVA	123	157	353	145	635	257	223	248	291	408	349	679	266	390	76	83	106	299	70	110	176	67	367	0

HOL cwi

common bulls below diagonal																								
common three quarter sib group												above diagonal												
	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT	LVA
AUS	0	519	969	492	920	804	689	769	956	644	890	1161	473	621	519	260	597	570	108	444	363	116	589	241
BEL	459	0	727	567	976	705	662	843	804	686	1067	823	435	640	292	217	448	571	112	424	301	143	615	253
CAN	901	700	0	917	2208	1239	1455	1374	1775	1909	1432	3535	995	1321	397	323	1237	1202	219	490	784	209	1133	543
CHE	448	566	821	0	1053	620	611	701	775	740	864	968	393	576	260	197	415	510	107	383	302	124	530	251
DEU	642	930	1400	905	0	2186	1603	2296	1969	2299	2716	2969	1122	1925	471	334	1232	1736	297	626	620	344	1196	790
DFS	546	621	933	561	1308	0	1045	1468	1396	1215	1660	1719	749	1203	474	330	825	1112	225	563	479	214	881	429
ESP	538	654	979	514	952	774	0	1265	1189	1355	1199	1696	785	1085	354	321	898	966	169	460	563	190	943	412
FRA	595	853	1025	652	1249	899	1029	0	1487	1462	1729	2045	845	1535	446	306	1013	1242	178	543	540	203	947	445
GBR	823	810	1812	773	1363	981	984	1085	0	1551	1731	2293	836	1285	505	339	950	1115	208	787	565	209	1023	472
ITA	554	702	1722	679	1595	998	1035	1042	1370	0	1516	2473	980	1495	296	280	945	1257	243	470	634	275	1061	609
NLD	766	1166	1317	846	2044	1271	1048	1212	1489	1370	0	2105	844	1459	637	320	899	1446	255	699	518	245	1060	511
USA	994	732	3609	901	1707	1082	1179	1193	2119	2156	1678	0	1259	1783	569	398	1779	1711	272	628	955	234	1417	755

HUN	342	355	893	320	786	549	601	591	674	856	647	1158	0	833	267	261	611	890	152	339	473	151	716	365
POL	414	518	1027	423	1294	792	750	1007	1006	1211	1148	1522	667	0	333	266	805	1230	238	446	560	242	959	548
NZL	421	231	341	217	329	308	288	287	400	250	572	484	195	210	0	168	336	353	57	352	200	65	327	127
ZAF	246	195	307	176	273	278	300	272	317	248	286	410	230	210	149	0	262	282	53	201	212	56	311	122
JPN	316	257	471	242	380	328	353	342	398	408	386	538	254	289	165	182	0	784	127	352	554	133	655	331
CZE	374	429	851	367	1167	649	691	816	805	994	1236	1330	756	877	234	213	263	0	183	432	525	212	837	459
EST	54	66	130	56	181	146	79	89	117	146	170	191	86	137	29	23	37	102	0	81	91	62	143	128
IRL	406	408	454	375	505	448	437	496	839	436	635	581	272	329	287	195	202	321	41	0	224	95	420	182
KOR	256	214	723	215	384	316	411	343	429	532	365	1072	367	404	139	162	271	369	37	156	0	109	519	276
SVN	80	112	161	89	325	166	133	153	154	241	208	184	114	187	48	38	57	152	33	75	68	0	157	114
PRT	459	616	1152	477	986	769	922	859	936	1062	1056	1475	678	884	256	300	320	693	84	353	446	122	0	445
LVA	110	145	338	134	612	243	218	235	272	404	326	657	253	377	66	75	101	291	65	99	173	67	354	0

HOL bde

common bulls below diagonal																									
common three quarter sib group above diagonal																									
	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	PRT	SVN	LVA	
AUS	0	526	969	492	921	804	679	877	956	644	919	1161	473	623	519	310	598	570	109	444	363	589	116	266	
BEL	460	0	733	570	982	711	652	893	811	688	1097	840	438	644	296	248	458	573	112	427	301	616	143	273	
CAN	901	700	0	917	2210	1239	1450	1507	1775	1909	1475	3535	995	1322	397	376	1240	1202	219	490	786	1133	209	569	
CHE	448	567	821	0	1054	620	604	722	775	740	876	968	393	576	260	218	416	510	107	383	302	530	123	271	
DEU	642	930	1400	905	0	2187	1584	2381	1971	2300	2746	2970	1123	1927	472	372	1235	1737	298	627	623	1197	343	819	
DFS	546	622	933	561	1307	0	1026	1599	1397	1215	1696	1719	749	1206	474	384	826	1112	226	564	480	882	213	456	
ESP	528	631	971	505	922	752	0	1312	1169	1347	1197	1681	778	1070	345	366	894	951	167	446	559	930	186	428	
FRA	632	888	1077	674	1291	922	1027	0	1603	1475	1911	2370	871	1606	519	381	1132	1286	182	585	569	986	202	473	
GBR	823	809	1812	773	1363	981	956	1123	0	1551	1768	2294	836	1287	505	395	952	1115	208	788	567	1025	208	500	
ITA	554	702	1722	679	1595	998	1021	1047	1370	0	1520	2474	980	1494	296	288	948	1257	243	470	637	1061	274	618	
NLD	795	1201	1367	868	2071	1293	1047	1318	1530	1373	0	2213	849	1473	650	373	937	1460	257	706	532	1074	243	540	
USA	994	733	3609	901	1707	1082	1164	1336	2119	2156	1880	0	1259	1784	569	467	1782	1711	272	629	958	1417	233	786	
HUN	342	355	893	320	786	549	594	598	674	856	660	1158	0	834	267	279	611	890	152	339	475	716	151	383	
POL	414	518	1027	423	1294	792	731	1037	1007	1210	1158	1522	667	0	333	292	806	1230	239	446	561	959	241	570	
NZL	421	231	341	217	329	308	281	308	400	250	591	484	195	210	0	205	336	353	57	352	200	327	65	145	
ZAF	287	212	349	192	293	302	340	317	368	251	343	495	236	218	186	0	309	303	54	238	231	331	55	138	
JPN	318	260	475	244	382	330	352	351	402	410	392	543	254	290	165	196	0	785	127	352	556	657	133	350	
CZE	374	429	851	367	1167	649	671	842	805	994	1252	1330	756	877	234	225	263	0	183	432	527	838	211	475	
EST	54	66	130	56	181	146	75	90	117	146	171	191	86	137	29	23	37	102	0	81	91	143	62	134	
IRL	406	408	454	375	505	448	419	513	839	436	646	581	272	329	287	226	202	321	41	0	225	420	95	197	
KOR	256	214	724	215	385	316	406	352	430	534	373	1075	369	405	139	178	273	370	37	156	0	521	109	288	
PRT	459	615	1152	477	986	769	906	872	935	1062	1069	1475	678	884	256	312	324	693	84	353	448	0	157	463	
SVN	80	112	161	89	325	166	128	152	154	240	206	184	114	187	48	38	57	152	33	75	68	122	0	114	
LVA	123	157	353	145	635	257	225	248	291	408	348	679	266	390	76	83	105	299	70	110	176	367	67	0	

HOL ang

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	LVA		
AUS	0	509	969	474	194	130	692	766	952	643	520	1158	470	613	306	597	570	107	442	363	578	111	266		
BEL	457	0	712	536	248	145	655	830	785	677	714	802	427	618	236	441	563	109	415	297	599	135	269		
CAN	901	695	0	879	553	267	1458	1369	1773	1907	1051	3535	990	1305	371	1237	1202	215	488	784	1116	195	569		
CHE	442	539	790	0	291	149	603	690	759	727	617	911	385	551	214	413	485	103	379	300	511	115	266		
DEU	161	241	516	256	0	340	383	450	461	683	675	572	272	512	27	192	325	117	126	141	253	167	283		
DFS	116	137	285	136	312	0	214	232	223	323	306	254	155	231	23	121	161	98	78	104	147	70	100		
ESP	540	657	980	510	264	199	0	1272	1192	1358	852	1700	782	1078	368	901	970	170	461	563	931	179	436		
FRA	594	850	1025	644	388	225	1043	0	1483	1452	1087	2035	838	1506	342	1010	1241	172	541	539	924	188	464		
GBR	823	801	1812	762	407	223	992	1083	0	1548	1093	2286	829	1265	388	949	1113	205	778	565	1001	195	499		
ITA	554	698	1722	671	624	310	1040	1039	1370	0	1280	2467	973	1463	284	943	1253	236	466	634	1046	257	616		
NLD	499	775	1081	595	693	302	773	939	1071	1232	0	1246	585	1096	207	528	1037	216	420	378	743	226	435		
USA	993	724	3609	847	514	244	1181	1191	2117	2156	1167	0	1252	1756	461	1779	1710	270	625	954	1390	219	786		
HUN	342	354	893	317	209	121	605	589	673	854	481	1156	0	822	275	610	886	151	335	472	702	145	380		
POL	414	507	1027	403	424	187	758	1001	1001	1191	972	1521	662	0	287	797	1212	232	438	556	930	220	564		
ZAF	284	209	346	188	20	22	339	295	365	247	186	490	234	215	0	305	298	51	235	228	323	50	136		
JPN	316	257	471	242	115	86	353	342	398	408	313	538	254	289	193	0	784	126	350	554	651	126	350		
CZE	374	429	851	355	243	118	696	816	805	994	1006	1330	756	877	221	263	0	180	430	525	823	201	475		
EST	54	65	130	56	77	79	81	89	117	145	153	191	85	135	23	37	102	0	79	91	136	61	133		
IRL	405	405	454	371	99	62	440	496	832	433	414	581	272	326	224	202	321	41	0	224	410	91	197		

KOR	256	214	723	214	106	83	411	343	429	532	289	1071	367	404	177	271	369	37	156	0	518	102	287
PRT	459	608	1152	466	227	137	924	859	933	1055	759	1474	677	870	308	320	693	82	352	446	0	150	457
SVN	79	111	160	89	159	53	132	149	153	235	204	183	114	180	34	56	152	33	73	68	120	0	108
LVA	123	157	353	143	225	44	241	246	291	408	289	679	266	390	82	105	299	70	110	175	367	66	0

HOL ran

common bulls below diagonal																									
common three quarter sib group above diagonal																									
	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT	LVA	
AUS	0	526	969	492	921	805	676	877	956	644	945	1161	473	623	519	310	598	570	109	444	364	117	589	266	
BEL	460	0	733	570	982	712	645	893	811	688	1120	840	438	644	296	248	458	573	112	427	302	144	616	273	
CAN	901	700	0	917	2210	1239	1442	1507	1775	1909	1506	3535	995	1322	397	376	1240	1202	219	490	788	210	1133	569	
CHE	448	567	821	0	1054	620	601	721	775	740	882	968	393	576	260	218	416	510	107	383	303	125	530	271	
DEU	642	930	1400	905	0	2187	1569	2380	1971	2300	2759	2970	1123	1927	472	372	1235	1737	298	627	625	345	1197	819	
DFS	546	622	933	561	1307	0	1016	1600	1398	1215	1738	1720	749	1207	475	384	826	1112	226	565	482	215	882	456	
ESP	526	623	965	500	904	741	0	1301	1160	1339	1200	1669	775	1062	341	366	890	943	165	444	559	187	925	425	
FRA	632	888	1077	673	1290	921	1012	0	1603	1475	1985	2370	871	1606	519	381	1132	1286	182	585	571	204	986	473	
GBR	823	809	1812	773	1363	981	944	1123	0	1551	1797	2295	836	1287	505	395	952	1115	208	790	568	210	1025	500	
ITA	554	702	1722	679	1595	998	1011	1047	1370	0	1523	2474	980	1494	296	288	948	1257	243	470	639	276	1061	618	
NLD	800	1225	1374	869	2073	1294	1038	1339	1542	1374	0	2341	853	1483	663	382	971	1465	258	713	539	246	1080	545	
USA	994	733	3609	901	1707	1082	1154	1336	2119	2156	1922	0	1259	1784	569	467	1782	1711	272	630	961	235	1417	786	
HUN	342	355	893	320	786	549	591	598	674	856	660	1158	0	834	267	279	611	890	152	339	476	152	716	383	
POL	414	518	1027	423	1294	792	722	1037	1007	1210	1159	1522	667	0	333	292	806	1230	239	446	562	243	959	570	
NZL	421	231	341	217	329	308	278	308	400	250	593	484	195	210	0	205	336	353	57	352	201	65	327	145	
ZAF	287	212	349	192	293	302	339	317	368	251	345	495	236	218	186	0	309	303	54	238	232	57	331	138	
JPN	320	260	476	244	383	331	353	353	404	411	395	545	255	291	165	196	0	785	127	352	557	134	657	350	
CZE	374	429	851	367	1167	649	665	842	805	994	1253	1330	756	877	234	225	265	0	183	432	527	213	838	475	
EST	54	66	130	56	181	146	74	90	117	146	171	191	86	137	29	23	37	102	0	81	91	63	143	134	
IRL	406	408	454	375	505	448	417	513	841	436	649	581	272	329	287	226	202	321	41	0	226	96	420	197	
KOR	256	214	724	215	385	316	403	352	430	534	376	1079	369	405	139	179	274	370	37	156	0	110	521	288	
SVN	81	113	162	90	326	167	129	154	155	242	209	185	115	188	48	38	58	153	33	76	69	0	158	115	
PRT	459	615	1152	477	986	769	898	872	935	1062	1073	1475	678	884	256	312	325	693	84	353	448	122	0	463	
LVA	123	157	353	145	635	257	221	248	291	408	349	679	266	390	76	83	105	299	70	110	176	67	367	0	

HOL rwi

common bulls below diagonal																									
common three quarter sib group above diagonal																									
	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	PRT	SVN	LVA	
AUS	0	501	969	492	921	805	676	877	956	644	943	1161	473	623	519	310	404	570	109	444	362	589	116	266	
BEL	457	0	713	563	960	691	629	851	780	686	1032	793	428	632	281	236	348	559	112	412	292	607	143	272	
CAN	901	690	0	917	2210	1239	1444	1507	1775	1909	1503	3535	995	1322	397	376	938	1202	219	490	785	1133	209	569	
CHE	448	563	821	0	1054	620	601	722	775	740	882	968	393	576	260	218	354	510	107	383	301	530	123	271	
DEU	642	924	1400	905	0	2187	1572	2381	1971	2300	2757	2970	1123	1927	472	372	996	1737	298	627	622	1197	343	819	
DFS	546	617	933	561	1307	0	1019	1600	1398	1215	1730	1720	749	1207	475	384	598	1112	226	565	479	882	213	456	
ESP	526	619	969	500	909	745	0	1303	1163	1342	1199	1672	776	1063	342	366	711	944	165	444	557	926	186	425	
FRA	632	875	1077	674	1291	922	1017	0	1603	1475	1980	2370	871	1606	519	381	824	1286	182	585	568	986	202	473	
GBR	823	792	1812	773	1363	981	949	1123	0	1551	1794	2295	836	1287	505	395	711	1115	208	790	566	1025	208	500	
ITA	554	702	1722	679	1595	998	1016	1047	1370	0	1523	2474	980	1494	296	288	876	1257	243	470	636	1061	274	618	
NLD	800	1129	1374	869	2072	1294	1040	1340	1541	1374	0	2334	853	1482	662	382	725	1465	257	712	534	1079	243	544	
USA	994	718	3609	901	1707	1082	1159	1336	2119	2156	1919	0	1259	1784	569	467	1261	1711	272	630	956	1417	233	786	
HUN	342	354	893	320	786	549	592	598	674	856	660	1158	0	834	267	279	516	890	152	339	474	716	151	383	
POL	414	515	1027	423	1294	792	725	1037	1007	1210	1159	1522	667	0	333	292	701	1230	239	446	560	959	241	570	
NZL	421	225	341	217	329	308	280	308	400	250	593	484	195	210	0	205	223	353	57	352	199	327	65	145	
ZAF	286	209	348	191	292	301	338	316	367	250	344	494	235	217	186	0	211	303	54	238	230	331	55	138	
JPN	277	232	435	225	354	300	309	314	354	398	351	485	237	280	141	151	0	642	115	264	470	534	130	310	
CZE	374	426	851	367	1167	649	666	842	805	994	1253	1330	756	877	234	225	245	0	183	432	526	838	211	475	
EST	54	66	130	56	181	146	74	90	117	146	171	191	86	137	29	23	37	102	0	81	91	143	62	134	
IRL	406	402	454	375	505	448	417	513	841	436	649	581	272	329	287	225	178	321	41	0	224	420	95	197	
KOR	256	214	724	215	385	316	405	352	430	534	376	1075	369	405	139	178	257	370	37	156	0	520	109	287	
PRT	459	611	1152	477	986	769	901	872	935	1062	1072	1475	678	884	256	311	294	693	84	353	448	0	157	463	
SVN	80	112	161	89	325	166	128	152	154	240	206	184	114	187	48	38	57	152	33	75	68	122	0	114	
LVA	123	157	353	145	635	257	221	248	291	408	349	679	266	390	76	83	101	299	70	110	176	367	67	0	

HOL rls

common bulls below diagonal															common three quarter sib group above diagonal									
	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT	LVA
AUS	0	526	969	492	921	805	680	877	956	644	945	1161	473	623	519	310	597	570	109	444	362	117	589	266
BEL	460	0	733	570	982	712	652	893	811	688	1120	840	438	644	296	248	456	573	112	427	300	144	616	273
CAN	901	700	0	917	2210	1239	1450	1507	1775	1909	1506	3535	995	1322	397	376	1237	1202	219	490	782	210	1133	569
CHE	448	567	821	0	1054	620	604	721	775	740	882	968	393	576	260	218	415	510	107	383	301	125	530	271
DEU	642	930	1400	905	0	2187	1586	2380	1971	2300	2759	2970	1123	1927	472	372	1233	1737	298	627	619	345	1197	819
DFS	546	622	933	561	1307	0	1029	1600	1398	1215	1738	1720	749	1207	475	384	825	1112	226	565	478	215	882	456
ESP	529	632	971	506	925	754	0	1314	1171	1347	1212	1681	778	1071	346	367	893	952	167	447	558	187	931	429
FRA	632	888	1077	673	1290	922	1030	0	1603	1475	1985	2370	871	1606	519	381	1130	1286	182	585	566	204	986	473
GBR	823	809	1812	773	1363	981	958	1123	0	1551	1797	2295	836	1287	505	395	950	1115	208	790	563	210	1025	500
ITA	554	702	1722	679	1595	998	1022	1047	1370	0	1523	2474	980	1494	296	288	946	1257	243	470	632	276	1061	618
NLD	800	1225	1374	869	2073	1294	1051	1339	1542	1374	0	2341	853	1483	663	382	969	1465	258	713	531	246	1080	545
USA	994	733	3609	901	1707	1083	1165	1336	2119	2156	1922	0	1259	1784	569	467	1779	1711	272	630	952	235	1417	786
HUN	342	355	893	320	786	549	595	598	674	856	660	1158	0	834	267	279	611	890	152	339	472	152	716	383
POL	414	518	1027	423	1294	792	732	1037	1007	1210	1159	1522	667	0	333	292	806	1230	239	446	559	243	959	570
NZL	421	231	341	217	329	308	282	308	400	250	593	484	195	210	0	205	336	353	57	352	199	65	327	145
ZAF	287	212	349	192	293	302	341	317	368	251	345	495	236	218	186	0	308	303	54	238	231	57	331	138
JPN	316	257	471	242	380	328	349	347	398	408	389	538	254	289	165	194	0	784	127	352	553	134	655	350
CZE	374	429	851	367	1167	649	673	842	805	994	1253	1330	756	877	234	225	263	0	183	432	523	213	838	475
EST	54	66	130	56	181	146	75	90	117	146	171	191	86	137	29	23	37	102	0	81	91	63	143	134
IRL	406	408	454	375	505	448	420	513	841	436	649	581	272	329	287	226	202	321	41	0	223	96	420	197
KOR	255	213	722	214	383	316	404	349	428	531	373	1069	367	404	138	178	270	368	37	155	0	109	517	287
SVN	81	113	162	90	326	167	129	154	155	242	209	185	115	188	48	38	58	153	33	76	68	0	158	115
PRT	459	616	1152	477	986	769	909	873	937	1063	1074	1476	679	884	256	312	320	694	84	353	445	122	0	463
LVA	123	157	353	145	635	257	226	248	291	408	349	679	266	390	76	83	105	299	70	110	175	67	367	0

HOL rlr

common bulls below diagonal															common three quarter sib group above diagonal									
	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT	LVA	
AUS	0	481	888	492	918	804	678	647	953	644	851	1160	469	584	262	559	452	108	429	277	116	587	241	
BEL	450	0	684	552	933	662	620	752	751	684	975	762	419	600	208	413	482	109	390	245	143	597	251	
CAN	846	679	0	894	2145	1143	1382	1234	1681	1903	1368	3341	980	1271	313	1115	1068	216	460	680	209	1110	541	
CHE	448	553	806	0	1053	619	606	668	775	740	855	968	389	558	198	408	444	107	376	254	123	527	251	
DEU	642	907	1397	905	0	2185	1588	2064	1967	2299	2693	2967	1118	1889	336	1204	1532	297	609	545	343	1193	791	
DFS	546	608	930	561	1307	0	1025	1255	1392	1215	1623	1718	744	1153	332	782	922	225	538	390	213	876	429	
ESP	531	621	960	507	933	760	0	1136	1171	1350	1163	1681	776	1042	322	859	847	166	437	480	187	935	410	
FRA	530	763	954	611	1185	832	916	0	1276	1429	1519	1701	787	1448	269	864	1055	170	462	458	202	872	428	
GBR	822	773	1739	772	1362	979	966	950	0	1551	1682	2287	830	1241	341	903	959	207	744	476	208	1019	473	
ITA	554	701	1722	679	1595	998	1026	1031	1370	0	1515	2473	980	1487	281	943	1220	243	466	594	274	1061	609	
NLD	738	1069	1297	841	2049	1266	1018	1127	1465	1370	0	2010	831	1408	316	867	1294	255	650	444	243	1049	511	
USA	994	708	3496	901	1707	1082	1168	1027	2118	2156	1645	0	1253	1733	401	1647	1501	272	602	820	233	1410	755	
HUN	342	348	891	320	786	549	596	556	673	856	651	1158	0	816	261	600	796	152	325	424	151	714	365	
POL	399	501	1006	410	1277	768	710	977	984	1207	1124	1492	657	0	253	770	1126	237	408	512	241	933	549	
ZAF	249	194	306	177	274	279	301	242	320	249	287	413	231	202	0	255	241	53	198	166	55	311	122	
JPN	311	256	469	242	380	327	345	327	394	408	383	531	254	283	182	0	673	125	325	466	133	645	329	
CZE	318	373	775	311	1050	569	576	686	693	971	1141	1177	664	821	177	248	0	176	350	451	209	757	445	
EST	54	65	130	56	181	146	75	86	117	146	170	191	86	136	23	37	97	0	79	86	62	142	128	
IRL	402	393	451	372	503	446	423	426	806	435	619	575	272	315	196	201	265	41	0	169	95	407	178	
KOR	194	188	633	187	345	272	340	311	352	506	316	916	325	382	120	237	322	35	121	0	107	455	261	
SVN	80	112	161	89	325	166	130	152	154	240	206	184	114	187	38	57	151	33	75	67	0	157	114	
PRT	457	605	1130	475	985	767	914	812	935	1063	1050	1472	678	869	300	319	627	83	351	395	122	0	445	
LVA	110	145	338	134	613	243	214	232	272	404	327	657	253	377	75	101	286	65	99	164	67	354	0	

HOL fan

common bulls below diagonal															common three quarter sib group above diagonal									
	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT	LVA	
AUS	0	499	969	492	657	804	689	874	956	644	909	1161	472	622	310	597	570	109	443	362	116	593	266	
BEL	457	0	711	561	786	687	646	850	779	686	1026	792	428	631	236	434	559	112	411	293	143	609	271	
CAN	901	690	0	917	1826	1239	1455	1498	1775	1909	1461	3535	994	1320	376	1237	1202	219	490	784	209	1134	569	
CHE	448	562	821	0	895	620	611	721	775	739	872	968	393	575	218	415	509	107	383	302	123	530	271	

DEU	530	774	1278	764	0	1588	1331	1792	1523	2159	2155	2266	910	1658	252	920	1372	272	465	527	337	981	759
DFS	546	617	933	561	1125	0	1045	1581	1396	1214	1683	1718	747	1204	384	825	1112	226	564	480	213	885	456
ESP	538	646	979	514	784	774	0	1327	1189	1355	1212	1696	784	1083	371	897	965	170	460	562	190	944	433
FRA	632	876	1077	673	1092	921	1063	0	1595	1475	1870	2351	868	1598	380	1125	1281	181	579	564	202	984	472
GBR	823	793	1812	773	1154	981	984	1124	0	1551	1753	2292	835	1283	394	949	1115	208	784	566	208	1026	500
ITA	554	702	1722	679	1519	998	1035	1047	1370	0	1515	2474	980	1493	288	946	1257	243	470	634	274	1060	618
NLD	790	1127	1361	867	1767	1291	1073	1302	1522	1372	0	2170	843	1459	371	928	1455	257	699	528	243	1071	539
USA	994	718	3609	901	1450	1082	1179	1329	2119	2156	1864	0	1258	1780	467	1778	1711	272	628	953	233	1417	786
HUN	342	354	893	320	650	548	601	598	674	856	658	1158	0	833	278	611	889	152	338	471	151	715	383
POL	414	515	1027	422	1180	791	748	1037	1006	1210	1151	1522	666	0	291	806	1227	237	444	558	240	957	569
ZAF	287	210	349	192	202	302	343	317	368	251	339	495	236	218	0	307	303	54	238	231	55	334	138
JPN	316	257	471	242	336	328	352	346	397	408	386	537	254	289	193	0	784	127	352	554	133	657	350
CZE	374	426	851	367	968	649	690	842	805	994	1251	1330	756	877	225	263	0	182	432	525	211	837	475
EST	54	66	130	56	167	146	79	90	117	146	171	191	86	136	23	37	102	0	81	91	62	142	134
IRL	405	402	454	375	397	448	437	513	835	436	645	581	272	329	226	202	321	41	0	224	95	420	197
KOR	255	214	722	215	346	316	408	348	429	532	370	1065	366	403	178	270	369	37	156	0	108	519	287
SVN	80	112	161	89	325	166	133	152	154	240	206	184	114	187	38	57	152	33	75	67	0	157	114
PRT	460	614	1153	478	850	770	925	874	940	1063	1070	1478	680	885	312	320	695	83	354	446	122	0	463
LVA	123	157	353	145	606	257	233	248	291	408	348	679	266	390	83	105	299	70	110	175	67	367	0

HOL fua

common bulls below diagonal																								
common three quarter sib group												above diagonal												
	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT	LVA
AUS	0	519	969	492	921	804	689	846	956	644	890	1161	473	622	519	310	597	570	109	444	363	114	589	266
BEL	459	0	729	569	978	707	664	880	806	687	1069	825	435	641	292	246	449	571	112	425	301	141	616	273
CAN	901	700	0	917	2209	1239	1455	1460	1775	1909	1432	3535	995	1322	397	376	1237	1202	219	490	787	207	1133	569
CHE	448	566	821	0	1054	620	611	720	775	740	864	968	393	576	260	218	415	510	107	383	302	122	530	271
DEU	642	930	1400	905	0	2187	1604	2368	1971	2300	2718	2970	1123	1926	472	372	1233	1737	298	627	624	340	1197	819
DFS	546	621	933	561	1308	0	1045	1555	1397	1215	1660	1719	749	1206	474	384	825	1112	226	564	481	212	882	456
ESP	538	654	979	514	952	774	0	1314	1190	1355	1199	1696	785	1085	354	371	898	965	170	460	564	188	943	433
FRA	631	885	1073	672	1290	920	1061	0	1574	1473	1838	2262	867	1598	499	373	1091	1278	181	574	560	200	980	470
GBR	823	810	1812	773	1363	981	984	1119	0	1551	1732	2294	836	1287	505	395	950	1115	208	788	567	206	1025	500
ITA	554	702	1722	679	1595	998	1035	1046	1370	0	1516	2473	980	1494	296	288	945	1257	243	470	638	272	1061	618
NLD	766	1166	1318	846	2044	1270	1047	1277	1490	1370	0	2107	844	1460	637	364	899	1446	255	699	521	242	1060	536
USA	994	732	3609	901	1707	1083	1179	1313	2119	2156	1678	0	1259	1784	569	467	1779	1711	272	629	959	232	1417	786
HUN	342	355	893	320	786	549	601	598	674	856	647	1158	0	834	267	279	611	890	152	339	476	151	716	383
POL	414	518	1027	423	1294	792	749	1036	1007	1210	1150	1522	667	0	333	292	806	1230	239	446	562	239	959	570
NZL	421	231	341	217	329	308	288	308	400	250	572	484	195	210	0	205	336	353	57	352	200	64	327	145
ZAF	287	212	349	192	293	302	343	317	368	251	325	495	236	218	186	0	308	303	54	238	231	55	331	138
JPN	316	257	471	242	380	328	353	347	398	408	386	538	254	289	165	194	0	784	127	352	555	132	655	350
CZE	374	429	851	367	1167	649	690	840	805	994	1236	1330	756	877	234	225	263	0	183	432	527	212	838	475
EST	54	66	130	56	181	146	79	90	117	146	170	191	86	137	29	23	37	102	0	81	91	62	143	134
IRL	406	408	454	375	505	448	437	510	839	436	634	581	272	329	287	226	202	321	41	0	225	94	420	197
KOR	256	214	724	215	385	316	411	352	430	534	366	1075	369	405	139	178	271	370	37	156	0	108	521	288
SVN	79	111	160	89	321	165	132	152	153	239	207	183	114	186	47	37	56	152	33	74	68	0	155	113
PRT	459	616	1152	477	986	769	922	871	936	1062	1056	1475	678	884	256	312	320	693	84	353	448	121	0	463
LVA	123	157	353	145	635	257	233	248	291	408	345	679	266	390	76	83	105	299	70	110	176	66	367	0

HOL ruh

common bulls below diagonal																								
common three quarter sib group above diagonal																								
	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT	LVA
AUS	0	519	969	492	921	758	681	874	956	644	919	1161	473	623	519	310	598	570	109	444	363	116	588	266
BEL	459	0	729	569	978	696	651	883	805	687	1082	825	435	641	292	246	450	571	112	425	301	143	615	273
CAN	901	700	0	917	2210	1161	1451	1498	1775	1909	1475	3535	995	1322	397	376	1239	1202	219	490	787	209	1131	569
CHE	448	566	821	0	1054	616	606	721	775	740	876	968	393	576	260	218	415	510	107	383	302	124	530	271
DEU	642	930	1400	905	0	2133	1588	2375	1971	2300	2746	2970	1123	1927	472	372	1234	1737	298	627	624	344	1195	819
DFS	546	621	933	561	1307	0	988	1515	1338	1214	1662	1626	741	1186	447	357	772	1078	224	547	468	214	872	452
ESP	529	633	972	507	926	755	0	1309	1173	1348	1200	1683	779	1073	347	369	895	953	167	448	561	186	930	430
FRA	632	887	1077	673	1290	922	1032	0	1596	1475	1905	2351	869	1604	516	380	1127	1281	182	580	568	203	982	472
GBR	823	808	1811	773	1362	980	957	1121	0	1551	1768	2294	836	1287	505	395	951	1115	208	788	567	209	1023	500
ITA	554	702	1722	679	1595	997	1023	1047	1369	0	1520	2474	980	1494	296	288	947	1257	243	470	638	275	1061	618
NLD	795	1196	1367	868	2071	1293	1050	1317	1529	1373	0	2213	849	1473	650	373	936	1460	257	706	533	245	1073	540
USA	994	732	3609	901	1707	1082	1166	1329	2119	2156	1880	0	1259	1784	569	467	1781	1711	272	629	960	234	1415	786

HUN	342	355	893	320	786	549	596	598	674	856	660	1158	0	834	267	279	611	890	152	339	476	151	716	383
POL	414	518	1027	423	1294	792	734	1037	1007	1210	1158	1522	667	0	333	292	806	1230	239	446	562	242	957	570
NZL	421	231	341	217	329	308	282	308	400	250	591	484	195	210	0	205	336	353	57	352	200	65	327	145
ZAF	287	212	349	192	293	302	342	317	368	251	343	495	236	218	186	0	309	303	54	238	231	56	330	138
JPN	316	258	473	242	381	329	351	348	399	409	389	540	254	289	165	195	0	785	127	352	556	133	657	350
CZE	374	429	851	367	1167	649	674	842	805	994	1252	1330	756	877	234	225	263	0	183	432	527	212	837	475
EST	54	66	130	56	181	146	75	90	117	146	171	191	86	137	29	23	37	102	0	81	91	62	142	134
IRL	406	408	454	375	505	448	421	513	839	436	646	581	272	329	287	226	202	321	41	0	225	95	420	197
KOR	256	214	724	215	385	316	407	352	430	534	373	1076	369	405	139	179	272	370	37	156	0	109	521	288
SVN	80	112	161	89	325	166	128	153	154	241	208	184	114	187	48	38	57	152	33	75	68	0	157	114
PRT	459	615	1152	477	986	766	908	872	935	1062	1069	1475	678	884	256	312	322	693	84	353	448	122	0	463
LVA	123	157	353	145	635	257	227	248	291	408	348	679	266	390	76	83	105	299	70	110	176	67	367	0

HOL usu

common bulls below diagonal																									
common three quarter sib group above diagonal																									
	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT	LVA	
AUS	0	519	969	492	921	805	692	877	956	644	945	1161	473	623	519	310	597	570	109	444	362	117	589	266	
BEL	459	0	729	569	978	708	667	886	806	687	1091	825	435	641	292	246	449	571	112	425	300	144	616	273	
CAN	901	700	0	917	2210	1239	1458	1507	1775	1909	1506	3535	995	1322	397	376	1237	1202	219	490	782	210	1133	569	
CHE	448	566	821	0	1054	620	612	721	775	740	882	968	393	576	260	218	415	510	107	383	301	125	530	271	
DEU	642	930	1400	905	0	2187	1614	2380	1971	2300	2759	2970	1123	1927	472	372	1233	1737	298	627	619	345	1197	819	
DFS	546	621	934	561	1308	0	1052	1600	1398	1215	1738	1720	749	1207	475	384	825	1112	226	565	478	215	882	456	
ESP	539	658	980	514	967	781	0	1343	1196	1360	1245	1701	786	1092	357	371	901	970	171	462	562	191	947	436	
FRA	632	888	1077	673	1290	922	1079	0	1604	1475	1986	2370	871	1606	519	381	1130	1286	182	585	566	204	986	473	
GBR	823	810	1812	773	1363	981	992	1124	0	1551	1798	2295	836	1287	505	395	950	1115	208	790	563	210	1025	500	
ITA	554	702	1722	679	1595	998	1040	1047	1370	0	1523	2474	980	1494	296	288	946	1257	243	470	632	276	1061	618	
NLD	800	1204	1374	869	2073	1294	1091	1340	1543	1374	0	2341	853	1483	663	382	969	1465	258	713	531	246	1080	545	
USA	994	732	3609	901	1707	1084	1181	1336	2119	2156	1922	0	1259	1784	569	467	1779	1711	272	630	951	235	1417	786	
HUN	342	355	893	320	786	549	604	598	674	856	660	1158	0	834	267	279	611	890	152	339	472	152	716	383	
POL	414	518	1027	423	1294	792	757	1037	1007	1210	1159	1522	667	0	333	292	806	1230	239	446	559	243	959	570	
NZL	421	231	341	217	329	308	290	308	400	250	593	484	195	210	0	205	336	353	57	352	199	65	327	145	
ZAF	287	212	349	192	293	303	343	317	368	251	345	495	236	218	186	0	308	303	54	238	231	57	331	138	
JPN	316	257	471	242	380	328	353	347	398	408	389	538	254	289	165	194	0	784	127	352	553	134	655	350	
CZE	374	429	851	367	1167	649	694	842	805	994	1253	1330	756	877	234	225	263	0	183	432	523	213	838	475	
EST	54	66	130	56	181	146	80	90	117	146	171	191	86	137	29	23	37	102	0	81	91	63	143	134	
IRL	406	408	454	375	505	448	439	513	841	436	649	581	272	329	287	226	202	321	41	0	223	96	420	197	
KOR	255	213	722	214	383	316	409	349	428	531	373	1068	367	404	138	178	270	368	37	155	0	109	517	287	
SVN	81	113	162	90	326	167	134	154	155	242	209	185	115	188	48	38	58	153	33	76	68	0	158	115	
PRT	459	616	1152	477	986	769	926	873	937	1063	1074	1476	679	884	256	312	320	694	84	353	445	122	0	463	
LVA	123	157	353	145	635	257	241	248	291	408	349	679	266	390	76	83	105	299	70	110	175	67	367	0	

HOL ude

common bulls below diagonal																									
common three quarter sib group above diagonal																									
	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT	LVA		
AUS	0	523	969	492	921	805	678	877	956	644	953	1161	473	623	310	598	570	109	443	363	117	589	266		
BEL	458	0	730	568	977	708	650	887	806	688	1124	835	437	642	245	455	572	112	422	299	144	616	273		
CAN	901	696	0	917	2210	1239	1449	1507	1775	1909	1592	3535	995	1322	376	1240	1202	219	490	786	210	1133	569		
CHE	448	565	821	0	1054	620	603	721	775	740	907	968	393	576	218	416	510	107	383	302	125	530	271		
DEU	642	929	1400	905	0	2187	1581	2380	1971	2300	2839	2970	1123	1927	372	1235	1737	298	627	623	345	1197	819		
DFS	546	621	934	561	1307	0	1025	1600	1398	1215	1761	1720	749	1207	384	826	1112	226	565	480	215	882	456		
ESP	527	628	970	503	917	750	0	1310	1168	1346	1236	1679	777	1069	366	894	950	167	446	558	187	929	428		
FRA	632	886	1077	673	1290	922	1023	0	1603	1475	2018	2370	871	1606	381	1132	1286	182	585	569	204	986	473		
GBR	823	805	1812	773	1363	981	953	1123	0	1551	1851	2295	836	1287	395	952	1115	208	787	567	210	1025	500		
ITA	554	702	1722	679	1595	998	1019	1047	1370	0	1608	2475	981	1495	288	948	1257	243	470	637	276	1061	618		
NLD	809	1228	1470	893	2166	1313	1065	1366	1597	1464	0	2436	875	1527	383	978	1502	269	719	545	254	1102	562		
USA	994	729	3609	901	1707	1084	1162	1336	2119	2156	2027	0	1259	1785	467	1782	1711	272	630	958	235	1417	786		
HUN	342	355	893	320	786	549	593	598	674	856	676	1158	0	835	279	611	890	152	339	475	152	716	383		
POL	414	518	1027	423	1294	792	730	1037	1007	1211	1198	1522	668	0	292	806	1230	239	446	561	243	959	570		
ZAF	287	212	349	192	293	303	339	317	368	251	346	495	236	218	0	309	303	54	238	231	57	331	138		
JPN	320	260	476	244	383	331	353	353	404	411	401	545	255	291	196	0	785	127	352	556	134	657	350		
CZE	374	429	851	367	1167	649	669	842	805	994	1282	1330	756	877	225	265	0	183	432	527	213	838	475		
EST	54	66	130	56	181	146	75	90	117	146	178	191	86	137	23	37	102	0	81	91	63	143	134		
IRL	405	407	454	375	505	448	418	513	838	436	655	581	272	329	226	202	321	41	0	225	96	420	197		

KOR	256	214	724	215	385	316	405	352	430	534	384	1076	369	405	179	274	370	37	156	0	110	521	288
SVN	81	113	162	90	326	167	129	154	155	242	218	185	115	188	38	58	153	33	76	69	0	158	115
PRT	459	615	1152	477	986	769	904	872	935	1062	1088	1475	678	884	312	325	693	84	353	448	122	0	463
LVA	123	157	353	145	635	257	224	248	291	408	362	679	266	390	83	105	299	70	110	176	67	367	0

HOL ftp

common bulls below diagonal																											
common three quarter sib group above diagonal																											
	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT	LVA			
AUS	0	519	969	492	921	805	681	877	956	644	953	1161	473	623	519	310	598	570	108	444	363	115	589	241			
BEL	459	0	729	569	978	708	651	885	805	687	1101	825	435	641	292	246	451	571	112	425	301	142	616	253			
CAN	901	700	0	917	2210	1239	1450	1507	1775	1909	1592	3535	995	1322	397	376	1240	1202	219	490	787	207	1133	543			
CHE	448	566	821	0	1054	620	605	721	775	740	907	968	393	576	260	218	416	510	107	383	302	122	530	251			
DEU	642	930	1400	905	0	2187	1587	2380	1971	2300	2839	2970	1123	1928	472	372	1235	1737	297	627	624	340	1197	790			
DFS	546	621	934	561	1307	0	1029	1600	1398	1215	1761	1720	749	1207	475	384	826	1112	225	565	481	212	882	430			
ESP	529	633	971	506	925	754	0	1315	1172	1347	1240	1682	778	1072	347	368	894	952	166	447	560	185	931	408			
FRA	632	887	1077	673	1290	922	1031	0	1603	1475	2018	2370	871	1606	519	381	1132	1286	181	585	570	200	986	450			
GBR	823	809	1812	773	1363	981	958	1123	0	1551	1851	2295	836	1287	505	395	952	1115	208	790	567	206	1025	472			
ITA	554	702	1722	679	1595	998	1022	1047	1370	0	1608	2475	981	1496	296	288	948	1257	243	470	638	273	1061	609			
NLD	809	1216	1470	893	2166	1313	1069	1366	1597	1464	0	2436	875	1527	664	383	978	1502	268	719	547	250	1102	530			
USA	994	732	3609	901	1707	1083	1165	1336	2119	2156	2027	0	1259	1786	569	467	1782	1711	272	630	960	232	1417	755			
HUN	342	355	893	320	786	549	595	598	674	856	676	1158	0	835	267	279	611	890	152	339	476	152	716	365			
POL	414	518	1027	423	1294	792	733	1037	1007	1212	1198	1522	668	0	333	292	806	1230	238	446	562	240	959	548			
NZL	421	231	341	217	329	308	282	308	400	250	594	484	195	210	0	205	336	353	57	352	200	64	327	127			
ZAF	287	212	349	192	293	303	341	317	368	251	346	495	236	218	186	0	309	303	54	238	231	56	331	124			
JPN	318	260	475	244	382	330	352	351	402	410	399	543	254	290	165	196	0	785	127	352	556	133	657	331			
CZE	374	429	851	367	1167	649	673	842	805	994	1282	1330	756	877	234	225	263	0	183	432	527	212	838	459			
EST	54	66	130	56	181	146	75	90	117	146	178	191	86	137	29	23	37	102	0	81	91	63	143	128			
IRL	406	408	454	375	505	448	420	513	841	436	655	581	272	329	287	226	202	321	41	0	225	95	420	182			
KOR	256	214	724	215	385	316	406	352	430	534	384	1076	369	405	139	179	273	370	37	156	0	109	521	277			
SVN	80	112	161	90	321	165	128	152	154	240	217	184	115	187	47	37	57	153	33	75	69	0	156	114			
PRT	459	615	1152	477	986	769	907	872	935	1062	1088	1475	678	884	256	312	324	693	84	353	448	121	0	445			
LVA	110	145	338	134	612	243	212	236	272	404	340	657	253	377	66	75	101	291	65	99	174	66	354	0			

HOL ftl

common bulls below diagonal																											
common three quarter sib group above diagonal																											
	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT	LVA	NZL			
AUS	0	526	969	492	921	805	678	877	956	644	945	1161	473	623	310	590	570	109	443	364	115	589	266	71			
BEL	460	0	733	570	982	712	652	893	811	688	1120	840	438	644	248	457	573	112	427	302	142	616	273	56			
CAN	901	700	0	917	2210	1239	1449	1507	1775	1909	1506	3535	995	1322	376	1233	1202	219	490	788	207	1133	569	84			
CHE	448	567	821	0	1054	620	603	721	775	740	882	968	393	576	218	416	510	107	383	303	122	530	271	58			
DEU	642	930	1400	905	0	2187	1581	2380	1971	2300	2759	2970	1123	1928	372	1233	1737	298	627	625	340	1197	819	91			
DFS	546	622	934	561	1307	0	1025	1600	1398	1215	1738	1720	749	1207	384	820	1112	226	565	482	212	882	456	63			
ESP	527	630	970	503	918	750	0	1310	1168	1346	1209	1679	777	1069	366	884	950	167	446	560	185	929	428	72			
FRA	632	888	1077	673	1290	922	1023	0	1603	1475	1985	2370	871	1606	381	1125	1286	182	585	571	200	986	473	65			
GBR	823	809	1812	773	1363	981	954	1123	0	1551	1797	2295	836	1287	395	947	1115	208	787	568	206	1025	500	80			
ITA	554	702	1722	679	1595	998	1019	1047	1370	0	1523	2474	980	1495	288	948	1257	243	470	639	273	1061	618	83			
NLD	800	1225	1374	869	2073	1294	1048	1339	1542	1374	0	2341	853	1483	382	965	1465	258	713	539	242	1080	545	129			
USA	994	733	3609	901	1707	1084	1162	1336	2119	2156	1922	0	1259	1785	467	1762	1711	272	630	961	232	1417	786	86			
HUN	342	355	893	320	786	549	593	598	674	856	660	1158	0	834	279	610	890	152	339	476	152	716	383	53			
POL	414	518	1027	423	1294	792	730	1037	1007	1211	1159	1522	667	0	292	804	1230	239	446	562	240	959	570	65			
ZAF	287	212	349	192	293	303	339	317	368	251	345	495	236	218	0	306	303	54	238	232	56	331	138	20			
JPN	318	260	475	244	382	330	352	351	402	410	393	543	254	290	196	0	784	126	350	557	133	657	350	60			
CZE	374	429	851	367	1167	649	670	842	805	994	1253	1330	756	877	225	263	0	183	432	527	212	838	475	68			
EST	54	66	130	56	181	146	75	90	117	146	171	191	86	137	23	37	102	0	81	91	63	143	134	24			
IRL	405	408	454	375	505	448	419	513	838	436	649	581	272	329	226	202	321	41	0	226	95	420	197	53			
KOR	256	214	724	215	385	316	405	352	430	534	376	1079	369	405	179	273	370	37	156	0	109	521	288	54			
SVN	80	112	161	90	321	165	128	152	154	240	208	184	115	187	37	57	153	33	75	69	0	156	114	30			
PRT	459	615	1152	477	986	769	905	872	935	1062	1073	1475	678	884	312	324	693	84	353	448	121	0	463	61			
LVA	123	157	353	145	635	257	225	248	291	408	349	679	266	390	83	105	299	70	110	176	66	367	0	32			
NZL	75	51	83	50	83	57	65	60	77	75	124	89	39	49	21	54	54	12	45	46	19	59	16	0			

common bulls below diagonal															common three quarter sib group above diagonal																
	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	POL	NZL		JPN	CZE	EST	IRL	KOR	SVN	PRT	ZAF	HUN	LVA						
AUS	0	513	968	474	916	680	683	875	820	643	798	881	519	512	403	451	108	377	241	115	501	169	347	266							
BEL	458	0	722	543	967	652	653	873	726	687	990	721	557	288	349	487	112	366	219	142	543	145	342	273							
CAN	900	695	0	880	2202	1083	1451	1507	1596	1907	1442	3120	1218	392	938	1072	218	425	607	207	1011	227	855	569							
CHE	443	542	791	0	964	578	599	707	730	727	789	881	502	255	353	430	106	340	228	121	465	133	319	266							
DEU	641	928	1399	849	0	2038	1589	2372	1809	2297	2689	2642	1791	462	995	1529	297	554	486	340	1077	223	919	819							
DFS	507	583	904	521	1262	0	925	1395	1152	1199	1542	1323	1049	386	585	897	219	451	333	212	754	212	578	443							
ESP	530	638	973	504	931	708	0	1322	1063	1349	1145	1511	975	348	713	846	166	379	429	186	831	218	640	431							
FRA	632	884	1077	659	1288	866	1043	0	1334	1473	1678	1762	1446	510	824	1100	180	472	422	200	852	212	698	472							
GBR	735	744	1656	717	1303	877	850	995	0	1530	1553	1920	1141	398	695	932	196	597	416	205	876	221	658	484							
ITA	554	702	1722	671	1594	987	1026	1047	1363	0	1593	2430	1464	294	876	1220	242	455	539	273	1019	227	919	618							
NLD	715	1075	1356	784	2100	1216	994	1229	1367	1456	0	1825	1365	540	724	1314	262	582	400	250	945	213	699	546							
USA	823	693	3337	822	1625	984	1059	1098	1898	2148	1581	0	1592	395	1221	1450	262	503	716	232	1207	257	1018	765							
POL	356	454	969	359	1198	712	643	940	913	1185	1090	1401	0	255	679	1094	226	362	463	238	847	189	710	544							
NZL	418	229	339	214	328	277	284	307	332	250	496	356	166	0	221	263	56	287	129	64	257	101	170	144							
JPN	277	232	435	225	354	299	310	314	354	398	357	485	267	141	0	615	114	247	399	130	516	165	464	310							
CZE	318	373	775	302	1049	565	576	700	686	971	1164	1161	801	184	241	0	175	338	398	210	722	203	715	453							
EST	54	66	130	56	181	143	75	90	114	146	174	188	128	29	37	97	0	74	82	63	134	46	140	134							
IRL	359	369	413	338	473	387	369	435	612	428	560	506	277	244	178	264	41	0	144	95	346	126	248	189							
KOR	180	169	568	170	314	237	301	280	309	459	290	812	348	97	216	282	34	105	0	108	392	128	359	240							
SVN	80	112	161	90	321	165	130	152	154	240	217	184	187	47	57	152	33	75	69	0	156	54	149	114							
PRT	395	537	1005	413	895	653	786	753	789	1020	923	1261	792	204	283	597	78	293	346	121	0	212	572	441							
ZAF	161	132	211	111	182	187	192	187	196	199	185	262	161	92	124	154	21	119	89	36	203	0	170	105							
HUN	268	279	784	259	649	441	473	484	532	800	546	962	583	129	214	606	79	208	274	114	550	151	0	349							
LVA	123	157	353	143	635	256	229	247	287	408	356	668	375	76	101	289	70	110	151	66	348	65	239	0							

HOL ocs

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	526	969	492	919	805	678	774	956	644	945	1157	473	622	519	598	570	108	444	364	115	589									
BEL	460	0	731	568	980	710	655	850	810	687	1119	834	438	643	296	457	573	112	426	302	141	615									
CAN	901	700	0	917	2208	1239	1441	1380	1775	1909	1506	3514	995	1321	397	1240	1202	219	490	790	207	1132									
CHE	448	567	821	0	1052	620	606	706	775	740	882	962	393	576	260	416	510	107	383	303	122	530									
DEU	642	929	1400	905	0	2186	1589	2302	1970	2299	2758	2957	1122	1926	470	1233	1736	297	626	624	340	1195									
DFS	546	622	934	561	1307	0	1028	1473	1398	1215	1738	1717	749	1205	475	826	1112	225	564	483	211	881									
ESP	531	640	973	507	933	760	0	1259	1175	1350	1221	1677	781	1077	352	891	957	166	453	563	187	938									
FRA	603	858	1036	661	1256	901	1017	0	1493	1463	1779	2049	847	1539	448	1019	1243	178	546	546	199	948									
GBR	823	810	1812	773	1363	981	967	1096	0	1551	1798	2288	836	1286	505	952	1115	208	789	568	206	1023									
ITA	554	702	1722	679	1595	998	1026	1043	1370	0	1523	2469	980	1494	296	948	1257	243	470	640	272	1061									
NLD	800	1226	1374	869	2073	1294	1063	1250	1543	1374	0	2334	853	1482	663	971	1465	257	713	539	240	1080									
USA	989	730	3574	894	1697	1079	1165	1210	2110	2149	1914	0	1256	1778	568	1778	1705	271	627	963	231	1413									
HUN	342	355	893	320	786	549	596	595	674	856	660	1156	0	833	267	611	890	152	339	476	150	715									
POL	414	518	1027	423	1294	792	738	1009	1007	1210	1159	1517	667	0	333	805	1230	238	446	562	240	959									
NZL	421	231	341	217	329	308	285	292	400	250	593	482	195	210	0	336	353	57	352	202	65	327									
JPN	319	259	475	244	383	331	353	349	403	411	394	544	255	291	165	0	785	127	352	558	132	657									
CZE	374	429	851	367	1167	649	678	820	805	994	1253	1324	756	877	234	265	0	183	432	527	208	837									
EST	54	66	130	56	181	146	75	89	117	146	171	191	86	137	29	37	102	0	81	91	62	143									
IRL	406	408	454	375	505	448	427	500	841	436	649	580	272	329	287	202	321	41	0	226	94	420									
KOR	256	214	724	215	385	316	408	345	430	534	376	1077	369	405	139	274	370	37	156	0	109	521									
SVN	79	110	160	89	322	164	130	149	153	238	204	183	113	186	48	56	150	33	74	68	0	157									
PRT	459	615	1152	477	986	769	914	860	935	1062	1073	1467	678	884	256	324	693	84	353	448	122	0									

HOL ous

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	526	969	492	920	805	684	878	956	644	945	1161	473	623	519	598	570	108	431	114	589					
BEL	460	0	733	570	982	712	659	895	812	688	1121	840	438	644	296	458	573	112	416	140	616					
CAN	901	700	0	917	2209	1239	1452	1508	1775	1909	1506	3535	995	1322	397	1240	1202	219	476	206	1132					
CHE	448	567	821	0	1053	620	607	721	775	740	882	968	393	576	260	416	510	107	376	122	530					
DEU	642	930	1400	905	0	2187	1593	2380	1971	2300	2759	2969	1123	1927	471	1234	1737	297	611	338	1196					

DFS	546	622	934	561	1307	0	1035	1600	1398	1215	1738	1720	749	1207	475	826	1112	225	541	211	882
ESP	531	640	973	507	933	760	0	1325	1181	1350	1224	1689	781	1079	353	897	958	166	440	186	938
FRA	633	890	1078	673	1290	922	1044	0	1604	1475	1986	2371	871	1607	519	1132	1286	181	557	198	987
GBR	823	808	1811	773	1361	980	964	1122	0	1551	1798	2295	836	1287	505	952	1115	208	752	205	1025
ITA	554	702	1722	679	1595	998	1026	1047	1369	0	1523	2474	980	1494	296	948	1257	243	467	271	1061
NLD	800	1226	1374	869	2073	1294	1063	1340	1541	1374	0	2341	853	1483	663	971	1465	257	677	239	1080
USA	994	733	3609	901	1707	1084	1171	1337	2119	2156	1922	0	1259	1784	569	1782	1711	272	604	231	1416
HUN	342	355	893	320	786	549	596	598	674	856	660	1158	0	834	267	611	890	152	329	151	715
POL	414	518	1027	423	1294	792	738	1038	1007	1210	1159	1522	667	0	333	806	1230	238	435	239	959
NZL	421	231	341	217	329	308	286	308	400	250	593	484	195	210	0	336	353	57	338	64	327
JPN	318	259	474	244	382	330	352	351	402	410	393	543	254	290	165	0	785	127	338	132	657
CZE	374	429	851	367	1167	649	678	842	804	994	1253	1330	756	877	234	264	0	183	417	210	838
EST	54	66	130	56	181	146	75	90	117	146	171	191	86	137	29	37	102	0	80	63	143
IRL	404	407	453	373	503	447	424	506	817	436	641	575	272	329	283	202	320	41	0	94	409
SVN	79	110	160	90	319	164	130	150	153	238	205	183	114	186	47	56	151	33	74	0	156
PRT	459	616	1152	477	986	769	915	873	935	1062	1074	1475	678	884	256	323	693	84	353	121	0

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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	518	969	492	919	805	686	769	956	644	925	1159	473	621	589	570	108	430	115	593
BEL	459	0	726	565	974	705	657	843	803	686	1074	818	434	638	444	570	112	413	141	615
CAN	901	699	0	917	2208	1239	1454	1374	1775	1909	1475	3527	995	1321	1223	1202	219	476	207	1136
CHE	448	564	821	0	1052	620	609	701	775	740	873	966	393	576	414	510	107	376	122	531
DEU	642	929	1400	905	0	2186	1596	2296	1970	2299	2733	2968	1123	1926	1228	1736	297	610	340	1199
DFS	546	620	934	561	1307	0	1039	1469	1398	1215	1710	1706	749	1205	815	1112	225	541	211	887
ESP	533	647	975	510	939	765	0	1256	1183	1352	1210	1687	782	1081	886	960	168	441	188	943
FRA	595	853	1025	652	1249	899	1014	0	1488	1462	1753	2038	845	1536	1007	1242	178	533	199	949
GBR	823	807	1811	773	1361	980	970	1083	0	1551	1773	2288	836	1286	940	1115	208	749	206	1027
ITA	554	702	1722	679	1595	998	1030	1042	1369	0	1520	2473	981	1496	947	1257	243	467	272	1061
NLD	774	1169	1327	848	2046	1272	1041	1216	1503	1371	0	2231	848	1471	933	1454	256	671	240	1071
USA	990	728	3609	901	1706	1084	1172	1193	2118	2156	1712	0	1260	1783	1728	1709	272	602	231	1421
HUN	342	355	893	320	786	549	598	591	674	856	647	1158	0	834	611	890	152	329	150	716
POL	414	517	1027	423	1294	792	741	1007	1007	1210	1151	1522	668	0	804	1230	238	435	240	960
JPN	316	258	472	242	381	329	352	343	399	409	388	539	254	289	0	782	126	334	132	657
CZE	374	428	851	367	1167	649	681	816	804	994	1236	1329	756	877	263	0	183	417	208	838
EST	54	66	130	56	181	146	77	89	117	146	170	191	86	137	37	102	0	80	62	143
IRL	403	407	453	373	503	447	426	494	814	436	631	575	272	329	202	320	41	0	94	410
SVN	79	110	160	89	322	164	131	149	153	238	204	183	113	186	56	150	33	74	0	157
PRT	460	617	1154	478	989	772	922	863	941	1063	1061	1477	680	886	321	695	84	354	122	0

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common bulls below diagonal																				
common three quarter				sib	group	above diagonal														
	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	CZE	IRL	KOR	SVN	PRT	EST	HUN	POL	
BEL	0	682	477	811	659	598	799	748	649	920	761	475	388	204	113	531	79	340	391	
CAN	679	0	805	1880	1143	1338	1342	1680	1831	1287	3339	1053	460	541	176	997	167	854	851	
CHE	476	715	0	849	531	517	621	674	682	690	824	406	315	204	98	440	77	310	344	
DEU	789	1282	726	0	1733	1369	1892	1612	2056	2226	2407	1393	495	428	263	967	218	880	1184	
DFS	604	931	474	1159	0	948	1465	1387	1123	1479	1700	904	538	302	165	752	165	582	726	
ESP	595	905	414	793	717	0	1195	1081	1270	1067	1557	833	402	387	158	812	124	633	716	
FRA	827	1021	559	1097	898	962	0	1485	1352	1535	2036	1074	532	377	157	834	125	696	1024	
GBR	771	1738	644	1171	978	865	1084	0	1468	1505	2279	943	743	371	172	882	155	664	811	
ITA	673	1672	629	1469	953	982	1005	1322	0	1398	2318	1147	433	480	221	969	196	889	1041	
NLD	999	1227	670	1782	1192	912	1133	1312	1301	0	1754	1241	590	353	193	894	186	668	896	
USA	708	3495	743	1479	1083	1035	1193	2116	2079	1448	0	1471	601	632	199	1227	191	1030	1103	
CZE	370	764	284	979	555	575	687	679	917	1106	1152	0	340	347	176	703	129	710	790	
IRL	393	450	299	413	447	383	494	808	414	562	575	257	0	132	79	344	54	249	263	
KOR	160	522	155	291	222	279	259	283	417	264	726	248	98	0	89	350	58	324	337	
SVN	92	139	72	248	132	113	120	134	195	168	161	130	63	60	0	135	48	127	178	
PRT	528	999	390	835	648	767	745	781	970	879	1258	578	290	313	104	0	97	568	610	
EST	44	104	37	126	106	52	59	90	111	119	123	69	26	24	23	53	0	111	158	
HUN	277	778	251	631	441	470	480	527	786	525	956	597	206	247	98	543	59	0	555	
POL	304	668	241	770	484	461	637	640	823	680	884	543	205	234	142	552	80	452	0	

HOL bcs

common bulls below diagonal

common three quarter sib group above diagonal

	BEL	CHE	DEU	FRA	GBR	ITA	NLD	USA	CZE	JPN	IRL	KOR	CAN	PRT	ESP	SVN	EST	HUN	NZL	POL
BEL	0	521	779	643	734	646	961	748	431	286	357	211	570	402	596	139	90	291	219	475
CHE	523	0	931	608	746	728	829	938	412	305	336	227	784	371	578	123	95	285	208	451
DEU	756	797	0	1699	1617	2162	2287	2422	1328	804	447	470	1735	825	1377	339	258	795	293	1546
FRA	647	551	1071	0	1075	1328	1286	1436	899	634	357	392	1064	633	1029	199	148	605	233	1206
GBR	754	735	1185	845	0	1530	1654	2243	874	587	680	414	1378	686	1112	208	181	594	364	1029
ITA	661	670	1491	980	1354	0	1476	2434	1155	781	419	535	1766	842	1326	272	226	836	261	1342
NLD	1043	816	1829	1016	1434	1339	0	1966	1202	583	579	386	1145	705	1120	243	222	595	484	1170
USA	681	871	1497	928	2106	2122	1592	0	1375	1025	556	715	2710	985	1612	233	226	943	366	1461
CZE	335	289	954	613	637	922	1072	1097	0	516	289	388	922	566	778	208	154	626	209	975
JPN	192	194	315	275	311	365	310	431	218	0	184	376	750	396	615	124	94	401	155	575
IRL	362	333	386	345	742	397	550	537	218	137	0	131	353	228	387	89	60	201	243	285
KOR	159	169	312	278	308	455	280	813	276	213	96	0	574	364	426	107	76	345	122	449
CAN	588	724	1281	878	1484	1644	1177	3068	718	387	365	553	0	784	1152	206	184	756	237	1065
PRT	396	325	722	589	605	847	678	1050	467	238	191	318	805	0	643	153	114	480	177	702
ESP	601	478	791	838	916	1009	973	1114	529	274	380	300	849	600	0	187	143	579	252	869
SVN	108	89	325	151	154	236	206	184	151	56	69	67	161	116	129	0	60	146	63	233
EST	55	50	159	79	107	137	153	155	88	35	33	34	123	71	68	33	0	127	45	206
HUN	236	224	579	435	480	735	469	885	531	189	162	266	729	468	429	112	73	0	138	642
NZL	186	184	248	196	307	233	447	322	155	118	204	95	238	153	217	46	25	109	0	177
POL	390	331	1092	844	847	1103	953	1327	726	244	230	341	936	670	586	184	121	543	138	0

JER sta

common bulls below diagonal

common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0	164	96	107	35	160	270	139	18	19
CAN	170	0	115	152	37	83	493	151	17	26
DFS	73	103	0	119	47	100	181	130	24	35
GBR	105	156	115	0	42	80	188	115	18	35
ITA	35	35	46	40	0	33	47	47	10	17
NZL	161	84	79	82	30	0	166	109	20	22
USA	265	497	150	195	50	171	0	265	39	41
ZAF	144	152	113	114	48	105	273	0	28	26
NLD	14	12	18	15	7	17	39	23	0	4
CHE	17	24	34	33	18	20	41	26	3	0

JER cwi

common bulls below diagonal

common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0	164	96	107	35	160	270	132	18	26
CAN	170	0	115	152	37	83	493	140	17	31
DFS	73	103	0	119	47	100	181	121	24	45
GBR	105	156	115	0	42	80	188	110	18	42
ITA	35	35	46	40	0	33	47	47	10	24
NZL	161	84	79	82	30	0	166	100	20	28
USA	265	497	150	195	50	171	0	243	39	48
ZAF	138	143	107	110	48	97	253	0	28	38
NLD	14	12	18	15	7	17	39	23	0	8
CHE	24	30	44	41	25	26	49	38	6	0

JER bde

common bulls below diagonal

common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	NZL	ZAF	NLD	USA	CHE
AUS	0	164	96	107	35	160	132	18	270	30

CAN	170	0	115	152	37	83	140	17	493	35
DFS	73	103	0	119	47	100	121	24	181	48
GBR	105	156	115	0	42	80	110	18	188	45
ITA	35	35	46	40	0	33	47	10	47	27
NZL	161	84	79	82	30	0	100	20	166	32
ZAF	138	143	107	110	48	97	0	28	243	42
NLD	14	12	18	15	7	17	23	0	39	10
USA	265	497	150	195	50	171	253	39	0	52
CHE	27	32	47	44	27	30	41	7	53	0

JER ang

common bulls below diagonal										
common three quarter sib group above diagonal										
	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE	
AUS	0	164	14	106	35	269	138	6	30	
CAN	170	0	39	152	37	493	151	9	35	
DFS	14	39	0	36	2	46	23	8	10	
GBR	104	156	36	0	41	186	112	12	43	
ITA	35	35	2	39	0	46	46	5	27	
USA	264	497	45	193	49	0	262	22	52	
ZAF	143	152	23	111	48	270	0	13	41	
NLD	3	7	8	10	4	20	11	0	5	
CHE	27	32	10	42	27	53	40	5	0	

JER ran

common bulls below diagonal										
common three quarter sib group above diagonal										
	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0	164	96	107	35	160	270	139	18	30
CAN	170	0	115	152	37	83	493	151	17	35
DFS	73	103	0	119	47	100	181	130	24	48
GBR	105	156	115	0	42	80	188	115	18	45
ITA	35	35	46	40	0	33	47	47	10	27
NZL	161	84	79	82	30	0	166	109	20	32
USA	265	497	150	195	50	171	0	265	39	52
ZAF	144	152	113	114	48	105	273	0	28	42
NLD	14	12	18	15	7	17	39	23	0	10
CHE	27	32	47	44	27	30	53	41	7	0

JER rwi

common bulls below diagonal										
common three quarter sib group above diagonal										
	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0	164	91	107	35	160	270	139	18	30
CAN	170	0	104	152	37	83	493	151	17	35
DFS	65	89	0	115	44	93	170	123	22	47
GBR	105	156	108	0	42	80	188	115	18	45
ITA	35	35	41	40	0	33	47	47	10	27
NZL	161	84	71	82	30	0	166	109	20	32
USA	265	497	136	195	50	171	0	265	39	52
ZAF	144	152	103	114	48	105	273	0	28	42
NLD	14	12	16	15	7	17	39	23	0	10
CHE	27	32	46	44	27	30	53	41	7	0

JER rls

common bulls below diagonal										
common three quarter sib group above diagonal										
	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0	164	96	107	35	160	270	139	18	30
CAN	170	0	115	152	37	83	493	151	17	35
DFS	73	103	0	119	47	100	181	130	24	48

GBR	105	156	115	0	42	80	188	115	18	45
ITA	35	35	46	40	0	33	47	47	10	27
NZL	161	84	79	82	30	0	166	109	20	32
USA	265	497	150	195	50	171	0	265	39	52
ZAF	144	152	113	114	48	105	273	0	28	42
NLD	14	12	18	15	7	17	39	23	0	10
CHE	27	32	47	44	27	30	53	41	7	0

JER rlr

common bulls below diagonal										
common three quarter sib group above diagonal										
	AUS	CAN	DFS	ITA	ZAF	NLD	USA	CHE		
AUS	0	164	88	35	110	18	269	30		
CAN	170	0	104	37	126	17	493	35		
DFS	63	89	0	44	93	22	169	47		
ITA	35	35	41	0	44	10	47	27		
ZAF	113	123	79	44	0	25	207	42		
NLD	14	12	16	7	18	0	39	10		
USA	264	497	135	50	206	39	0	52		
CHE	27	32	46	27	41	7	53	0		

JER fan

common bulls below diagonal										
common three quarter sib group above diagonal										
	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE	
AUS	0	164	93	106	35	269	138	18	30	
CAN	170	0	115	152	37	493	151	17	35	
DFS	71	103	0	117	47	180	129	24	48	
GBR	104	156	113	0	42	187	115	18	45	
ITA	35	35	46	40	0	47	47	10	27	
USA	264	497	149	194	50	0	264	39	52	
ZAF	143	152	112	114	48	272	0	28	42	
NLD	14	12	18	15	7	39	23	0	10	
CHE	27	32	47	44	27	53	41	7	0	

JER fua

common bulls below diagonal										
common three quarter sib group above diagonal										
	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0	164	96	107	35	160	270	139	18	30
CAN	170	0	115	152	37	83	493	151	17	35
DFS	73	103	0	119	47	100	181	130	24	48
GBR	105	156	115	0	42	80	188	115	18	45
ITA	35	35	46	40	0	33	47	47	10	27
NZL	161	84	79	82	30	0	166	109	20	32
USA	265	497	150	195	50	171	0	265	39	52
ZAF	144	152	113	114	48	105	273	0	28	42
NLD	14	12	18	15	7	17	39	23	0	10
CHE	27	32	47	44	27	30	53	41	7	0

JER ruh

common bulls below diagonal										
common three quarter sib group above diagonal										
	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0	164	88	107	35	160	270	139	18	30
CAN	170	0	98	152	37	83	493	151	17	35
DFS	63	87	0	106	44	86	162	118	22	47
GBR	105	156	104	0	42	80	188	115	18	45
ITA	35	35	41	40	0	33	47	47	10	27
NZL	161	84	66	82	30	0	166	109	20	32
USA	265	497	130	195	50	171	0	265	39	52

ZAF	144	152	101	114	48	105	273	0	28	42
NLD	14	12	16	15	7	17	39	23	0	10
CHE	27	32	46	44	27	30	53	41	7	0

JER usu

common bulls below diagonal										
common three quarter sib group above diagonal										
	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0	164	96	107	35	160	270	139	18	30
CAN	170	0	115	152	37	83	493	151	17	35
DFS	73	103	0	119	47	100	181	130	24	48
GBR	105	156	115	0	42	80	188	115	18	45
ITA	35	35	46	40	0	33	47	47	10	27
NZL	161	84	79	82	30	0	166	109	20	32
USA	265	497	150	195	50	171	0	265	39	52
ZAF	144	152	113	114	48	105	273	0	28	42
NLD	14	12	18	15	7	17	39	23	0	10
CHE	27	32	47	44	27	30	53	41	7	0

JER ude

common bulls below diagonal										
common three quarter sib group above diagonal										
	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE	
AUS	0	164	94	106	35	269	139	20	30	
CAN	170	0	115	151	37	490	151	19	35	
DFS	72	103	0	117	47	180	130	43	48	
GBR	104	155	113	0	42	187	115	24	45	
ITA	35	35	46	40	0	47	47	10	27	
USA	264	495	149	194	50	0	264	46	52	
ZAF	144	152	113	114	48	272	0	35	42	
NLD	16	14	37	21	7	45	30	0	12	
CHE	27	32	47	44	27	53	41	9	0	

JER ftp

common bulls below diagonal										
common three quarter sib group above diagonal										
	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0	164	96	107	35	160	270	139	20	30
CAN	170	0	115	152	37	83	493	151	19	35
DFS	73	103	0	119	46	100	181	130	43	48
GBR	105	156	115	0	42	80	188	115	24	45
ITA	35	35	45	40	0	33	46	47	10	27
NZL	161	84	79	82	30	0	166	109	23	32
USA	265	497	150	195	49	171	0	265	46	52
ZAF	144	152	113	114	48	105	273	0	35	42
NLD	16	14	37	21	7	20	45	30	0	12
CHE	27	32	47	44	27	30	53	41	9	0

JER ftl

common bulls below diagonal										
common three quarter sib group above diagonal										
	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE	NZL
AUS	0	164	93	106	35	269	131	18	30	25
CAN	170	0	115	152	37	493	140	17	35	19
DFS	71	103	0	117	47	180	120	24	48	23
GBR	104	156	113	0	42	187	110	18	45	17
ITA	35	35	46	40	0	47	47	10	27	3
USA	264	497	149	194	50	0	243	39	52	26
ZAF	137	143	106	110	48	253	0	28	42	18
NLD	14	12	18	15	7	39	23	0	10	6
CHE	27	32	47	44	27	53	41	7	0	8

NZL	25	18	22	16	1	24	17	4	7	0
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JER rtp

common bulls below diagonal								
common three quarter sib group above diagonal								
	AUS	CAN	DFS	NZL	ZAF	NLD	USA	CHE
AUS	0	164	80	160	129	20	270	30
CAN	170	0	93	83	137	19	493	35
DFS	58	84	0	79	105	41	152	47
NZL	161	84	61	0	96	23	165	32
ZAF	133	137	89	89	0	35	238	42
NLD	16	14	35	20	30	0	46	12
USA	265	497	122	170	240	45	0	52
CHE	27	32	46	30	41	9	53	0

JER ocs

common bulls below diagonal									
common three quarter sib group above diagonal									
	AUS	CAN	DFS	GBR	ITA	NZL	USA	NLD	CHE
AUS	0	164	96	35	35	160	270	18	26
CAN	170	0	115	38	37	83	493	17	31
DFS	73	103	0	32	47	100	181	24	45
GBR	40	43	30	0	12	35	40	4	3
ITA	35	35	46	13	0	33	47	10	24
NZL	161	84	79	39	30	0	166	20	28
USA	265	497	150	43	50	171	0	39	48
NLD	14	12	18	5	7	17	39	0	8
CHE	24	30	44	4	25	26	49	6	0

JER ous

common bulls below diagonal									
common three quarter sib group above diagonal									
	AUS	CAN	DFS	GBR	NZL	USA	NLD	CHE	ITA
AUS	0	164	93	107	160	270	18	26	35
CAN	170	0	109	151	83	490	17	31	37
DFS	71	101	0	109	92	172	24	45	46
GBR	105	155	110	0	77	187	18	42	42
NZL	161	84	73	79	0	165	20	28	33
USA	265	495	143	194	170	0	39	48	46
NLD	14	12	18	15	17	39	0	8	10
CHE	24	30	44	41	26	49	6	0	24
ITA	35	35	45	40	30	49	7	25	0

JER ofl

common bulls below diagonal							
common three quarter sib group above diagonal							
	CAN	DFS	GBR	ITA	USA	NLD	CHE
CAN	0	115	151	37	493	17	31
DFS	103	0	117	47	180	24	45
GBR	155	113	0	42	186	18	42
ITA	35	46	40	0	47	10	24
USA	497	149	193	50	0	39	48
NLD	12	18	15	7	39	0	8
CHE	30	44	41	25	49	6	0

JER loc

JER bcs

RDC sta

DCC cwi											
common bulls below diagonal											
common three quarter sib group above diagonal											
	AUS	CAN	DEU	DFS	GBR	NZL	USA	NLD	CAM	NOR	LVA
AUS	0	27	14	56	12	26	16	11	5	11	18
CAN	27	0	11	154	80	38	159	4	0	3	10
DEU	14	11	0	61	4	13	4	14	0	6	30
DFS	44	155	52	0	62	64	87	34	0	56	111
GBR	10	79	4	57	0	30	66	1	0	0	3
NZL	25	36	12	62	27	0	28	5	2	4	7
USA	16	153	4	83	62	27	0	2	0	0	4
NLD	11	4	13	33	1	5	2	0	0	17	11
CAM	5	0	0	0	0	2	0	0	0	0	0
NOR	10	2	5	43	0	4	0	16	0	0	3
LVA	17	10	24	77	3	7	4	10	0	2	0

-----DC ang-----										
common bulls below diagonal										
common three quarter sib group						above diagonal				
AUS	CAN	DEU	DFS	GBR	USA	NLD	CAM	NOR	LVA	

AUS	0	27	4	19	12	16	11	5	12	19
CAN	27	0	0	54	80	159	4	0	4	10
DEU	4	0	0	19	0	0	2	0	3	4
DFS	19	56	19	0	23	21	14	0	46	16
GBR	10	79	0	21	0	66	1	0	0	3
USA	16	153	0	21	62	0	2	0	0	4
NLD	11	4	2	14	1	2	0	0	17	11
CAM	5	0	0	0	0	0	0	0	0	0
NOR	11	3	3	46	0	0	16	0	0	5
LVA	18	10	3	15	3	4	10	0	4	0

RDC ran

common bulls below diagonal

common three quarter sib group above diagonal

AUSCANDEUDFSGBRNORNZLUSANLDCAMLVA

AUS	0	27	14	56	12	20	26	16	11	5	19
CAN	27	0	11	154	80	5	38	159	4	0	10
DEU	14	11	0	61	4	12	13	4	14	0	32
DFS	44	155	52	0	62	99	63	87	35	0	130
GBR	10	79	4	57	0	0	30	66	1	0	3
NOR	16	5	11	77	0	0	8	0	27	0	14
NZL	25	36	12	59	27	7	0	28	5	2	8
USA	16	153	4	83	62	0	27	0	2	0	4
NLD	11	4	13	34	1	26	5	2	0	0	12
CAM	5	0	0	0	0	0	2	0	0	0	0
LVA	18	10	26	92	3	12	8	4	11	0	0

RDC rwi

common bulls below diagonal

common three quarter sib group above diagonal

AUSCANDEUDFSGBRNORNZLUSANLDCAMNORLVA

AUS	0	27	14	56	12	26	16	11	5	11	19
CAN	27	0	11	154	80	38	159	4	0	2	10
DEU	14	11	0	61	4	13	4	14	0	6	32
DFS	44	155	52	0	62	64	87	35	0	53	130
GBR	10	79	4	57	0	30	66	1	0	0	3
NZL	25	36	12	62	27	0	28	5	2	4	8
USA	16	153	4	83	62	27	0	2	0	0	4
NLD	11	4	13	34	1	5	2	0	0	17	12
CAM	5	0	0	0	0	2	0	0	0	0	0
NOR	10	2	5	40	0	4	0	16	0	0	3
LVA	18	10	26	92	3	8	4	11	0	2	0

RDC rls

common bulls below diagonal

common three quarter sib group above diagonal

AUSCANDEUDFSGBRNORNZLUSANLDCAMLVA

AUS	0	27	14	56	12	20	26	16	11	5	19
CAN	27	0	11	154	80	5	38	159	4	0	10
DEU	14	11	0	61	4	12	13	4	14	0	32
DFS	44	155	52	0	62	102	66	87	36	0	130
GBR	10	79	4	57	0	0	30	66	1	0	3
NOR	16	5	11	79	0	0	8	0	27	0	14
NZL	25	36	12	64	27	7	0	28	5	2	8
USA	16	153	4	83	62	0	27	0	2	0	4
NLD	11	4	13	35	1	26	5	2	0	0	12
CAM	5	0	0	0	0	0	2	0	0	0	0
LVA	18	10	26	92	3	12	8	4	11	0	0

RDC rlr

common bulls below diagonal

common three quarter sib group above diagonal

AUSCANDEUDFSNORNLDUSACAMLVA

AUS	0	27	14	56	20	11	16	5	18
CAN	27	0	11	153	5	4	159	0	10
DEU	14	11	0	61	12	14	4	0	30
DFS	44	154	52	0	99	33	87	0	111
NOR	16	5	11	77	0	27	0	0	12
NLD	11	4	13	32	26	0	2	0	11
USA	16	153	4	83	0	2	0	0	4
CAM	5	0	0	0	0	0	0	0	0
LVA	17	10	24	77	10	10	4	0	0

RDC fan

common bulls below diagonal

common three quarter sib group above diagonal

AUSCANDEUDFSGBRNORUSANLDCAMLVA

AUS	0	27	11	56	12	20	16	11	5	19
CAN	27	0	9	154	80	5	159	4	0	10
DEU	11	9	0	52	4	11	4	14	0	19
DFS	44	155	46	0	62	99	87	34	0	130
GBR	10	79	4	57	0	0	66	1	0	3
NOR	16	5	10	77	0	0	0	27	0	14
USA	16	153	4	83	62	0	0	2	0	4
NLD	11	4	13	33	1	26	2	0	0	12
CAM	5	0	0	0	0	0	0	0	0	0
LVA	18	10	16	92	3	12	4	11	0	0

RDC fua

common bulls below diagonal

common three quarter sib group above diagonal

AUSCANDEUDFSGBRNORNZLUSANLDCAMLVA

AUS	0	27	14	56	12	20	26	16	11	5	19
CAN	27	0	11	154	80	5	38	159	4	0	10
DEU	14	11	0	61	4	12	13	4	14	0	32
DFS	44	155	52	0	62	102	66	87	34	0	130
GBR	10	79	4	57	0	0	30	66	1	0	3
NOR	16	5	11	79	0	0	8	0	27	0	14
NZL	25	36	12	64	27	7	0	28	5	2	8
USA	16	153	4	83	62	0	27	0	2	0	4
NLD	11	4	13	33	1	26	5	2	0	0	12
CAM	5	0	0	0	0	0	2	0	0	0	0
LVA	18	10	26	92	3	12	8	4	11	0	0

RDC ruh

common bulls below diagonal

common three quarter sib group above diagonal

AUSCANDEUDFSGBRNORNZLUSANLDCAMLVA

AUS	0	27	14	56	12	20	26	16	11	5	19
CAN	27	0	11	154	80	5	38	159	4	0	10
DEU	14	11	0	61	4	12	13	4	14	0	32
DFS	44	155	52	0	62	99	64	87	34	0	124
GBR	10	79	4	57	0	0	30	66	1	0	3
NOR	16	5	11	77	0	0	8	0	27	0	14
NZL	25	36	12	61	27	7	0	28	5	2	8
USA	16	153	4	83	62	0	27	0	2	0	4
NLD	11	4	13	33	1	26	5	2	0	0	12
CAM	5	0	0	0	0	0	2	0	0	0	0
LVA	18	10	26	88	3	12	8	4	11	0	0

RDC usu

common bulls below diagonal

common three quarter sib group above diagonal

AUSCANDEUDFSGBRNORNZLUSANLDCAMLVA

AUS	0	27	14	56	12	20	26	16	11	5	19
CAN	27	0	11	154	80	5	38	159	4	0	10
DEU	14	11	0	61	4	13	13	4	14	0	32
DFS	44	155	52	0	62	94	66	87	36	0	130
GBR	10	79	4	57	0	0	30	66	1	0	3
NOR	16	5	12	74	0	0	8	0	27	0	14
NZL	25	36	12	64	27	7	0	28	5	2	8
USA	16	153	4	83	62	0	27	0	2	0	4
NLD	11	4	13	35	1	26	5	2	0	0	12

CAM	5	0	0	0	0	0	2	0	0	0	0
LVA	18	10	26	92	3	12	8	4	11	0	0

RDC ude

common bulls below diagonal											
common three quarter sib group above diagonal											
	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM	LVA	
AUS	0	27	14	56	12	20	16	13	5	19	
CAN	27	0	11	154	80	5	156	4	0	10	
DEU	14	11	0	61	4	12	4	16	0	32	
DFS	44	155	52	0	62	102	87	45	0	130	
GBR	10	79	4	57	0	0	66	1	0	3	
NOR	16	5	11	79	0	0	0	34	0	14	
USA	16	152	4	83	62	0	0	2	0	4	
NLD	13	4	15	44	1	33	2	0	0	15	
CAM	5	0	0	0	0	0	0	0	0	0	
LVA	18	10	26	92	3	12	4	14	0	0	

RDC ftp

common bulls below diagonal											
common three quarter sib group above diagonal											
	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM	LVA
AUS	0	27	14	56	12	20	26	16	13	5	18
CAN	27	0	11	154	80	5	38	159	4	0	10
DEU	14	11	0	61	4	13	13	4	16	0	30
DFS	44	155	52	0	62	101	64	87	44	0	111
GBR	10	79	4	57	0	0	30	66	1	0	3
NOR	16	5	12	79	0	0	8	0	34	0	13
NZL	25	36	12	62	27	7	0	28	7	2	7
USA	16	153	4	83	62	0	27	0	2	0	4
NLD	13	4	15	43	1	33	7	2	0	0	14
CAM	5	0	0	0	0	0	2	0	0	0	0
LVA	17	10	24	77	3	11	7	4	13	0	0

RDC ft1

common bulls below diagonal											
common three quarter sib group above diagonal											
	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM	LVA	NZL
AUS	0	27	14	56	12	20	16	11	5	19	6
CAN	27	0	11	154	80	5	157	4	0	10	6
DEU	14	11	0	61	4	12	4	14	0	32	6
DFS	44	155	52	0	62	96	87	36	0	130	15
GBR	10	79	4	57	0	0	65	1	0	3	6
NOR	16	5	11	74	0	0	0	27	0	14	2
USA	16	152	4	83	61	0	0	2	0	4	6
NLD	11	4	13	35	1	26	2	0	0	12	3
CAM	5	0	0	0	0	0	0	0	0	0	0
LVA	18	10	26	92	3	12	4	11	0	0	2
NZL	6	6	5	15	6	2	6	3	0	2	0

RDC rtp

common bulls below diagonal										
common three quarter sib group above diagonal										
	AUS	CAN	DEU	DFS	NOR	NZL	NLD	USA	CAM	LVA
AUS	0	27	14	51	20	26	13	16	5	19
CAN	27	0	11	148	5	38	4	159	0	10
DEU	14	11	0	58	13	13	16	4	0	32
DFS	41	148	52	0	93	59	42	82	0	113
NOR	16	5	12	74	0	8	34	0	0	14
NZL	25	36	12	58	7	0	6	28	2	8
NLD	13	4	15	41	33	6	0	2	0	14

USA	16	153	4	79	0	27	2	0	0	4
CAM	5	0	0	0	0	2	0	0	0	0
LVA	18	10	26	80	12	8	13	4	0	0

RDC ocs

common bulls below diagonal										
common three quarter sib group above diagonal										
	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0	27	14	56	11	22	26	16	11	5
CAN	27	0	11	154	77	7	38	159	4	0
DEU	14	11	0	61	4	15	13	4	14	0
DFS	44	155	52	0	62	124	66	87	36	0
GBR	9	76	4	57	0	0	27	64	1	0
NOR	18	6	14	102	0	0	10	0	28	0
NZL	25	36	12	64	24	9	0	28	5	2
USA	16	153	4	83	60	0	27	0	2	0
NLD	11	4	13	35	1	27	5	2	0	0
CAM	5	0	0	0	0	0	2	0	0	0

RDC ous

common bulls below diagonal										
common three quarter sib group above diagonal										
	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0	27	14	56	11	20	26	16	11	5
CAN	27	0	11	154	77	5	38	156	4	0
DEU	14	11	0	61	4	12	13	4	14	0
DFS	44	155	52	0	62	102	66	87	36	0
GBR	9	76	4	57	0	0	27	64	1	0
NOR	16	5	11	79	0	0	8	0	27	0
NZL	25	36	12	64	24	7	0	28	5	2
USA	16	152	4	83	60	0	27	0	2	0
NLD	11	4	13	35	1	26	5	2	0	0
CAM	5	0	0	0	0	0	2	0	0	0

RDC ofl

common bulls below diagonal										
common three quarter sib group above diagonal										
	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM	
AUS	0	27	14	56	11	20	16	11	5	
CAN	27	0	11	154	77	5	159	4	0	
DEU	14	11	0	61	4	12	4	14	0	
DFS	44	155	52	0	62	102	87	36	0	
GBR	9	76	4	57	0	0	64	1	0	
NOR	16	5	11	79	0	0	0	27	0	
USA	16	153	4	83	60	0	0	2	0	
NLD	11	4	13	35	1	26	2	0	0	
CAM	5	0	0	0	0	0	0	0	0	

RDC loc

RDC bcs

SIM sta

SIM cwi

SIM bde

SIM ang

SIM ran

SIM rwi

SIM rls

SIM rlr

SIM fan

SIM fua

SIM ruh

SIM usu

SIM ude

SIM ftp

SIM ftl

SIM rtp

SIM ocs

SIM ous

SIM ofl

SIM loc

SIM bcs
