

Introduction

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

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

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

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

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

Changes in national procedures

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

BEL (HOL) Few bulls missing due to drop in daughters, changes in type of proofs caused by the program assigning them.
DEA (BSW) Drops in info causing changes in reliabilities
JPN (HOL) Changes in information caused by additional records and modification of pedigree.
NZL (ALL) Changes in information caused by continuous DNA parentage testing
DFS (ALL) Changes in type of proofs: Type of proof is based on information from production. When production information for foreign bulls become available such bulls might change type of proof for other traits as well. Drops in information.
SVN (ALL) Small changes in information due changes in data base related to the pedigree completeness as well as phenotypic data improvement.
ESP (HOL) Base change
ZAF (HOL, JER) Reliabilities estimated with Jamrozik et al. method.

INTERBULL CHANGES COMPARED TO THE PREVIOUS ROUTINE RUN

Post-processing Windows:

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

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

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

The new weights are as follows:

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

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

DATA AND METHOD OF ANALYSIS

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

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

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

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

SCIENTIFIC LITERATURE

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

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

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

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

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

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

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

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

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

NEXT ROUTINE INTERNATIONAL EVALUATION

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

NEXT TEST INTERNATIONAL EVALUATION

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

PUBLICATION OF INTERBULL ROUTINE RUN

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

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

PUBLICATION OF INTERBULL TEST RUN

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

^aLTable 1. National evaluation data considered in the Interbull evaluation for conformation traits (August Routine Evaluation 2021).

Number of records for stature by breed

Country	BSW	GUE	HOL	JER	RDC	SIM
AUS		45	3830	742	240	
BEL			1605			
CAN	236	100	12053	773	871	
CHE	2809		3383	46		
CZE			4206			
DEA	3605					
DEU			19825		241	
DFS			12073	2028	6289	
ESP			4124			
EST			768			
FRA	379		17093			
FRM						
GBR	22	217	6163	440	316	
HUN			2791			
IRL			1774			
ISR						
ITA	2153		8769	101		
JPN			5891			
KOR			1396			
LTU						
LVA						
NLD	127		15003	47	52	
NOR					2414	
NZL			6455	3998	596	
POL			8873			
PRT			2103			
SVK						
SVN	323		579			
URY						
USA	877	700	33090	4287	258	
ZAF			851	547		
HRV						
CAM				36		
No. Records	10531	1062	172698	13009	11313	
Pub. Proofs	8443	904	138169	11309	12112	0

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

BSW	sta	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN		6.35								
CHE		0.95	12.39							
FRA		0.98	0.96	0.92						
ITA		0.96	0.95	0.95	14.15					
NLD		0.95	0.95	0.96	0.92	4.15				
USA		0.98	0.95	0.97	0.95	0.94	1.63			
DEA		0.97	0.98	0.97	0.96	0.96	0.96	11.29		
SVN		0.92	0.90	0.91	0.93	0.91	0.91	0.92	15.88	
GBR		0.96	0.93	0.96	0.94	0.93	0.96	0.91	0.90	0.68

BSW	cwi	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN		8.19								
CHE		0.89	10.27							
FRA		0.87	0.89	0.94						
ITA		0.81	0.85	0.87	21.58					
NLD		0.91	0.81	0.87	0.71	4.55				
USA		0.89	0.90	0.92	0.85	0.81	0.91			
DEA		0.87	0.82	0.81	0.75	0.82	0.78	11.42		
SVN		0.88	0.87	0.85	0.85	0.81	0.87	0.89	22.66	
GBR		0.91	0.84	0.82	0.72	0.90	0.81	0.78	0.82	1.44

BSW	bde	CAN	CHE	FRA	ITA	NLD	DEA	SVN	GBR	USA
CAN		6.84								
CHE		0.84	10.35							
FRA		0.72	0.88	0.91						
ITA		0.78	0.91	0.91	17.93					
NLD		0.82	0.85	0.86	0.85	4.25				
DEA		0.81	0.90	0.92	0.90	0.83	11.20			
SVN		0.78	0.75	0.79	0.82	0.79	0.73	25.78		
GBR		0.86	0.89	0.81	0.85	0.90	0.87	0.85	1.70	
USA		0.72	0.75	0.86	0.78	0.86	0.79	0.78	0.86	0.84

BSW	ang	CAN	CHE	FRA	NLD	USA	GBR
CAN		8.34					
CHE		0.70	11.02				
FRA		0.88	0.67	0.86			
NLD		0.80	0.68	0.70	3.79		
USA		0.89	0.67	0.78	0.77	1.09	
GBR		0.89	0.77	0.80	0.83	0.90	0.75

BSW	ran	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN		6.81								
CHE		0.94	10.64							
FRA		0.97	0.96	0.94						
ITA		0.94	0.93	0.94	23.00					
NLD		0.95	0.92	0.96	0.92	4.53				
USA		0.97	0.94	0.97	0.91	0.95	1.36			
DEA		0.96	0.94	0.95	0.95	0.92	0.97	11.87		
SVN		0.91	0.90	0.91	0.90	0.91	0.91	0.90	21.58	
GBR		0.96	0.94	0.97	0.94	0.97	0.96	0.92	0.93	1.81

BSW	rwi	CAN	CHE	FRA	NLD	USA	DEA	GBR	SVN	ITA
CAN		6.84								
CHE	0.89	10.18								
FRA	0.96	0.87	0.98							
NLD	0.93	0.86	0.93	4.00						
USA	0.91	0.84	0.87	0.81	0.97					
DEA	0.93	0.89	0.93	0.80	0.90	13.33				
GBR	0.93	0.86	0.92	0.88	0.93	0.84	1.35			
SVN	0.91	0.82	0.94	0.87	0.83	0.90	0.86	26.75		
ITA	0.87	0.80	0.89	0.80	0.85	0.87	0.88	0.87	20.07	

BSW	rls	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN		7.77								
CHE	0.92	13.07								
FRA	0.91	0.91	1.02							
ITA	0.91	0.85	0.93	23.84						
NLD	0.88	0.84	0.88	0.84	5.11					
USA	0.95	0.93	0.90	0.86	0.86	0.82				
DEA	0.92	0.92	0.93	0.89	0.82	0.91	12.26			
SVN	0.87	0.82	0.89	0.87	0.84	0.86	0.89	21.79		
GBR	0.84	0.87	0.91	0.82	0.86	0.83	0.88	0.82	1.29	

BSW	fan	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN		8.87								
CHE	0.68	13.78								
FRA	0.78	0.73	1.12							
ITA	0.69	0.85	0.80	21.75						
NLD	0.74	0.68	0.84	0.70	5.15					
USA	0.82	0.72	0.85	0.85	0.81	0.86				
DEA	0.62	0.91	0.67	0.89	0.65	0.66	11.64			
SVN	0.67	0.84	0.70	0.85	0.66	0.70	0.94	24.74		
GBR	0.81	0.71	0.90	0.74	0.88	0.83	0.69	0.70	1.20	

BSW	hde	CAN	CHE	FRA	ITA	NLD	DEA	SVN	USA
CAN		8.44							
CHE	0.87	12.59							
FRA	0.82	0.81	1.17						
ITA	0.79	0.83	0.85	21.83					
NLD	0.77	0.74	0.84	0.75	5.15				
DEA	0.78	0.87	0.84	0.92	0.77	12.22			
SVN	0.76	0.75	0.84	0.89	0.74	0.89	30.30		
USA	0.85	0.74	0.86	0.89	0.81	0.77	0.83	0.86	

BSW	fua	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN		7.02								
CHE	0.87	11.98								
FRA	0.89	0.87	0.89							
ITA	0.90	0.83	0.85	20.71						
NLD	0.90	0.85	0.90	0.84	4.60					
USA	0.94	0.86	0.87	0.93	0.87	1.31				
DEA	0.85	0.85	0.94	0.83	0.82	0.85	11.22			
SVN	0.76	0.75	0.84	0.85	0.77	0.76	0.90	21.30		
GBR	0.92	0.84	0.88	0.88	0.91	0.92	0.76	0.67	1.27	

BSW	ruh	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN		7.53								
CHE	0.91	11.88								
FRA	0.85	0.84	0.93							
ITA	0.75	0.85	0.86	13.16						
NLD	0.77	0.85	0.87	0.86	4.24					
USA	0.84	0.84	0.88	0.87	0.87	1.09				
DEA	0.81	0.86	0.89	0.93	0.90	0.86	11.78			
SVN	0.82	0.84	0.80	0.86	0.89	0.83	0.90	19.28		
GBR	0.75	0.80	0.86	0.85	0.88	0.91	0.78	0.77	1.61	

BSW	ruw	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN
CAN		8.17							
CHE	0.91	11.91							
FRA	0.85	0.86	0.86						
ITA	0.79	0.88	0.79	13.46					
NLD	0.70	0.66	0.79	0.69	4.24				
USA	0.86	0.89	0.85	0.89	0.79	1.03			
DEA	0.85	0.91	0.75	0.95	0.55	0.90	12.29		
SVN	0.82	0.81	0.75	0.85	0.71	0.82	0.83	17.66	

BSW	usu	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN		8.49								
CHE	0.90	12.01								
FRA	0.83	0.91	0.90							
ITA	0.89	0.90	0.88	18.91						
NLD	0.83	0.83	0.89	0.82	4.13					
USA	0.84	0.89	0.87	0.87	0.90	1.01				
DEA	0.92	0.92	0.88	0.93	0.78	0.83	11.52			
SVN	0.85	0.83	0.72	0.83	0.69	0.73	0.85	23.57		
GBR	0.80	0.79	0.86	0.87	0.91	0.93	0.74	0.66	2.96	

BSW	ude	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN		6.53								
CHE	0.96	12.04								
FRA	0.95	0.95	0.97							
ITA	0.94	0.96	0.95	20.62						
NLD	0.96	0.94	0.95	0.93	4.02					
USA	0.96	0.95	0.96	0.95	0.95	1.24				
DEA	0.93	0.97	0.92	0.97	0.93	0.93	12.04			
SVN	0.94	0.96	0.91	0.97	0.94	0.93	0.96	21.39		
GBR	0.96	0.94	0.96	0.94	0.96	0.96	0.91	0.92	1.91	

BSW	ftp	CAN	CHE	FRA	NLD	USA	DEA	SVN	GBR	ITA
CAN		7.36								
CHE	0.97	13.95								
FRA	0.97	0.95	0.93							
NLD	0.96	0.95	0.95	5.02						
USA	0.92	0.90	0.88	0.91	1.33					
DEA	0.95	0.99	0.95	0.95	0.90	11.12				
SVN	0.94	0.93	0.92	0.93	0.90	0.92	17.87			
GBR	0.96	0.93	0.89	0.94	0.95	0.91	0.93	1.29		
ITA	0.87	0.86	0.86	0.86	0.88	0.86	0.86	0.87	21.93	

BSW	ftl	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN		6.40								
CHE	0.90	14.67								
FRA	0.95	0.95	0.95							
ITA	0.93	0.94	0.95	18.51						
NLD	0.92	0.96	0.92	0.92	4.99					
USA	0.94	0.96	0.95	0.93	0.96	1.76				
DEA	0.90	0.98	0.98	0.96	0.94	0.96	11.11			
SVN	0.90	0.92	0.90	0.93	0.94	0.91	0.93	17.99		
GBR	0.95	0.94	0.93	0.94	0.97	0.96	0.93	0.94	1.41	

BSW	rtp	CAN	CHE	FRA	ITA	NLD	DEA	SVN	USA
CAN		6.64							
CHE	0.97	14.51							
FRA	0.97	0.97	0.93						
ITA	0.92	0.95	0.93	20.93					
NLD	0.97	0.96	0.97	0.93	4.62				
DEA	0.96	0.99	0.97	0.96	0.94	12.05			
SVN	0.94	0.93	0.92	0.94	0.95	0.92	17.36		
USA	0.92	0.89	0.91	0.90	0.94	0.89	0.90	1.33	

BSW	ocs	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN		7.56								
CHE	0.85	9.27								
FRA	0.78	0.86	0.95							
ITA	0.81	0.82	0.89	9.25						
NLD	0.74	0.76	0.80	0.74	3.56					
USA	0.85	0.77	0.84	0.83	0.82	0.53				
DEA	0.82	0.91	0.90	0.88	0.71	0.76	10.68			
SVN	0.70	0.73	0.76	0.74	0.72	0.74	0.78	20.79		
GBR	0.82	0.87	0.86	0.81	0.87	0.89	0.74	0.73	1.75	

BSW	ous	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN		8.11								
CHE	0.89	13.78								
FRA	0.88	0.92	0.94							
ITA	0.82	0.89	0.90	10.45						
NLD	0.87	0.87	0.92	0.79	4.49					
USA	0.85	0.89	0.86	0.83	0.85	1.00				
DEA	0.86	0.96	0.91	0.90	0.85	0.89	12.42			
SVN	0.75	0.84	0.78	0.82	0.77	0.83	0.92	19.90		
GBR	0.82	0.85	0.76	0.81	0.77	0.87	0.77	0.74	1.43	

BSW	ofl	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN		8.39								
CHE	0.86	11.59								
FRA	0.66	0.67	1.26							
ITA	0.67	0.70	0.85	17.83						
NLD	0.67	0.66	0.74	0.65	4.27					
USA	0.73	0.66	0.78	0.74	0.66	1.04				
DEA	0.69	0.85	0.68	0.81	0.62	0.63	11.31			
SVN	0.77	0.86	0.68	0.76	0.66	0.71	0.90	28.17		
GBR	0.74	0.77	0.82	0.68	0.73	0.72	0.68	0.65	1.72	

BSW	ofr	CAN	CHE	DEA	ITA	SVN	USA	FRA
CAN		6.95						
CHE	0.83	12.13						
DEA	0.84	0.90	11.58					
ITA	0.83	0.91	0.95	17.53				
SVN	0.78	0.81	0.79	0.85	21.97			
USA	0.81	0.85	0.91	0.86	0.79	1.63		
FRA	0.80	0.87	0.93	0.91	0.83	0.90	0.90	

BSW	tpl	CAN	CHE	DEA	ITA	SVN	FRA
CAN		6.65					
CHE	0.90	12.02					
DEA	0.91	0.91	11.73				
ITA	0.92	0.92	0.94	24.05			
SVN	0.89	0.90	0.89	0.88	23.08		
FRA	0.97	0.94	0.90	0.91	0.88	1.28	

BSW	oru	CAN	CHE	DEA	ITA	SVN	USA	FRA
CAN		6.97						
CHE	0.75	16.19						
DEA	0.70	0.87	12.58					
ITA	0.91	0.76	0.75	17.69				
SVN	0.84	0.58	0.64	0.72	27.28			
USA	0.89	0.57	0.47	0.83	0.69	0.97		
FRA	0.90	0.88	0.84	0.89	0.72	0.85	1.11	

BSW	rle	CHE	DEA	ITA	SVN	USA	FRA
CHE		11.76					
DEA	0.96	12.39					
ITA	0.83	0.87	19.91				
SVN	0.81	0.82	0.82	26.26			
USA	0.54	0.51	0.78	0.72	0.97		
FRA	0.92	0.93	0.89	0.82	0.74	1.03	

BSW	thp	CAN	CHE	DEA	ITA	SVN	USA	FRA
CAN		7.67						
CHE	0.82	11.28						
DEA	0.77	0.85	12.17					
ITA	0.88	0.91	0.84	29.93				
SVN	0.80	0.84	0.85	0.88	36.12			
USA	0.87	0.88	0.70	0.83	0.71	1.36		
FRA	0.89	0.85	0.87	0.85	0.83	0.80	1.02	

BSW	hoq	CAN	CHE	DEA	ITA	SVN	FRA
CAN		7.08					
CHE	0.92	12.03					
DEA	0.91	0.89	12.55				
ITA	0.92	0.83	0.86	19.94			
SVN	0.95	0.89	0.92	0.90	21.80		
FRA	0.91	0.84	0.89	0.88	0.91	1.03	

BSW ful

	CHE	DEA	ITA	SVN	FRA
CHE	11.74				
DEA	0.91	12.36			
ITA	0.92	0.96	12.89		
SVN	0.78	0.87	0.85	20.81	
FRA	0.69	0.82	0.74	0.75	0.94

BSW udb

	CHE	DEA	ITA	SVN	FRA
CHE	11.90				
DEA	0.97	13.33			
ITA	0.93	0.97	26.66		
SVN	0.82	0.86	0.81	25.85	
FRA	0.91	0.88	0.85	0.79	0.94

BSW tdi

	CHE	DEA	ITA	SVN	FRA
CHE	15.81				
DEA	0.96	11.38			
ITA	0.94	0.95	20.96		
SVN	0.91	0.93	0.93	17.71	
FRA	0.96	0.96	0.91	0.91	0.92

BSW tth

	CHE	DEA	ITA	SVN	FRA
CHE	14.41				
DEA	0.98	12.99			
ITA	0.93	0.94	23.15		
SVN	0.88	0.91	0.88	20.01	
FRA	0.93	0.93	0.95	0.88	0.87

GUE sta

	CAN	GBR	USA	AUS
CAN	6.35			
GBR	0.97	1.23		
USA	0.98	0.96	2.81	
AUS	0.90	0.93	0.91	0.84

GUE cwi

	CAN	GBR	USA	AUS
CAN	6.77			
GBR	0.92	1.73		
USA	0.86	0.86	1.55	
AUS	0.72	0.80	0.67	0.34

GUE bde

	CAN	GBR	USA	AUS
CAN	6.15			
GBR	0.87	1.52		
USA	0.75	0.89	1.79	
AUS	0.80	0.78	0.71	0.45

GUE ang

	CAN	GBR	USA	AUS
CAN	7.94			
GBR	0.89	1.79		
USA	0.88	0.91	1.91	
AUS	0.65	0.76	0.68	0.39

GUE	ran			
	CAN	GBR	USA	AUS
CAN	6.36			
GBR	0.97	1.62		
USA	0.97	0.97	2.01	
AUS	0.91	0.94	0.91	0.76

GUE	rwi			
	CAN	GBR	USA	AUS
CAN	6.78			
GBR	0.93	1.50		
USA	0.92	0.92	1.74	
AUS	0.86	0.85	0.79	0.64

GUE	rls			
	CAN	GBR	USA	AUS
CAN	8.47			
GBR	0.82	1.83		
USA	0.93	0.80	0.92	
AUS	0.72	0.81	0.72	0.32

GUE	rlr			
	CAN	USA	AUS	
CAN	7.19			
USA	0.85	0.90		
AUS	0.62	0.55	0.19	

GUE	fan			
	CAN	GBR	USA	AUS
CAN	8.25			
GBR	0.79	1.71		
USA	0.84	0.76	0.88	
AUS	0.64	0.77	0.66	0.26

GUE	fua			
	CAN	GBR	USA	AUS
CAN	7.26			
GBR	0.94	1.68		
USA	0.92	0.91	1.84	
AUS	0.80	0.79	0.77	0.38

GUE	ruh			
	CAN	GBR	USA	AUS
CAN	6.81			
GBR	0.74	2.09		
USA	0.80	0.90	1.50	
AUS	0.77	0.78	0.77	0.36

GUE usu

	CAN	GBR	USA	AUS
CAN	6.74			
GBR	0.80	1.77		
USA	0.80	0.87	1.36	
AUS	0.77	0.79	0.76	0.29

GUE ude

	CAN	GBR	USA	AUS
CAN	6.10			
GBR	0.97	1.59		
USA	0.95	0.95	1.86	
AUS	0.90	0.91	0.90	0.53

GUE ftp

	CAN	GBR	USA	AUS
CAN	5.80			
GBR	0.96	1.29		
USA	0.92	0.93	1.62	
AUS	0.92	0.92	0.87	0.40

GUE ftl

	CAN	GBR	USA	AUS
CAN	4.65			
GBR	0.95	1.91		
USA	0.95	0.97	2.05	
AUS	0.94	0.94	0.93	0.94

GUE rtp

	CAN	AUS	USA
CAN	5.53		
AUS	0.90	0.35	
USA	0.93	0.90	1.62

GUE ocs

	CAN	GBR	USA	AUS
CAN	8.18			
GBR	0.83	2.16		
USA	0.79	0.87	0.90	
AUS	0.58	0.66	0.60	0.82

GUE ous

	CAN	GBR	USA	AUS
CAN	7.91			
GBR	0.82	1.60		
USA	0.89	0.83	0.86	
AUS	0.70	0.81	0.71	1.07

GUE ofl

	CAN	GBR	USA	AUS
CAN	7.58			
GBR	0.74	1.42		
USA	0.80	0.69	0.98	

AUS 0.44 0.53 0.48 0.59

HOL sta

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT
AUS	0.64																						
BEL	0.89	1.09																					
CAN	0.89	0.95	5.41																				
CHE	0.89	0.92	0.96	10.65																			
DEU	0.89	0.93	0.98	0.97	12.88																		
DFS	0.87	0.95	0.97	0.96	0.97	10.74																	
ESP	0.89	0.94	0.98	0.96	0.98	0.97	0.82																
FRA	0.90	0.96	0.98	0.97	0.97	0.97	0.98	1.06															
GBR	0.93	0.93	0.97	0.95	0.96	0.94	0.96	0.97	1.10														
ITA	0.87	0.89	0.95	0.92	0.94	0.93	0.95	0.95	0.95	1.09													
NLD	0.87	0.93	0.96	0.97	0.98	0.97	0.97	0.97	0.94	0.92	4.14												
USA	0.90	0.91	0.98	0.94	0.96	0.94	0.96	0.96	0.97	0.94	0.93	1.20											
HUN	0.89	0.92	0.96	0.93	0.96	0.93	0.96	0.97	0.95	0.93	0.94	0.91											
POL	0.85	0.87	0.92	0.90	0.93	0.91	0.93	0.92	0.90	0.90	0.91	0.90	0.92	9.94									
NZL	0.88	0.86	0.84	0.84	0.83	0.83	0.87	0.89	0.83	0.83	0.86	0.84	0.83	0.83	0.43								
ZAF	0.91	0.91	0.89	0.90	0.87	0.89	0.91	0.93	0.86	0.86	0.86	0.89	0.86	0.86	0.73								
JPN	0.89	0.95	0.98	0.97	0.97	0.97	0.98	0.98	0.96	0.95	0.96	0.97	0.96	0.92	0.91	1.20							
CZE	0.89	0.94	0.97	0.94	0.97	0.95	0.96	0.96	0.95	0.92	0.95	0.94	0.96	0.92	0.92	0.96	13.08						
EST	0.86	0.91	0.94	0.93	0.95	0.95	0.93	0.95	0.92	0.93	0.96	0.90	0.93	0.90	0.87	0.94	0.95	15.10					
IRL	0.89	0.89	0.92	0.91	0.91	0.88	0.92	0.93	0.97	0.91	0.89	0.93	0.91	0.86	0.88	0.91	0.93	0.88	0.72				
KOR	0.85	0.85	0.85	0.84	0.85	0.84	0.84	0.84	0.84	0.84	0.84	0.85	0.85	0.85	0.86	0.86	0.85	0.85	4.51				
SVN	0.87	0.92	0.94	0.94	0.95	0.95	0.95	0.94	0.91	0.91	0.96	0.92	0.91	0.93	0.84	0.85	0.95	0.93	0.88	0.85	14.50		
PRT	0.88	0.90	0.94	0.91	0.94	0.93	0.94	0.94	0.94	0.92	0.91	0.92	0.93	0.89	0.83	0.87	0.94	0.94	0.90	0.90	0.84	0.89	1.23

HOL cwi

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT
AUS	0.41																						
BEL	0.67	1.70																					
CAN	0.73	0.85	6.40																				
CHE	0.65	0.85	0.89	11.20																			
DEU	0.70	0.87	0.90	0.84	12.45																		
DFS	0.71	0.87	0.92	0.84	0.93	12.67																	
ESP	0.67	0.88	0.92	0.87	0.82	0.85	1.05																
FRA	0.65	0.91	0.85	0.92	0.86	0.83	0.86	1.15															
GBR	0.81	0.85	0.92	0.85	0.90	0.89	0.85	0.82	1.41														
ITA	0.65	0.79	0.76	0.81	0.69	0.66	0.81	0.88	0.70	1.25													
NLD	0.72	0.87	0.92	0.87	0.94	0.91	0.86	0.86	0.92	0.71	5.03												
USA	0.65	0.83	0.86	0.88	0.81	0.80	0.86	0.92	0.80	0.91	0.81	1.26											
HUN	0.65	0.82	0.86	0.84	0.84	0.83	0.83	0.89	0.78	0.81	0.81	0.88	1.14										
POL	0.65	0.89	0.87	0.83	0.85	0.85	0.87	0.85	0.83	0.78	0.84	0.82	0.83	12.37									
NZL	0.79	0.64	0.71	0.64	0.70	0.71	0.72	0.65	0.80	0.63	0.69	0.68	0.63	0.64	0.38								
ZAF	0.66	0.89	0.84	0.86	0.85	0.85	0.86	0.88	0.89	0.76	0.85	0.87	0.83	0.69	0.83								
JPN	0.64	0.83	0.76	0.83	0.71	0.71	0.81	0.91	0.67	0.92	0.71	0.91	0.83	0.75	0.63	0.77	1.53						
CZE	0.71	0.90	0.92	0.84	0.91	0.91	0.91	0.84	0.88	0.77	0.89	0.84	0.86	0.89	0.70	0.87	0.77	14.13					
EST	0.72	0.77	0.83	0.75	0.75	0.83	0.81	0.70	0.78	0.65	0.82	0.66	0.66	0.71	0.67	0.71	0.66	0.78	23.58				

HOL ang

AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	ZAF	JPN	CZE	EST	IRL	KOR	PRT	SVN
0.43																					
BEL	0.60	1.16																			
CAN	0.65	0.75	6.63																		
CHE	0.60	0.77	0.88	11.65																	
DEU	0.62	0.69	0.78	0.73	12.73																
DFS	0.67	0.85	0.89	0.82	0.79	10.45															
ESP	0.64	0.75	0.87	0.78	0.70	0.84	0.73														
FRA	0.63	0.84	0.88	0.86	0.75	0.88	0.83	0.94													
GBR	0.77	0.75	0.91	0.80	0.74	0.87	0.81	0.81	1.50												
ITA	0.66	0.73	0.90	0.78	0.74	0.84	0.86	0.81	0.85	1.27											
NLD	0.71	0.61	0.82	0.75	0.61	0.71	0.78	0.68	0.83	0.78	4.46										
USA	0.67	0.75	0.93	0.81	0.81	0.90	0.84	0.84	0.90	0.85	0.75	1.38									
HUN	0.60	0.71	0.76	0.70	0.78	0.78	0.70	0.81	0.71	0.74	0.60	0.79	1.02								
POL	0.60	0.67	0.70	0.67	0.61	0.72	0.77	0.72	0.65	0.79	0.64	0.68	0.60	10.17							
ZAF	0.63	0.81	0.71	0.67	0.72	0.79	0.69	0.73	0.86	0.74	0.61	0.76	0.78	0.62	0.72						
JPN	0.65	0.80	0.90	0.81	0.77	0.91	0.87	0.85	0.86	0.91	0.78	0.88	0.76	0.76	0.77	1.42					
CZE	0.65	0.77	0.82	0.74	0.72	0.85	0.74	0.76	0.75	0.79	0.63	0.77	0.80	0.65	0.68	0.79	14.11				
EST	0.63	0.78	0.63	0.64	0.69	0.79	0.62	0.67	0.64	0.62	0.60	0.61	0.75	0.64	0.73	0.69	0.73	24.54			
IRL	0.72	0.72	0.86	0.76	0.76	0.83	0.80	0.81	0.92	0.83	0.74	0.88	0.73	0.64	0.81	0.85	0.76	0.62	0.73	2.27	
KOR	0.69	0.77	0.78	0.72	0.69	0.74	0.77	0.74	0.78	0.73	0.63	0.77	0.76	0.63	0.76	0.84	0.69	0.69	0.75	0.78	1.24
PRT	0.60	0.69	0.77	0.63	0.73	0.79	0.74	0.73	0.78	0.78	0.60	0.79	0.70	0.65	0.69	0.80	0.72	0.62	0.75	0.78	0.62
SVN	0.68	0.64	0.72	0.74	0.61	0.66	0.69	0.66	0.70	0.74	0.71	0.65	0.61	0.83	0.64	0.69	0.63	0.71	0.63	0.73	20.97

HOL ran

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PER
AUS	0.63																						
BEL	0.94	1.47																					
CAN	0.91	0.97	6.08																				
CHE	0.93	0.96	0.96	11.37																			
DEU	0.92	0.97	0.98	0.95	12.21																		
DFS	0.92	0.98	0.98	0.96	0.98	11.60																	
ESP	0.92	0.97	0.97	0.97	0.97	0.96	1.15																
FRA	0.95	0.98	0.97	0.97	0.97	0.97	0.97	1.07															
GBR	0.94	0.96	0.97	0.95	0.97	0.95	0.96	0.98	1.41														
ITA	0.89	0.95	0.95	0.93	0.96	0.94	0.95	0.96	0.95	1.47													
NLD	0.91	0.96	0.97	0.95	0.98	0.96	0.97	0.96	0.97	0.94	0.94	5.05											
USA	0.91	0.95	0.97	0.95	0.96	0.96	0.96	0.96	0.97	0.94	0.94	0.96	1.46										
HUN	0.91	0.97	0.96	0.95	0.97	0.96	0.97	0.97	0.95	0.95	0.95	0.94	1.05										
POL	0.90	0.95	0.96	0.94	0.96	0.95	0.96	0.94	0.94	0.95	0.95	0.95	0.92	0.95	11.25								
NZL	0.94	0.89	0.88	0.90	0.89	0.88	0.88	0.93	0.94	0.87	0.89	0.89	0.89	0.87	0.34								
ZAF	0.95	0.95	0.92	0.92	0.92	0.92	0.93	0.95	0.94	0.89	0.93	0.92	0.94	0.89	0.90	0.88							
JPN	0.89	0.95	0.97	0.96	0.96	0.97	0.96	0.94	0.92	0.93	0.94	0.94	0.95	0.95	0.86	0.89	1.44						
CZE	0.89	0.95	0.96	0.92	0.97	0.95	0.95	0.94	0.96	0.94	0.96	0.96	0.95	0.94	0.87	0.90	0.93	14.61					
EST	0.89	0.93	0.93	0.90	0.95	0.94	0.92	0.92	0.92	0.92	0.96	0.93	0.90	0.93	0.84	0.88	0.92	0.94	18.86				
IRL	0.93	0.92	0.92	0.93	0.94	0.91	0.92	0.96	0.98	0.92	0.94	0.94	0.91	0.90	0.94	0.90	0.89	0.91	0.89	0.89	1.76		
KOR	0.89	0.89	0.89	0.89	0.89	0.89	0.90	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.87	0.89	0.90	0.89	0.88	0.88	4.88		

SVN 0.91 0.96 0.95 0.93 0.96 0.96 0.94 0.95 0.93 0.94 0.94 0.93 0.92 0.94 0.88 0.89 0.95 0.91 0.91 0.90 0.88 17.66
 PRT 0.88 0.92 0.92 0.91 0.95 0.92 0.94 0.93 0.94 0.92 0.93 0.93 0.92 0.88 0.89 0.90 0.93 0.89 0.90 0.88 0.93 1.78

HOL rwi

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	PRT	SVN
AUS	0.53																						
BEL	0.85	1.47																					
CAN	0.88	0.95	5.77																				
CHE	0.86	0.95	0.93	11.08																			
DEU	0.83	0.93	0.95	0.89	11.43																		
DFS	0.81	0.92	0.94	0.89	0.97	12.41																	
ESP	0.90	0.93	0.97	0.91	0.95	0.94	0.99																
FRA	0.87	0.96	0.97	0.93	0.95	0.95	0.95	1.11															
GBR	0.86	0.91	0.94	0.87	0.90	0.91	0.92	0.94	1.32														
ITA	0.79	0.84	0.88	0.81	0.84	0.84	0.88	0.89	0.90	1.30													
NLD	0.85	0.95	0.94	0.93	0.96	0.93	0.94	0.95	0.89	0.80	4.79												
USA	0.79	0.85	0.91	0.80	0.85	0.87	0.88	0.89	0.94	0.89	0.81	1.28											
HUN	0.79	0.91	0.92	0.85	0.93	0.91	0.89	0.93	0.90	0.89	0.90	0.88	1.02										
POL	0.82	0.90	0.92	0.89	0.90	0.90	0.90	0.90	0.88	0.86	0.88	0.82	0.91	11.21									
NZL	0.85	0.85	0.88	0.81	0.83	0.81	0.87	0.86	0.87	0.78	0.84	0.83	0.82	0.76	0.31								
ZAF	0.79	0.82	0.85	0.79	0.84	0.84	0.80	0.84	0.91	0.80	0.80	0.87	0.85	0.80	0.80	0.89							
JPN	0.83	0.95	0.96	0.94	0.94	0.95	0.94	0.97	0.93	0.90	0.93	0.90	0.93	0.92	0.85	0.86	1.32						
CZE	0.82	0.92	0.94	0.88	0.95	0.93	0.94	0.92	0.90	0.86	0.93	0.86	0.92	0.91	0.86	0.82	0.93	14.93					
EST	0.80	0.90	0.90	0.90	0.92	0.88	0.89	0.89	0.85	0.84	0.92	0.79	0.88	0.91	0.81	0.81	0.89	0.92	17.32				
IRL	0.79	0.79	0.80	0.79	0.79	0.79	0.79	0.79	0.88	0.79	0.79	0.85	0.79	0.79	0.80	0.79	0.80	0.80	0.80	1.58			
KOR	0.79	0.84	0.81	0.80	0.80	0.79	0.79	0.83	0.79	0.78	0.80	0.79	0.82	0.79	0.77	0.79	0.82	0.79	0.80	0.79	0.79	3.35	
PRT	0.79	0.85	0.88	0.80	0.89	0.89	0.87	0.87	0.85	0.84	0.82	0.85	0.88	0.84	0.76	0.83	0.86	0.86	0.79	0.78	0.78	1.72	
SVN	0.82	0.90	0.93	0.91	0.92	0.93	0.93	0.90	0.89	0.81	0.93	0.85	0.87	0.91	0.78	0.83	0.92	0.92	0.90	0.79	0.80	0.81	21.38

HOL rls

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT
AUS	0.30																						
BEL	0.79	1.83																					
CAN	0.72	0.95	6.22																				
CHE	0.80	0.92	0.93	11.66																			
DEU	0.74	0.94	0.95	0.91	11.94																		
DFS	0.71	0.94	0.97	0.91	0.96	13.45																	
ESP	0.74	0.95	0.95	0.92	0.96	0.95	1.19																
FRA	0.79	0.91	0.89	0.90	0.89	0.88	0.91	1.07															
GBR	0.81	0.87	0.84	0.86	0.86	0.82	0.83	0.91	1.44														
ITA	0.70	0.89	0.89	0.85	0.90	0.90	0.90	0.89	0.82	1.51													
NLD	0.74	0.91	0.93	0.91	0.94	0.92	0.92	0.89	0.86	0.87	5.24												
USA	0.71	0.95	0.96	0.89	0.93	0.95	0.95	0.87	0.82	0.88	0.90	1.64											
HUN	0.74	0.92	0.91	0.87	0.93	0.91	0.94	0.88	0.83	0.90	0.86	0.91	1.01										
POL	0.72	0.91	0.92	0.87	0.95	0.91	0.92	0.89	0.81	0.89	0.86	0.90	0.94	12.10									
NZL	0.71	0.65	0.65	0.66	0.66	0.65	0.65	0.72	0.74	0.65	0.65	0.65	0.66	0.66	0.16								
ZAF	0.83	0.81	0.78	0.78	0.75	0.71	0.78	0.84	0.87	0.71	0.76	0.77	0.76	0.80	0.66	0.83							
JPN	0.70	0.92	0.97	0.89	0.94	0.97	0.94	0.87	0.80	0.89	0.89	0.94	0.89	0.92	0.65	0.72	1.76						
CZE	0.72	0.91	0.92	0.83	0.93	0.92	0.91	0.87	0.85	0.87	0.88	0.91	0.92	0.94	0.65	0.77	0.92	15.40					
EST	0.72	0.86	0.85	0.84	0.90	0.88	0.88	0.84	0.73	0.84	0.89	0.85	0.84	0.88	0.65	0.69	0.86	0.82	21.03				
IRL	0.80	0.77	0.71	0.78	0.74	0.71	0.72	0.81	0.90	0.72	0.76	0.71	0.72	0.72	0.79	0.71	0.74	0.70	1.57				
KOR	0.70	0.81	0.85	0.81	0.83	0.86	0.87	0.81	0.73	0.78	0.81	0.85	0.85	0.81	0.66	0.70	0.86	0.80	0.74	0.70	2.29		
SVN	0.71	0.90	0.94	0.90	0.93	0.95	0.91	0.89	0.81	0.89	0.91	0.91	0.90	0.88	0.66	0.70	0.92	0.86	0.87	0.70	0.83	22.44	
PRT	0.69	0.86	0.83	0.78	0.84	0.85	0.85	0.83	0.77	0.84	0.80	0.84	0.85	0.81	0.65	0.69	0.82	0.81	0.72	0.69	0.80	0.82	2.38

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	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT
AUS	0.32																					
BEL	0.68	2.09																				
CAN	0.63	0.83	7.38																			
CHE	0.66	0.84	0.79	11.80																		
DEU	0.71	0.88	0.83	0.77	12.70																	
DFS	0.63	0.91	0.87	0.78	0.87	13.24																
ESP	0.66	0.77	0.86	0.69	0.85	0.81	1.01															
FRA	0.78	0.79	0.79	0.73	0.90	0.73	0.85	1.04														
GBR	0.76	0.79	0.82	0.71	0.92	0.76	0.85	0.92	1.44													
ITA	0.63	0.69	0.77	0.67	0.76	0.72	0.75	0.73	0.75	1.59												
NLD	0.69	0.78	0.75	0.71	0.91	0.78	0.79	0.85	0.89	0.73	5.04											
USA	0.66	0.75	0.87	0.70	0.84	0.80	0.85	0.82	0.84	0.85	0.81	1.59										
HUN	0.76	0.76	0.77	0.76	0.87	0.72	0.84	0.91	0.87	0.68	0.80	0.80	0.80	1.17								
POL	0.64	0.71	0.75	0.70	0.71	0.71	0.71	0.70	0.68	0.73	0.64	0.75	0.73	0.73	13.09							
ZAF	0.84	0.77	0.77	0.74	0.83	0.72	0.78	0.86	0.87	0.69	0.74	0.81	0.87	0.65	0.89							
JPN	0.74	0.76	0.73	0.83	0.82	0.73	0.76	0.79	0.75	0.67	0.79	0.77	0.85	0.66	0.76	2.13						
CZE	0.72	0.85	0.84	0.75	0.92	0.83	0.85	0.88	0.85	0.75	0.81	0.83	0.92	0.74	0.80	0.86	15.73					
EST	0.74	0.73	0.71	0.72	0.83	0.75	0.86	0.84	0.80	0.64	0.84	0.74	0.84	0.64	0.73	0.87	0.86	23.34				
IRL	0.69	0.68	0.73	0.65	0.81	0.68	0.74	0.77	0.91	0.69	0.75	0.72	0.70	0.65	0.74	0.63	0.71	0.67	1.60			
KOR	0.64	0.64	0.71	0.63	0.72	0.65	0.77	0.73	0.72	0.64	0.65	0.73	0.75	0.66	0.64	0.64	0.72	0.66	0.64	1.56		
SVN	0.63	0.65	0.72	0.64	0.75	0.76	0.71	0.65	0.68	0.64	0.64	0.73	0.65	0.65	0.64	0.64	0.73	0.65	0.73	0.64	22.01	
PRT	0.63	0.63	0.63	0.63	0.75	0.63	0.71	0.75	0.67	0.65	0.69	0.73	0.65	0.63	0.66	0.65	0.71	0.74	0.63	0.72	0.70	2.15

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	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	E
AUS	0.37																						
BEL	0.74	1.48																					
CAN	0.78	0.77	5.31																				
CHE	0.83	0.80	0.92	11.89																			
DEU	0.75	0.83	0.93	0.86	12.32																		
DFS	0.78	0.85	0.90	0.89	0.88	11.87																	
ESP	0.78	0.79	0.88	0.85	0.83	0.83	0.85																
FRA	0.80	0.90	0.90	0.88	0.91	0.91	0.84	1.07															
GBR	0.78	0.78	0.95	0.88	0.96	0.87	0.87	0.90	1.35														
ITA	0.72	0.67	0.88	0.82	0.86	0.77	0.85	0.81	0.90	1.31													
NLD	0.76	0.87	0.93	0.90	0.95	0.90	0.86	0.93	0.93	0.82	4.95												
USA	0.75	0.70	0.94	0.86	0.90	0.84	0.89	0.84	0.94	0.93	0.88	1.42											
HUN	0.79	0.74	0.89	0.87	0.86	0.87	0.82	0.85	0.86	0.79	0.86	0.82	1.03										
POL	0.72	0.81	0.85	0.84	0.91	0.88	0.80	0.88	0.88	0.78	0.87	0.80	0.84	11.81									
NZL	0.77	0.78	0.84	0.81	0.85	0.82	0.80	0.87	0.87	0.78	0.85	0.85	0.75	0.76	0.42								
ZAF	0.76	0.78	0.85	0.81	0.88	0.86	0.81	0.83	0.88	0.73	0.85	0.82	0.82	0.76	0.80	0.85							
JPN	0.76	0.76	0.95	0.91	0.89	0.90	0.84	0.87	0.91	0.86	0.89	0.91	0.88	0.86	0.82	0.81	1.44						
CZE	0.77	0.86	0.88	0.85	0.93	0.90	0.80	0.90	0.90	0.77	0.90	0.80	0.92	0.90	0.77	0.90	0.86	14.26					
EST	0.66	0.73	0.78	0.75	0.80	0.83	0.66	0.80	0.77	0.65	0.81	0.69	0.81	0.77	0.67	0.77	0.71	0.81	19.12				
IRL	0.78	0.74	0.84	0.81	0.84	0.74	0.86	0.82	0.92	0.86	0.82	0.88	0.71	0.77	0.84	0.79	0.79	0.76	0.66	1.17			
KOR	0.70	0.75	0.68	0.76	0.70	0.77	0.73	0.75	0.69	0.64	0.72	0.66	0.77	0.74	0.67	0.80	0.73	0.79	0.68	0.69	3.28		

SVN	0.60	0.79	0.57	0.63	0.67	0.65	0.65	0.66	0.61	0.61	0.66	0.60	0.62	0.66	0.54	0.60	0.63	0.65	0.60	0.60	0.68	17.64
PRT	0.64	0.72	0.66	0.66	0.65	0.68	0.71	0.67	0.66	0.63	0.67	0.66	0.63	0.66	0.69	0.67	0.68	0.65	0.64	0.67	0.68	1.48

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	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT
AUS	0.40																						
BEL	0.83	1.25																					
CAN	0.78	0.91	5.40																				
CHE	0.82	0.91	0.93	11.06																			
DEU	0.82	0.89	0.88	0.88	13.10																		
DFS	0.78	0.91	0.87	0.91	0.95	11.60																	
ESP	0.82	0.86	0.83	0.85	0.91	0.91	0.80																
FRA	0.78	0.89	0.86	0.88	0.90	0.93	0.89	1.07															
GBR	0.79	0.82	0.74	0.81	0.86	0.89	0.87	0.88	1.36														
ITA	0.73	0.75	0.72	0.74	0.82	0.85	0.88	0.83	0.86	1.28													
NLD	0.75	0.83	0.75	0.83	0.92	0.92	0.90	0.87	0.88	0.83	4.36												
USA	0.77	0.83	0.82	0.85	0.90	0.92	0.89	0.87	0.93	0.88	0.85	1.50											
HUN	0.82	0.77	0.79	0.77	0.86	0.83	0.88	0.82	0.81	0.82	0.98												
POL	0.73	0.83	0.72	0.76	0.83	0.86	0.86	0.83	0.83	0.84	0.79	0.79	10.58										
NZL	0.80	0.82	0.74	0.84	0.83	0.88	0.85	0.86	0.92	0.82	0.84	0.90	0.83	0.78	0.40								
ZAF	0.73	0.76	0.72	0.78	0.76	0.83	0.79	0.75	0.86	0.78	0.77	0.81	0.74	0.73	0.82	0.80							
JPN	0.81	0.91	0.92	0.91	0.92	0.92	0.90	0.82	0.84	0.86	0.86	0.87	0.86	0.85	0.83	0.78	1.46						
CZE	0.81	0.88	0.88	0.84	0.89	0.86	0.80	0.83	0.75	0.74	0.76	0.78	0.85	0.74	0.77	0.76	0.86	14.84					
EST	0.73	0.81	0.81	0.76	0.83	0.84	0.86	0.81	0.77	0.78	0.78	0.84	0.79	0.79	0.80	0.74	0.85	0.81	17.58				
IRL	0.73	0.75	0.72	0.74	0.79	0.82	0.83	0.79	0.91	0.86	0.82	0.88	0.77	0.76	0.83	0.73	0.77	0.73	1.03				
KOR	0.73	0.84	0.84	0.77	0.74	0.73	0.75	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.69	0.73	0.83	0.78	0.74	0.73	3.48		
SVN	0.74	0.91	0.85	0.81	0.87	0.86	0.82	0.84	0.74	0.75	0.81	0.76	0.74	0.76	0.71	0.72	0.85	0.84	0.83	0.72	0.80	15.71	
PRT	0.74	0.78	0.72	0.72	0.79	0.83	0.84	0.80	0.86	0.84	0.81	0.81	0.78	0.81	0.77	0.76	0.78	0.72	0.74	0.80	0.72	0.77	1.32

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	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT
AUS	0.35																						
BEL	0.64	1.51																					
CAN	0.78	0.76	5.64																				
CHE	0.77	0.88	0.91	11.92																			
DEU	0.74	0.79	0.92	0.93	11.61																		
DFS	0.70	0.86	0.80	0.90	0.82	11.60																	
ESP	0.79	0.69	0.83	0.81	0.79	0.79	0.77																
FRA	0.74	0.86	0.78	0.86	0.75	0.91	0.82	1.07															
GBR	0.81	0.65	0.81	0.80	0.75	0.82	0.91	0.88	1.33														
ITA	0.73	0.69	0.79	0.79	0.78	0.90	0.81	0.88	1.37														
NLD	0.79	0.80	0.84	0.87	0.81	0.90	0.89	0.92	0.92	0.82	4.41												
USA	0.79	0.69	0.82	0.79	0.75	0.86	0.91	0.88	0.95	0.88	0.90	1.48											
HUN	0.72	0.90	0.81	0.91	0.84	0.91	0.77	0.90	0.77	0.78	0.85	0.79	1.01										
POL	0.67	0.75	0.82	0.84	0.89	0.79	0.75	0.71	0.70	0.75	0.75	0.71	0.83	11.38									
NZL	0.61	0.58	0.57	0.58	0.58	0.57	0.69	0.57	0.61	0.66	0.57	0.68	0.57	0.57	0.58	0.40							
ZAF	0.78</																						

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	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT
AUS	0.61																						
BEL	0.94	1.46																					
CAN	0.94	0.96	6.02																				
CHE	0.96	0.97	0.98	11.94																			
DEU	0.95	0.95	0.98	0.96	13.88																		
DFS	0.90	0.96	0.96	0.94	0.95	10.81																	
ESP	0.93	0.93	0.97	0.95	0.97	0.92	0.92																
FRA	0.93	0.99	0.97	0.97	0.95	0.95	0.92	1.10															
GBR	0.93	0.90	0.96	0.93	0.95	0.91	0.96	0.89	1.38														
ITA	0.85	0.85	0.87	0.85	0.86	0.86	0.86	0.85	0.87	1.18													
NLD	0.94	0.97	0.98	0.97	0.98	0.95	0.95	0.97	0.95	0.85	5.15												
USA	0.86	0.87	0.92	0.88	0.92	0.92	0.92	0.86	0.95	0.87	0.90	1.38											
HUN	0.95	0.93	0.95	0.95	0.91	0.95	0.92	0.92	0.85	0.94	0.88	0.93											
POL	0.88	0.88	0.93	0.89	0.93	0.89	0.92	0.88	0.92	0.85	0.93	0.88	0.91	11.76									
NZL	0.92	0.89	0.92	0.90	0.90	0.86	0.89	0.90	0.91	0.86	0.91	0.87	0.89	0.88	0.32								
ZAF	0.91	0.91	0.94	0.93	0.91	0.89	0.93	0.91	0.93	0.85	0.92	0.88	0.93	0.87	0.90	0.82							
JPN	0.93	0.98	0.97	0.97	0.95	0.95	0.93	0.98	0.90	0.85	0.97	0.86	0.92	0.89	0.89	0.92	1.49						
CZE	0.95	0.95	0.96	0.95	0.95	0.92	0.95	0.93	0.92	0.85	0.95	0.87	0.96	0.91	0.90	0.92	0.95	13.11					
EST	0.94	0.95	0.96	0.95	0.94	0.91	0.94	0.94	0.92	0.86	0.96	0.86	0.93	0.91	0.87	0.90	0.96	0.96	18.76				
IRL	0.91	0.87	0.93	0.91	0.93	0.89	0.92	0.87	0.96	0.85	0.91	0.89	0.88	0.87	0.87	0.90	0.87	0.88	0.89	1.32			
KOR	0.89	0.91	0.90	0.91	0.89	0.90	0.90	0.90	0.86	0.85	0.89	0.85	0.91	0.86	0.86	0.90	0.92	0.90	0.89	0.85	3.25		
SVN	0.94	0.94	0.95	0.95	0.97	0.94	0.96	0.93	0.93	0.85	0.95	0.89	0.94	0.88	0.86	0.87	0.93	0.92	0.93	0.92	0.87	15.84	
PRT	0.89	0.89	0.92	0.89	0.92	0.87	0.93	0.86	0.93	0.86	0.90	0.88	0.92	0.91	0.86	0.87	0.89	0.91	0.90	0.88	0.86	0.92	1.53

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	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	P
AUS	0.78																					
BEL	0.94	1.42																				
CAN	0.95	0.92	5.23																			
CHE	0.93	0.97	0.91	11.34																		
DEU	0.94	0.98	0.95	0.96	13.57																	
DFS	0.93	0.97	0.93	0.98	0.98	10.86																
ESP	0.93	0.98	0.93	0.96	0.98	0.97	1.10															
FRA	0.94	0.90	0.98	0.90	0.93	0.91	0.91	1.07														
GBR	0.95	0.97	0.96	0.95	0.98	0.95	0.97	0.94	1.32													
ITA	0.90	0.93	0.93	0.91	0.93	0.92	0.93	0.92	0.95	1.41												
NLD	0.94	0.98	0.93	0.97	0.98	0.98	0.98	0.91	0.97	0.91	4.95											
USA	0.94	0.94	0.96	0.94	0.96	0.95	0.96	0.94	0.97	0.94	0.95	1.44										
HUN	0.90	0.96	0.90	0.96	0.94	0.95	0.95	0.90	0.92	0.90	0.95	0.90	1.12									
POL	0.93	0.96	0.91	0.96	0.97	0.97	0.96	0.90	0.95	0.92	0.96	0.94	0.96	11.19								
ZAF	0.92	0.93	0.90	0.91	0.91	0.93	0.94	0.90	0.92	0.90	0.92	0.91	0.91	0.93	0.87							
JPN	0.94	0.98	0.94	0.98	0.98	0.98	0.98	0.92	0.97	0.93	0.98	0.97	0.95	0.98	0.94	1.42						
CZE	0.93	0.96	0.92	0.97	0.97	0.97	0.97	0.91	0.96	0.92	0.97	0.95	0.95	0.98	0.92	0.98	14.37					
EST	0.92	0.94	0.90	0.94	0.96	0.96	0.94	0.90	0.93	0.91	0.94	0.91	0.94	0.96	0.89	0.95	0.96	16.28				
IRL	0.92	0.95	0.94	0.91	0.95	0.92	0.93	0.93	0.98	0.93	0.93	0.94	0.90	0.92	0.90	0.94	0.93	0.90	0.90	1.73		
KOR	0.91	0.93	0.89	0.93	0.93	0.94	0.94	0.89	0.93	0.90	0.94	0.92	0.92	0.93	0.90	0.95	0.93	0.91	0.90	4.37		

SVN	0.90	0.94	0.90	0.94	0.95	0.94	0.95	0.90	0.95	0.92	0.96	0.91	0.93	0.95	0.90	0.95	0.94	0.93	0.91	0.90	17.51
PRT	0.90	0.95	0.91	0.93	0.95	0.95	0.93	0.90	0.94	0.91	0.95	0.93	0.91	0.94	0.90	0.95	0.95	0.93	0.93	0.90	1.87

HOL	rtp	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	POL	NZL	JPN	CZE	EST	IRL	KOR	SVN	PRT	ZAF	HUN
AUS	0.43																							
BEL	0.93	1.43																						
CAN	0.90	0.97	6.12																					
CHE	0.92	0.97	0.98	11.98																				
DEU	0.90	0.96	0.97	0.97	14.06																			
DFS	0.88	0.94	0.95	0.95	0.96	11.03																		
ESP	0.90	0.96	0.97	0.96	0.98	0.96	0.88																	
FRA	0.91	0.97	0.98	0.98	0.97	0.96	0.97	1.05																
GBR	0.92	0.96	0.97	0.96	0.97	0.95	0.97	0.98	1.48															
ITA	0.88	0.89	0.89	0.93	0.92	0.92	0.92	0.91	1.29															
NLD	0.91	0.96	0.98	0.97	0.98	0.97	0.98	0.98	0.91	5.08														
USA	0.89	0.94	0.95	0.93	0.95	0.97	0.96	0.94	0.97	0.90	0.96	1.59												
POL	0.88	0.93	0.94	0.92	0.96	0.93	0.96	0.94	0.94	0.91	0.95	0.91	11.25											
NZL	0.91	0.95	0.95	0.94	0.94	0.90	0.93	0.96	0.95	0.86	0.95	0.90	0.92	0.47										
JPN	0.91	0.97	0.98	0.97	0.96	0.96	0.97	0.97	0.96	0.91	0.98	0.96	0.94	0.94	1.57									
CZE	0.90	0.97	0.95	0.95	0.96	0.94	0.94	0.94	0.95	0.90	0.95	0.94	0.94	0.95	14.55									
EST	0.92	0.95	0.94	0.95	0.95	0.91	0.94	0.94	0.94	0.89	0.96	0.91	0.93	0.91	0.94	0.94	16.75							
IRL	0.89	0.94	0.95	0.93	0.94	0.93	0.94	0.95	0.95	0.88	0.94	0.92	0.90	0.93	0.94	0.90	0.90	1.28						
KOR	0.88	0.91	0.93	0.93	0.93	0.93	0.95	0.93	0.93	0.91	0.93	0.91	0.90	0.94	0.88	0.90	0.90	0.90	2.19					
SVN	0.88	0.92	0.94	0.93	0.95	0.92	0.95	0.94	0.94	0.90	0.95	0.91	0.94	0.91	0.92	0.93	0.91	0.91	14.38					
PRT	0.88	0.90	0.91	0.89	0.91	0.89	0.91	0.89	0.92	0.88	0.89	0.90	0.87	0.90	0.89	0.88	0.88	0.88	0.91	1.54				
ZAF	0.89	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.86	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.56			
HUN	0.89	0.95	0.94	0.94	0.97	0.95	0.96	0.96	0.91	0.96	0.95	0.96	0.92	0.95	0.95	0.94	0.92	0.89	0.95	0.90	0.88	1.06		

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	0.98																							
BEL	0.58	1.25																						
CAN	0.59	0.73	5.72																					
CHE	0.62	0.79	0.92	11.43																				
DEU	0.58	0.71	0.82	0.85	12.94																			
DFS	0.65	0.71	0.75	0.81	0.87	10.23																		
ESP	0.65	0.72	0.78	0.81	0.86	0.87	0.79																	
FRA	0.57	0.76	0.75	0.89	0.87	0.87	0.88	1.09																
GBR	0.67	0.73	0.83	0.91	0.92	0.87	0.87	0.89	1.03															
ITA	0.54	0.73	0.78	0.83	0.82	0.81	0.85	0.87	0.83	0.79	2.88													
NLD	0.59	0.72	0.75	0.83	0.89	0.88	0.86	0.85	0.88	0.79	0.84	0.86	0.89											
USA	0.61	0.72	0.81	0.87	0.88	0.88	0.86	0.87	0.90	0.84	0.79	0.77	0.77	1.03										
HUN	0.57	0.73	0.77	0.80	0.82	0.74	0.76	0.79	0.81	0.78	0.74	0.77	0.77	1.03										
POL	0.50	0.70	0.65	0.69	0.68	0.70	0.70	0.72	0.68	0.72	0.69	0.69	0.68	10.80										
NZL	0.79	0.52	0.65	0.66	0.63	0.61	0.61	0.57	0.72	0.51	0.65	0.6												

HOL of 1

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	JPN	CZE	EST	IRL	SVN	PRT
AUS	0.77																			
BEL	0.62	1.75																		
CAN	0.40	0.70	6.58																	
CHE	0.55	0.77	0.91	11.48																
DEU	0.38	0.75	0.83	0.78	11.81															
DFS	0.35	0.65	0.86	0.77	0.80	13.09														
ESP	0.41	0.72	0.81	0.76	0.71	0.82	0.90													
FRA	0.52	0.80	0.70	0.74	0.76	0.63	0.76	1.06												
GBR	0.50	0.74	0.75	0.79	0.74	0.71	0.80	0.85	1.56											
ITA	0.47	0.72	0.70	0.70	0.72	0.62	0.69	0.80	0.68	1.66										
NLD	0.41	0.82	0.68	0.69	0.75	0.65	0.65	0.81	0.74	0.67	4.69									
USA	0.49	0.71	0.81	0.77	0.74	0.67	0.73	0.71	0.73	0.77	0.68	1.51								
HUN	0.55	0.76	0.61	0.64	0.70	0.62	0.62	0.75	0.65	0.72	0.67	0.70	1.19							
POL	0.46	0.69	0.67	0.67	0.68	0.62	0.62	0.67	0.62	0.70	0.62	0.74	0.71	13.58						
JPN	0.43	0.65	0.85	0.78	0.78	0.72	0.70	0.63	0.63	0.71	0.63	0.84	0.63	0.74	0.54					
CZE	0.47	0.75	0.79	0.72	0.78	0.64	0.65	0.69	0.65	0.78	0.64	0.83	0.80	0.83	0.80	17.04				
EST	0.44	0.64	0.62	0.65	0.64	0.64	0.63	0.65	0.64	0.63	0.66	0.63	0.68	0.63	0.64	0.70	20.57			
IRL	0.55	0.72	0.74	0.79	0.68	0.65	0.69	0.67	0.78	0.67	0.62	0.66	0.65	0.59	0.68	0.64	0.44	1.34		
SVN	0.39	0.77	0.68	0.66	0.69	0.65	0.64	0.69	0.63	0.68	0.69	0.81	0.84	0.77	0.83	0.77	0.61	24.23		
PRT	0.35	0.61	0.61	0.61	0.62	0.61	0.63	0.68	0.64	0.67	0.63	0.63	0.65	0.61	0.61	0.63	0.68	0.50	0.66	0.19

HOL loc

HOI bcs

JER sta

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.54									
CAN	0.89	6.76								
DFS	0.90	0.96	11.75							
GBR	0.91	0.96	0.94	1.08						
ITA	0.89	0.94	0.92	0.94	1.35					
NZL	0.87	0.84	0.85	0.91	0.84	0.36				
USA	0.90	0.97	0.95	0.96	0.93	0.88	1.70			
ZAF	0.87	0.86	0.85	0.92	0.86	0.89	0.86	8.87		
NLD	0.89	0.95	0.97	0.94	0.92	0.85	0.93	0.87	4.77	
CHE	0.90	0.95	0.96	0.95	0.93	0.85	0.94	0.88	0.97	11.57

JER cwi

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.29									
CAN	0.71	6.60								
DFS	0.76	0.84	15.68							
GBR	0.80	0.92	0.85	1.79						
ITA	0.66	0.80	0.71	0.73	1.45					
NZL	0.80	0.69	0.67	0.75	0.66	0.38				
USA	0.73	0.90	0.81	0.84	0.88	0.67	1.04			
ZAF	0.69	0.79	0.72	0.83	0.71	0.78	0.77	8.69		
NLD	0.74	0.91	0.89	0.90	0.71	0.71	0.84	0.81	4.44	
CHE	0.68	0.88	0.86	0.83	0.84	0.67	0.87	0.73	0.86	12.37

JER bde

	AUS	CAN	DFS	GBR	ITA	NZL	ZAF	NLD	USA	CHE
AUS	0.33									
CAN	0.75	5.72								
DFS	0.78	0.85	13.63							
GBR	0.74	0.85	0.84	1.56						
ITA	0.71	0.74	0.76	0.83	1.47					
NZL	0.78	0.69	0.70	0.69	0.70	0.38				
ZAF	0.80	0.74	0.83	0.81	0.73	0.78	8.86			
NLD	0.71	0.82	0.83	0.90	0.87	0.70	0.79	4.65		
USA	0.70	0.71	0.74	0.77	0.90	0.69	0.72	0.87	1.04	
CHE	0.77	0.87	0.90	0.89	0.84	0.71	0.82	0.90	0.85	13.29

JER ang

	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE
AUS	0.34								
CAN	0.66	7.63							
DFS	0.70	0.81	13.29						
GBR	0.77	0.79	0.86	1.24					
ITA	0.65	0.82	0.80	0.85	1.34				
USA	0.71	0.83	0.87	0.84	0.77	1.04			
ZAF	0.62	0.63	0.68	0.81	0.70	0.68	8.77		
NLD	0.71	0.81	0.72	0.82	0.78	0.74	0.65	6.12	
CHE	0.63	0.80	0.71	0.72	0.73	0.73	0.65	0.75	9.80

JER	ran									
	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.36									
CAN	0.90	5.83								
DFS	0.91	0.96	11.61							
GBR	0.95	0.95	0.95	1.15						
ITA	0.90	0.96	0.94	0.94	1.23					
NZL	0.92	0.88	0.88	0.92	0.88	0.30				
USA	0.90	0.95	0.96	0.97	0.93	0.90	1.23			
ZAF	0.90	0.90	0.90	0.91	0.90	0.88	0.90	9.06		
NLD	0.91	0.96	0.96	0.96	0.94	0.89	0.95	0.92	4.78	
CHE	0.92	0.96	0.96	0.94	0.93	0.89	0.94	0.91	0.95	13.08

JER	rwi									
	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.32									
CAN	0.82	6.33								
DFS	0.81	0.91	12.13							
GBR	0.82	0.92	0.85	1.43						
ITA	0.80	0.85	0.82	0.86	1.61					
NZL	0.88	0.83	0.82	0.80	0.78	0.31				
USA	0.79	0.83	0.82	0.85	0.85	0.78	1.02			
ZAF	0.79	0.80	0.80	0.82	0.80	0.77	0.80	9.26		
NLD	0.85	0.94	0.91	0.88	0.80	0.86	0.81	0.81	5.05	
CHE	0.84	0.93	0.84	0.86	0.81	0.80	0.80	0.80	0.92	11.92

JER	rls									
	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.18									
CAN	0.67	6.16								
DFS	0.70	0.91	12.66							
GBR	0.75	0.85	0.78	1.74						
ITA	0.71	0.83	0.82	0.78	1.58					
NZL	0.67	0.66	0.67	0.75	0.68	0.13				
USA	0.70	0.95	0.91	0.88	0.82	0.70	0.96			
ZAF	0.73	0.68	0.70	0.79	0.73	0.87	0.75	11.96		
NLD	0.74	0.91	0.91	0.85	0.85	0.67	0.87	0.75	3.53	
CHE	0.78	0.92	0.86	0.83	0.81	0.69	0.86	0.74	0.90	9.53

JER	rlr								
	AUS	CAN	DFS	ITA	ZAF	NLD	USA	CHE	
AUS	0.21								
CAN	0.54	6.54							
DFS	0.55	0.75	13.57						
ITA	0.56	0.80	0.65	1.03					
ZAF	0.54	0.55	0.54	0.58	12.91				
NLD	0.57	0.86	0.88	0.73	0.63	4.58			
USA	0.53	0.75	0.65	0.81	0.55	0.74	0.96		
CHE	0.66	0.69	0.64	0.63	0.57	0.70	0.59	12.09	

JER	fan	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE
AUS		0.22								
CAN		0.63	6.10							
DFS		0.65	0.86	12.74						
GBR		0.72	0.78	0.73	1.49					
ITA		0.65	0.75	0.69	0.75	1.69				
USA		0.64	0.87	0.78	0.86	0.82	0.93			
ZAF		0.68	0.66	0.68	0.87	0.67	0.76	9.72		
NLD		0.68	0.75	0.78	0.86	0.73	0.78	0.71	3.88	
CHE		0.67	0.78	0.80	0.69	0.67	0.69	0.68	0.73	11.99

JER	fua	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS		0.38									
CAN		0.76	5.57								
DFS		0.75	0.86	12.80							
GBR		0.78	0.94	0.85	1.65						
ITA		0.70	0.86	0.78	0.87	1.42					
NZL		0.80	0.74	0.75	0.81	0.70	0.43				
USA		0.76	0.94	0.87	0.92	0.90	0.72	1.63			
ZAF		0.73	0.91	0.87	0.93	0.82	0.75	0.90	11.83		
NLD		0.77	0.92	0.89	0.92	0.83	0.82	0.87	0.86	4.74	
CHE		0.80	0.91	0.84	0.87	0.82	0.72	0.86	0.88	0.89	11.68

JER	ruh	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS		0.36									
CAN		0.74	6.89								
DFS		0.75	0.84	10.70							
GBR		0.82	0.80	0.83	1.31						
ITA		0.75	0.76	0.80	0.85	1.40					
NZL		0.72	0.72	0.76	0.76	0.80	0.43				
USA		0.77	0.84	0.89	0.91	0.83	0.74	1.26			
ZAF		0.83	0.74	0.80	0.88	0.81	0.78	0.85	9.25		
NLD		0.76	0.76	0.91	0.88	0.83	0.82	0.86	0.79	4.37	
CHE		0.80	0.91	0.85	0.83	0.79	0.77	0.84	0.79	0.83	13.11

JER	usu	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS		0.38									
CAN		0.76	6.38								
DFS		0.70	0.85	13.45							
GBR		0.81	0.87	0.84	1.84						
ITA		0.68	0.77	0.72	0.80	1.54					
NZL		0.59	0.59	0.59	0.64	0.64	0.42				
USA		0.73	0.84	0.87	0.84	0.79	0.60	0.99			
ZAF		0.77	0.80	0.73	0.81	0.65	0.59	0.78	10.16		
NLD		0.81	0.84	0.88	0.91	0.80	0.60	0.88	0.79	4.81	
CHE		0.75	0.90	0.86	0.79	0.78	0.61	0.84	0.76	0.86	9.90

JER	ude	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE
AUS		0.35								
CAN		0.92	5.29							
DFS		0.91	0.94	12.20						
GBR		0.91	0.97	0.93	1.46					
ITA		0.92	0.94	0.93	0.93	1.34				
USA		0.90	0.96	0.95	0.94	0.95	1.82			

ZAF	0.89	0.90	0.91	0.92	0.90	0.90	10.49			
NLD	0.91	0.96	0.95	0.96	0.94	0.95	0.92	4.21		
CHE	0.94	0.95	0.94	0.93	0.95	0.94	0.90	0.96	10.03	

JER ftp

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.46									
CAN	0.89	6.38								
DFS	0.88	0.93	12.80							
GBR	0.91	0.94	0.90	1.35						
ITA	0.86	0.87	0.86	0.86	1.78					
NZL	0.87	0.93	0.87	0.88	0.87	0.31				
USA	0.86	0.95	0.92	0.93	0.86	0.89	1.34			
ZAF	0.87	0.93	0.89	0.93	0.86	0.90	0.90	10.18		
NLD	0.93	0.97	0.94	0.94	0.86	0.90	0.90	0.90	5.60	
CHE	0.92	0.95	0.92	0.92	0.86	0.89	0.90	0.88	0.96	10.13

JER ft1

	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE
AUS	0.33								
CAN	0.91	5.61							
DFS	0.92	0.91	13.87						
GBR	0.92	0.93	0.94	1.45					
ITA	0.90	0.92	0.91	0.93	1.66				
USA	0.91	0.92	0.94	0.97	0.92	1.11			
ZAF	0.93	0.90	0.92	0.95	0.90	0.97	11.01		
NLD	0.93	0.93	0.97	0.97	0.91	0.95	0.93	4.68	
CHE	0.92	0.92	0.94	0.96	0.91	0.94	0.93	0.96	11.58

JER rtp

	AUS	CAN	DFS	NZL	ZAF	NLD	USA	CHE
AUS	0.32							
CAN	0.88	6.44						
DFS	0.89	0.95	13.07					
NZL	0.87	0.96	0.91	0.42				
ZAF	0.88	0.92	0.89	0.87	9.46			
NLD	0.90	0.97	0.96	0.93	0.89	4.95		
USA	0.88	0.91	0.94	0.87	0.88	0.94	1.40	
CHE	0.91	0.98	0.95	0.95	0.93	0.96	0.92	10.98

JER ocs

	AUS	CAN	DFS	GBR	ITA	NZL	USA	NLD	CHE
AUS	0.79								
CAN	0.54	6.38							
DFS	0.57	0.70	12.76						
GBR	0.64	0.84	0.83	2.66					
ITA	0.54	0.79	0.76	0.82	0.73				
NZL	0.62	0.57	0.47	0.56	0.55	0.32			
USA	0.64	0.78	0.76	0.86	0.79	0.59	0.88		
NLD	0.60	0.75	0.86	0.88	0.80	0.64	0.83	3.03	
CHE	0.61	0.90	0.77	0.90	0.81	0.56	0.81	0.83	8.18

JER ous

	AUS	CAN	DFS	GBR	NZL	USA	NLD	CHE
AUS	0.79							
CAN	0.68	6.40						
DFS	0.60	0.84	12.85					
GBR	0.74	0.87	0.71	1.43				
NZL	0.82	0.75	0.69	0.74	0.46			

USA	0.66	0.89	0.76	0.85	0.71	1.04				
NLD	0.66	0.87	0.89	0.77	0.78	0.87	4.64			
CHE	0.73	0.91	0.80	0.87	0.78	0.87	0.92	11.03		

JER ofl

	AUS	CAN	DFS	GBR	ITA	USA	NLD	CHE		
AUS	6.32									
CAN	0.52	6.04								
DFS	0.40	0.80	13.66							
GBR	0.58	0.72	0.65	1.33						
ITA	0.43	0.73	0.62	0.72	1.09					
USA	0.65	0.82	0.64	0.71	0.76	1.63				
NLD	0.42	0.69	0.65	0.73	0.67	0.67	4.55			
CHE	0.50	0.88	0.70	0.72	0.69	0.74	0.69	10.68		

RDC sta

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM	
AUS	0.64										
CAN	0.88	6.24									
DEU	0.90	0.97	13.48								
DFS	0.87	0.97	0.97	8.62							
GBR	0.92	0.96	0.96	0.93	1.29						
NOR	0.89	0.94	0.95	0.98	0.93	13.38					
NZL	0.89	0.89	0.86	0.90	0.92	0.92	0.49				
USA	0.90	0.97	0.96	0.94	0.97	0.92	0.89	2.35			
NLD	0.88	0.95	0.97	0.97	0.94	0.96	0.84	0.93	4.67		
CAM	0.92	0.91	0.91	0.92	0.92	0.92	0.91	0.91	0.91	5.52	

RDC cwi

	AUS	CAN	DEU	DFS	GBR	NZL	USA	NLD	CAM	NOR	
AUS	0.41										
CAN	0.74	7.31									
DEU	0.71	0.88	11.33								
DFS	0.78	0.82	0.89	13.70							
GBR	0.83	0.88	0.89	0.87	1.59						
NZL	0.80	0.69	0.72	0.69	0.81	0.35					
USA	0.68	0.85	0.81	0.83	0.84	0.72	1.28				
NLD	0.73	0.92	0.92	0.89	0.91	0.70	0.82	4.65			
CAM	0.78	0.79	0.79	0.79	0.79	0.77	0.79	0.79	6.66		
NOR	0.80	0.80	0.80	0.84	0.82	0.80	0.82	0.87	0.79	15.10	

RDC bde

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM	
AUS	0.49										
CAN	0.81	6.08									
DEU	0.78	0.87	9.81								
DFS	0.79	0.83	0.92	11.84							
GBR	0.78	0.86	0.92	0.89	1.56						
NOR	0.81	0.81	0.80	0.90	0.83	14.88					
NZL	0.76	0.70	0.72	0.74	0.74	0.80	0.35				
USA	0.72	0.76	0.89	0.83	0.89	0.83	0.73	1.28			
NLD	0.70	0.83	0.90	0.85	0.91	0.83	0.69	0.90	4.14		
CAM	0.83	0.82	0.84	0.84	0.84	0.83	0.86	0.84	0.84	4.71	

RDC ang

	AUS	CAN	DEU	DFS	GBR	USA	NLD	CAM	NOR	
AUS	0.47									
CAN	0.65	6.76								
DEU	0.64	0.78	12.64							

RDC ran

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0.42									
CAN	0.91	6.02								
DEU	0.92	0.97	8.91							
DFS	0.91	0.94	0.95	10.03						
GBR	0.93	0.97	0.97	0.95	1.53					
NOR	0.92	0.93	0.91	0.90	0.94	12.18				
NZL	0.92	0.91	0.89	0.88	0.92	0.92	0.28			
USA	0.91	0.98	0.96	0.94	0.97	0.94	0.91	1.69		
NLD	0.91	0.97	0.98	0.96	0.97	0.94	0.89	0.96	5.83	
CAM	0.93	0.94	0.93	0.94	0.94	0.94	0.93	0.94	0.94	5.60

RDC rwi

	AUS	CAN	DEU	DFS	GBR	NZL	USA	NLD	CAM	NOR
AUS	0.45									
CAN	0.85	5.90								
DEU	0.82	0.94	9.61							
DFS	0.80	0.93	0.93	10.48						
GBR	0.85	0.92	0.90	0.88	1.41					
NZL	0.83	0.90	0.83	0.88	0.91	0.34				
USA	0.79	0.91	0.85	0.88	0.94	0.88	1.41			
NLD	0.84	0.94	0.95	0.92	0.89	0.85	0.81	6.07		
CAM	0.86	0.88	0.87	0.88	0.87	0.89	0.88	0.88	6.56	
NOR	0.86	0.89	0.87	0.95	0.88	0.89	0.88	0.90	0.88	13.94

RDC rls

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0.23									
CAN	0.69	6.51								
DEU	0.74	0.94	9.29							
DFS	0.72	0.96	0.94	9.31						
GBR	0.80	0.77	0.86	0.79	1.61					
NOR	0.76	0.88	0.88	0.96	0.81	13.41				
NZL	0.70	0.67	0.68	0.67	0.72	0.74	0.13			
USA	0.71	0.93	0.93	0.94	0.82	0.86	0.67	0.91		
NLD	0.74	0.92	0.92	0.89	0.86	0.81	0.66	0.90	5.23	
CAM	0.82	0.79	0.79	0.78	0.79	0.79	0.76	0.79	0.79	6.45

RDC rlr

	AUS	CAN	DEU	DFS	NOR	NLD	USA	CAM
AUS	0.18							
CAN	0.59	6.60						
DEU	0.61	0.87	10.25					
DFS	0.57	0.83	0.90	10.91				
NOR	0.63	0.75	0.84	0.88	15.37			
NLD	0.58	0.87	0.91	0.88	0.86	4.72		
USA	0.55	0.72	0.77	0.68	0.72	0.80	0.91	
CAM	0.76	0.73	0.72	0.71	0.71	0.71	0.71	6.79

RDC fan

AUS CAN DEU DFS GBR NOR USA NLD CAM

AUS	0.29									
CAN	0.66	6.39								
DEU	0.71	0.81	14.07							
DFS	0.65	0.71	0.80	9.35						
GBR	0.75	0.79	0.91	0.72	1.62					
NOR	0.70	0.73	0.84	0.64	0.77	14.36				
USA	0.68	0.85	0.84	0.73	0.84	0.77	1.06			
NLD	0.69	0.75	0.89	0.77	0.88	0.68	0.80	4.85		
CAM	0.80	0.80	0.77	0.77	0.77	0.77	0.79	0.79	7.78	

RDC	fua									
	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0.38									
CAN	0.77	5.60								
DEU	0.75	0.91	12.46							
DFS	0.73	0.81	0.82	11.72						
GBR	0.77	0.89	0.95	0.87	1.54					
NOR	0.74	0.81	0.74	0.86	0.81	12.98				
NZL	0.76	0.80	0.81	0.69	0.78	0.72	0.37			
USA	0.75	0.93	0.89	0.84	0.92	0.80	0.84	1.50		
NLD	0.77	0.92	0.93	0.88	0.92	0.85	0.84	0.88	4.14	
CAM	0.81	0.82	0.81	0.81	0.80	0.81	0.79	0.81	0.81	6.55

RDC	ruh									
	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0.47									
CAN	0.78	5.76								
DEU	0.81	0.87	14.90							
DFS	0.77	0.87	0.89	10.76						
GBR	0.80	0.76	0.85	0.86	1.44					
NOR	0.77	0.83	0.86	0.88	0.82	12.81				
NZL	0.84	0.73	0.82	0.77	0.92	0.77	0.34			
USA	0.77	0.85	0.89	0.91	0.89	0.83	0.84	1.36		
NLD	0.75	0.75	0.91	0.91	0.88	0.90	0.83	0.85	4.17	
CAM	0.84	0.82	0.82	0.83	0.84	0.82	0.85	0.82	0.82	6.09

RDC	usu									
	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0.35									
CAN	0.75	5.60								
DEU	0.72	0.90	12.63							
DFS	0.68	0.75	0.77	13.04						
GBR	0.80	0.81	0.75	0.78	1.86					
NOR	0.70	0.73	0.69	0.78	0.77	13.71				
NZL	0.69	0.73	0.63	0.59	0.72	0.69	0.34			
USA	0.78	0.82	0.76	0.83	0.89	0.78	0.71	1.22		
NLD	0.78	0.83	0.80	0.89	0.92	0.82	0.58	0.90	4.57	
CAM	0.81	0.77	0.76	0.76	0.78	0.76	0.78	0.78	0.77	6.00

RDC	ude									
	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM	
AUS	0.54									
CAN	0.90	5.52								
DEU	0.91	0.97	12.42							
DFS	0.90	0.96	0.94	10.65						
GBR	0.91	0.96	0.96	0.94	1.83					
NOR	0.92	0.93	0.93	0.91	0.94	11.97				
USA	0.89	0.97	0.96	0.96	0.96	0.94	1.31			
NLD	0.91	0.97	0.97	0.95	0.97	0.96	0.96	4.16		
CAM	0.93	0.94	0.93	0.94	0.94	0.93	0.93	0.94	4.47	

RDC	ftp	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS		0.53									
CAN		0.92	5.57								
DEU		0.93	0.97	13.09							
DFS		0.89	0.94	0.92	11.92						
GBR		0.92	0.93	0.95	0.89	1.51					
NOR		0.89	0.90	0.89	0.88	0.92	11.88				
NZL		0.92	0.89	0.90	0.87	0.89	0.89	0.27			
USA		0.87	0.93	0.92	0.92	0.93	0.92	0.87	1.45		
NLD		0.93	0.98	0.97	0.95	0.94	0.88	0.91	0.90	4.70	
CAM		0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	6.84

RDC	ftl	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM
AUS		0.53								
CAN		0.93	4.95							
DEU		0.94	0.94	13.90						
DFS		0.92	0.91	0.98	10.57					
GBR		0.95	0.93	0.98	0.93	1.41				
NOR		0.92	0.93	0.94	0.93	0.94	12.85			
USA		0.94	0.93	0.96	0.93	0.97	0.94	1.65		
NLD		0.93	0.93	0.98	0.97	0.97	0.94	0.95	5.25	
CAM		0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	7.36

RDC	rtp	AUS	CAN	DEU	DFS	NOR	NZL	NLD	USA	CAM
AUS		0.39								
CAN		0.89	6.25							
DEU		0.89	0.96	14.24						
DFS		0.89	0.93	0.96	12.26					
NOR		0.91	0.91	0.90	0.89	13.77				
NZL		0.92	0.95	0.93	0.88	0.89	0.35			
NLD		0.91	0.98	0.97	0.96	0.90	0.94	5.46		
USA		0.89	0.92	0.95	0.93	0.93	0.89	0.96	1.45	
CAM		0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	6.29

RDC	ocs	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS		1.13									
CAN		0.61	5.26								
DEU		0.61	0.82	20.49							
DFS		0.66	0.69	0.81	10.46						
GBR		0.68	0.80	0.92	0.80	1.60					
NOR		0.62	0.76	0.76	0.76	0.82	11.80				
NZL		0.73	0.57	0.63	0.49	0.68	0.69	0.28			
USA		0.64	0.82	0.89	0.79	0.89	0.82	0.72	0.57		
NLD		0.62	0.75	0.88	0.84	0.88	0.74	0.66	0.86	2.96	
CAM		0.74	0.81	0.81	0.81	0.81	0.81	0.74	0.82	0.82	6.16

RDC	ous	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS		1.46									
CAN		0.72	5.42								
DEU		0.75	0.88	17.28							
DFS		0.63	0.80	0.82	10.81						
GBR		0.83	0.83	0.84	0.73	1.56					
NOR		0.65	0.81	0.82	0.82	0.86	11.37				
NZL		0.83	0.82	0.79	0.71	0.80	0.75	0.37			

USA	0.74	0.89	0.87	0.87	0.87	0.86	0.87	1.00
NLD	0.69	0.87	0.91	0.88	0.77	0.82	0.81	0.86
CAM	0.79	0.86	0.85	0.85	0.86	0.85	0.84	0.87
								3.95
								6.37

RDC of1

	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM
AUS	0.63								
CAN	0.43	5.68							
DEU	0.41	0.83	16.19						
DFS	0.38	0.80	0.79	13.52					
GBR	0.51	0.74	0.74	0.68	1.40				
NOR	0.51	0.72	0.75	0.62	0.75	14.97			
USA	0.53	0.73	0.74	0.65	0.70	0.75	1.32		
NLD	0.43	0.69	0.75	0.65	0.74	0.69	0.68	6.44	
CAM	0.72	0.75	0.75	0.75	0.76	0.75	0.77	0.75	6.96

^aLAPPENDIX II. Number of common bulls

BSW

common bulls below diagonal

common three quarter sib group above diagonal

CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
-----	-----	-----	-----	-----	-----	-----	-----	-----

CAN	0	128	75	128	41	150	113	30	17
CHE	112	0	156	470	66	267	519	65	15
FRA	66	116	0	175	55	90	177	48	14
ITA	111	408	137	0	88	209	567	84	16
NLD	33	63	44	70	0	56	81	32	11
USA	141	236	62	152	42	0	222	31	17
DEA	94	426	130	483	71	177	0	82	13
SVN	27	63	46	82	31	26	76	0	8
GBR	14	13	13	14	9	15	11	6	0

BSW

common bulls below diagonal

common three quarter sib group above diagonal

CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
-----	-----	-----	-----	-----	-----	-----	-----	-----

CAN	0	120	44	128	34	150	111	29	17
CHE	105	0	93	415	61	238	456	62	15
FRA	39	65	0	102	36	54	115	39	10
ITA	111	354	78	0	80	209	531	82	16
NLD	29	60	31	66	0	42	75	32	11
USA	141	203	36	152	33	0	204	30	17
DEA	93	367	81	446	69	152	0	80	12
SVN	26	60	38	80	31	25	75	0	8
GBR	14	13	9	14	9	15	11	6	0

BSW

common bulls below diagonal

common three quarter sib group above diagonal

CAN	CHE	FRA	ITA	NLD	DEA	SVN	GBR	USA
-----	-----	-----	-----	-----	-----	-----	-----	-----

CAN	0	128	75	128	34	113	22	17	150
CHE	112	0	156	470	65	519	50	15	267
FRA	66	116	0	175	51	177	35	14	90
ITA	111	408	137	0	80	567	65	16	209
NLD	29	63	41	66	0	76	24	11	42
DEA	94	426	130	483	70	0	62	13	222
SVN	20	47	35	62	24	58	0	6	22
GBR	14	13	13	14	9	11	4	0	17
USA	141	236	62	152	33	177	19	15	0

BSW

common bulls below diagonal

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

CAN	0	127	75	22	149	17
CHE	112	0	152	41	265	15
FRA	66	112	0	33	90	14
NLD	19	42	28	0	27	8
USA	140	236	62	22	0	17
GBR	14	13	13	6	15	0

BSW

common bulls below diagonal

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

CAN	0	128	75	128	41	150	113	30	17
CHE	112	0	156	470	66	267	519	65	15
FRA	66	116	0	175	55	90	177	48	14
ITA	111	408	137	0	88	209	567	84	16
NLD	33	63	44	70	0	56	81	32	11
USA	141	236	62	152	42	0	222	31	17
DEA	94	426	130	483	71	177	0	82	13
SVN	27	63	46	82	31	26	76	0	8
GBR	14	13	13	14	9	15	11	6	0

BSW

common bulls below diagonal

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

CAN	0	128	44	41	150	113	17	22	124
CHE	112	0	93	66	267	519	15	50	463
FRA	39	65	0	36	54	115	10	35	102
NLD	33	63	31	0	56	81	11	24	86
USA	141	236	36	42	0	222	17	22	195
DEA	94	426	81	71	177	0	13	62	561
GBR	14	13	9	9	15	11	0	6	16
SVN	20	47	35	24	19	58	4	0	65
ITA	108	402	78	69	138	475	14	62	0

BSW

common bulls below diagonal

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

CAN	0	128	75	128	41	150	113	30	17
CHE	112	0	156	470	66	267	519	65	15
FRA	66	116	0	175	55	90	177	48	14
ITA	111	408	137	0	88	209	567	84	16
NLD	33	63	44	70	0	56	81	32	11
USA	141	236	62	152	42	0	222	31	17
DEA	94	426	130	483	71	177	0	82	13
SVN	27	63	46	82	31	26	76	0	8
GBR	14	13	13	14	9	15	11	6	0

BSW

common bulls below diagonal

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

CAN	0	128	75	128	33	150	113	30	17
CHE	112	0	156	470	64	267	519	65	15

FRA	66	116	0	175	51	90	177	48	14
ITA	111	408	137	0	79	209	567	84	16
NLD	28	62	41	65	0	41	75	32	11
USA	141	236	62	152	31	0	222	31	17
DEA	94	426	130	483	69	177	0	82	13
SVN	27	63	46	82	31	26	76	0	8
GBR	14	13	13	14	9	15	11	6	0

BSW

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

CAN	0	128	75	124	33	113	30	150
CHE	112	0	156	464	64	519	65	267
FRA	66	116	0	174	51	177	48	90
ITA	108	403	137	0	78	561	84	195
NLD	28	62	41	64	0	75	32	41
DEA	94	426	130	475	69	0	82	222
SVN	27	63	46	82	31	76	0	31
USA	141	236	62	138	31	177	26	0

BSW

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

CAN	0	128	44	85	33	150	80	23	17
CHE	112	0	93	299	65	266	325	51	15
FRA	39	65	0	94	35	54	105	36	10
ITA	76	247	71	0	59	111	284	59	13
NLD	28	63	30	54	0	41	63	24	11
USA	141	236	36	79	32	0	125	23	17
DEA	68	260	74	249	58	88	0	62	10
SVN	21	48	36	57	24	20	58	0	6
GBR	14	13	9	11	9	15	9	4	0

BSW

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

CAN	0	128	75	128	34	150	113	30	17
CHE	112	0	156	470	65	267	519	65	15
FRA	66	116	0	175	51	90	177	48	14
ITA	111	408	137	0	80	209	567	84	16
NLD	29	63	41	66	0	42	76	32	11
USA	141	236	62	152	33	0	222	31	17
DEA	94	426	130	483	70	177	0	83	13
SVN	27	63	46	82	31	26	77	0	8
GBR	14	13	13	14	9	15	11	6	0

BSW

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

CAN	0	128	75	128	34	150	113	30
CHE	112	0	156	470	65	267	519	65
FRA	66	116	0	175	51	90	177	48
ITA	111	408	137	0	80	209	567	84
NLD	29	63	41	66	0	42	76	32
USA	141	236	62	152	33	0	222	31
DEA	94	426	130	483	70	177	0	83
SVN	27	63	46	82	31	26	77	0

BSW

common bulls below diagonal

common three quarter sib group above diagonal

CAN CHE FRA ITA NLD USA DEA SVN GBR

CAN	0	128	75	128	41	150	113	23	17
CHE	112	0	156	470	66	267	519	51	15
FRA	66	116	0	175	55	90	177	36	14
ITA	111	408	137	0	88	209	567	66	16
NLD	33	63	44	70	0	56	81	24	11
USA	141	236	62	152	42	0	222	23	17
DEA	94	426	130	483	71	177	0	64	13
SVN	21	48	36	63	24	20	60	0	6
GBR	14	13	13	14	9	15	11	4	0

BSW

common bulls below diagonal

common three quarter sib group above diagonal

CAN CHE FRA ITA NLD USA DEA SVN GBR

CAN	0	128	75	128	41	148	113	30	17
CHE	112	0	156	470	66	267	519	65	15
FRA	66	116	0	175	55	90	177	48	14
ITA	111	408	137	0	88	209	567	84	16
NLD	33	63	44	70	0	56	81	32	11
USA	140	236	62	152	42	0	222	31	17
DEA	94	426	130	483	71	177	0	83	13
SVN	27	63	46	82	31	26	77	0	8
GBR	14	13	13	14	9	15	11	6	0

BSW

common bulls below diagonal

common three quarter sib group above diagonal

CAN CHE FRA NLD USA DEA SVN GBR ITA

CAN	0	128	75	41	150	102	29	17	116
CHE	112	0	156	66	267	487	63	15	428
FRA	66	116	0	55	90	167	47	14	162
NLD	33	63	44	0	56	75	32	11	78
USA	141	236	62	42	0	197	30	17	165
DEA	86	395	122	69	149	0	81	12	473
SVN	26	61	45	31	25	76	0	8	81
GBR	14	13	13	9	15	11	6	0	16
ITA	101	371	125	65	119	410	79	14	0

BSW

common bulls below diagonal

common three quarter sib group above diagonal

CAN CHE FRA ITA NLD USA DEA SVN GBR

CAN	0	128	75	128	41	150	113	29	17
CHE	112	0	156	470	66	267	519	64	15
FRA	66	116	0	175	55	90	177	47	14
ITA	111	408	137	0	88	207	567	83	16
NLD	33	63	44	70	0	56	81	32	11
USA	141	236	62	151	42	0	222	30	17
DEA	94	426	130	483	71	177	0	82	13
SVN	26	62	45	81	31	25	76	0	8
GBR	14	13	13	14	9	15	11	6	0

BSW

common bulls below diagonal

common three quarter sib group above diagonal

CAN CHE FRA ITA NLD DEA SVN USA

CAN	0	128	75	85	29	80	29	150
CHE	112	0	153	299	61	325	63	266
FRA	66	113	0	114	48	125	47	90
ITA	76	247	85	0	58	284	69	111
NLD	25	61	39	54	0	62	31	36
DEA	68	260	85	249	58	0	74	125
SVN	26	61	45	68	31	67	0	29
USA	141	236	62	79	28	88	25	0

BSW

common bulls below diagonal

common three quarter sib group above diagonal

CAN CHE FRA ITA NLD USA DEA SVN GBR

CAN	0	120	65	128	41	150	80	22	17
CHE	105	0	118	414	61	238	320	50	15
FRA	60	88	0	141	45	75	114	35	14
ITA	111	352	113	0	86	206	320	65	16
NLD	33	60	39	70	0	56	63	24	11
USA	141	203	55	152	42	0	125	22	17
DEA	68	256	82	284	58	88	0	60	10
SVN	20	47	35	62	24	19	56	0	6
GBR	14	13	13	14	9	15	9	4	0

BSW

common bulls below diagonal

common three quarter sib group above diagonal

CAN CHE FRA ITA NLD USA DEA SVN GBR

CAN	0	120	65	128	41	149	113	23	17
CHE	105	0	118	415	61	238	464	51	15
FRA	60	88	0	141	45	75	146	36	14
ITA	111	354	113	0	88	209	560	66	16
NLD	33	60	39	70	0	56	81	24	11
USA	140	203	55	152	42	0	220	23	17
DEA	93	377	108	479	71	173	0	64	13
SVN	21	48	36	63	24	20	60	0	6
GBR	14	13	13	14	9	15	11	4	0

BSW

common bulls below diagonal

common three quarter sib group above diagonal

CAN CHE FRA ITA NLD USA DEA SVN GBR

CAN	0	120	65	124	41	150	113	23	17
CHE	105	0	118	414	61	238	464	51	15
FRA	60	88	0	140	45	75	146	36	14
ITA	108	353	113	0	86	195	555	66	16
NLD	33	60	39	69	0	56	81	24	11
USA	141	203	55	138	42	0	220	23	17
DEA	93	377	108	472	71	173	0	63	13
SVN	21	48	36	63	24	20	59	0	6
GBR	14	13	13	14	9	15	11	4	0

BSW

BSW

BSW

common bulls below diagonal

common three quarter sib group above diagonal

CAN CHE DEA ITA SVN USA FRA

CAN	0	119	112	86	22	151	45
CHE	104	0	458	299	50	237	93
DEA	94	374	0	325	62	216	115
ITA	77	246	274	0	58	111	94
SVN	20	47	58	56	0	22	35
USA	141	203	172	79	19	0	54
FRA	40	65	81	71	35	36	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

CAN	CHE	DEA	ITA	SVN	FRA
-----	-----	-----	-----	-----	-----

CAN	0	126	114	129	30	76
CHE	111	0	519	470	64	156
DEA	94	426	0	565	82	177
ITA	112	408	482	0	83	175
SVN	27	63	76	82	0	48
FRA	67	116	130	137	46	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

CAN	CHE	DEA	ITA	SVN	USA	FRA
-----	-----	-----	-----	-----	-----	-----

CAN	0	119	90	86	22	151	45
CHE	104	0	355	299	50	237	93
DEA	78	287	0	291	61	153	107
ITA	77	246	256	0	58	111	94
SVN	20	47	57	56	0	22	35
USA	141	203	112	79	19	0	54
FRA	40	65	76	71	35	36	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

CHE	DEA	ITA	SVN	USA	FRA
-----	-----	-----	-----	-----	-----

CHE	0	501	299	50	266	154
DEA	411	0	324	62	207	173
ITA	247	273	0	58	111	114
SVN	47	58	56	0	22	35
USA	236	161	79	19	0	89
FRA	115	128	85	35	62	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

CAN	CHE	DEA	ITA	SVN	USA	FRA
-----	-----	-----	-----	-----	-----	-----

CAN	0	76	64	67	21	83	33
CHE	65	0	355	299	47	237	93
DEA	52	287	0	291	57	153	107
ITA	60	246	256	0	52	111	94
SVN	19	45	53	51	0	22	34
USA	74	203	112	79	19	0	54
FRA	28	65	76	71	34	36	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

CAN	CHE	DEA	ITA	SVN	FRA
-----	-----	-----	-----	-----	-----

CAN	0	126	114	125	29	76
-----	---	-----	-----	-----	----	----

CHE	111	0	519	464	62	156
DEA	94	426	0	559	81	177
ITA	109	403	474	0	81	174
SVN	26	61	75	80	0	47
FRA	67	116	130	137	45	0

BSW

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

CHE	0	518	467	50	153
DEA	425	0	565	64	176
ITA	405	482	0	65	173
SVN	48	60	63	0	36
FRA	115	129	137	36	0

BSW

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

CHE	0	291	274	49	106
DEA	245	0	282	62	124
ITA	231	249	0	59	113
SVN	47	58	57	0	36
FRA	78	84	85	36	0

BSW

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

CHE	0	518	461	63	153
DEA	425	0	559	82	176
ITA	400	474	0	82	172
SVN	62	76	81	0	47
FRA	115	129	137	45	0

BSW

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

CHE	0	324	297	63	89
DEA	259	0	283	74	103
ITA	245	249	0	69	93
SVN	62	67	68	0	39
FRA	64	73	70	38	0

GUE

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

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

GUE

common bulls below diagonal
common three quarter sib group above diagonal

CAN GBR USA AUS

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

GUE

common bulls below diagonal

common three quarter sib group above diagonal

CAN GBR USA AUS

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

GUE

common bulls below diagonal

common three quarter sib group above diagonal

CAN GBR USA AUS

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

GUE

common bulls below diagonal

common three quarter sib group above diagonal

CAN GBR USA AUS

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

GUE

common bulls below diagonal

common three quarter sib group above diagonal

CAN GBR USA AUS

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

GUE

common bulls below diagonal

common three quarter sib group above diagonal

CAN GBR USA AUS

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

GUE

common bulls below diagonal

common three quarter sib group above diagonal

CAN USA AUS

CAN	0	35	19
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USA	33	0	6
AUS	19	4	0

GUE

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

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

GUE

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

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

GUE

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

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

GUE

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

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

GUE

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

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

GUE

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

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

GUE

common bulls below diagonal

common three quarter sib group above diagonal

CAN GBR USA AUS

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

GUE

common bulls below diagonal

common three quarter sib group above diagonal

CAN AUS USA

CAN	0	19	63
AUS	19	0	22
USA	52	19	0

GUE

common bulls below diagonal

common three quarter sib group above diagonal

CAN GBR USA AUS

CAN	0	12	63	19
GBR	9	0	33	9
USA	52	31	0	21
AUS	19	8	18	0

GUE

common bulls below diagonal

common three quarter sib group above diagonal

CAN GBR USA AUS

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

GUE

common bulls below diagonal

common three quarter sib group above diagonal

CAN GBR USA AUS

CAN	0	20	63	19
GBR	17	0	72	10
USA	52	71	0	22
AUS	19	8	19	0

GUE

GUE

HOL

common bulls below diagonal

common three quarter sib group above diagonal

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

AUS	0	479	857	457	766	749	614	792	866	676	875	1044	461	546	492	305	549	527	88	412	309	123	476
BEL	412	0	625	510	801	649	569	740	704	664	997	738	405	548	279	247	415	512	86	393	253	152	494
CAN	777	596	0	848	1746	1128	1268	1282	1503	1712	1284	3022	884	1080	369	375	1132	1043	140	433	648	188	848
CHE	393	507	690	0	905	599	558	597	702	720	821	915	382	532	251	221	396	501	77	352	259	125	443
DEU	421	679	707	620	0	1889	1296	1939	1602	2131	2199	2471	951	1520	409	355	1095	1483	197	530	502	285	875

DFS	489	566	814	506	908	0	937	1407	1314	1297	1598	1631	722	1098	457	383	788	1050	148	532	429	210	758
ESP	469	552	785	444	607	657	0	1084	1053	1264	1055	1489	699	886	318	367	832	849	122	409	469	177	724
FRA	478	677	730	493	690	611	710	0	1387	1432	1743	2222	794	1310	481	356	1067	1120	137	523	469	172	735
GBR	718	706	1519	674	837	896	852	774	0	1495	1592	2018	774	1084	476	394	868	1006	143	717	485	204	820
ITA	545	658	1435	645	1115	991	930	723	1261	0	1536	2365	904	1304	348	350	985	1204	169	481	574	246	885
NLD	719	1097	1123	777	1270	1154	895	890	1320	1278	0	2129	789	1275	596	382	885	1329	182	653	449	236	864
USA	859	631	3003	796	933	995	962	1010	1833	1824	1672	0	1148	1529	539	466	1660	1507	189	561	807	218	1080
HUN	327	329	784	304	571	512	536	466	627	762	593	1039	0	725	274	299	592	823	110	330	414	139	560
POL	351	431	793	368	813	702	555	688	809	965	952	1246	552	0	308	289	728	1061	166	390	476	224	754
NZL	395	216	314	207	252	292	259	236	371	278	529	453	207	188	0	209	316	329	43	338	177	62	286
ZAF	280	210	348	191	255	300	339	251	366	310	344	494	257	215	189	0	306	301	52	236	228	74	313
JPN	275	222	381	209	259	294	297	257	335	348	318	440	239	231	148	193	0	725	105	324	480	135	532
CZE	333	378	702	348	881	600	575	637	709	882	1116	1111	695	718	214	224	216	0	135	394	458	201	688
EST	42	51	64	35	97	73	52	50	66	87	110	117	66	91	18	21	24	75	0	63	69	53	103
IRL	372	377	409	345	381	423	393	411	769	453	597	519	277	289	276	224	184	298	33	0	196	99	363
KOR	216	174	586	180	246	285	328	235	362	480	299	906	322	343	120	176	221	320	28	137	0	97	409
SVN	84	120	138	88	255	166	129	114	156	211	202	166	102	176	46	53	65	148	30	76	60	0	142
PRT	359	495	853	385	604	647	694	583	754	852	855	1102	539	696	221	298	255	566	64	313	346	113	0

HOL

common bulls below diagonal																							
common three quarter sib group above diagonal																							

AUS	0	472	857	457	766	748	626	650	866	676	820	1044	461	544	492	255	548	527	88	412	307	123	479
BEL	411	0	619	507	796	642	581	664	696	660	941	721	402	544	275	216	405	510	86	390	252	152	495
CAN	777	596	0	848	1745	1128	1278	1106	1503	1713	1210	3022	884	1079	369	322	1129	1043	140	433	644	188	850
CHE	393	506	690	0	905	599	567	547	702	720	798	915	382	530	251	198	395	501	77	352	258	125	444
DEU	421	679	707	620	0	1889	1324	1803	1601	2131	2159	2471	951	1514	409	321	1093	1483	197	530	499	285	875
DFS	489	565	814	506	908	0	960	1221	1312	1296	1519	1630	721	1093	456	329	787	1050	148	530	427	210	761
ESP	479	578	797	454	643	682	0	1006	1076	1280	1046	1509	710	905	329	322	836	868	127	423	470	183	742
FRA	432	630	671	454	617	578	706	0	1226	1380	1392	1775	740	1217	390	270	899	1063	134	463	429	171	696
GBR	718	706	1519	674	837	896	884	720	0	1495	1525	2016	774	1082	476	338	866	1006	143	714	483	204	822
ITA	545	658	1435	645	1115	991	959	707	1261	0	1515	2366	904	1304	348	336	983	1204	169	481	569	246	886
NLD	687	1035	1066	753	1248	1130	897	758	1266	1262	0	1893	768	1251	569	319	813	1310	180	639	429	236	848
USA	859	630	3003	796	933	994	981	807	1833	1824	1428	0	1148	1527	539	397	1657	1507	189	559	801	218	1083
HUN	327	329	784	304	571	512	548	449	627	762	576	1039	0	724	274	271	592	823	110	330	410	139	563
POL	351	431	793	368	813	702	576	645	808	965	941	1246	552	0	308	263	727	1061	166	390	473</td		

NZL	395	216	314	207	252	292	261	236	371	278	527	453	207	188	0	209	316	329	43	338	176	287	51
ZAF	280	210	348	191	255	300	340	251	366	309	342	493	257	215	189	0	306	301	52	236	227	313	55
JPN	272	220	378	207	257	292	295	254	332	346	314	436	237	230	146	191	0	725	105	324	478	534	111
CZE	333	378	702	348	881	600	578	637	709	882	1115	1111	695	718	214	224	214	0	135	394	458	691	172
EST	42	51	64	35	97	73	53	50	66	87	110	117	66	91	18	21	24	75	0	63	69	103	49
IRL	372	377	409	345	381	423	394	411	767	453	594	519	277	289	276	224	182	298	33	0	195	364	76
KOR	216	174	586	180	246	285	328	325	362	480	296	902	322	343	120	175	220	320	28	137	0	409	84
PRT	360	496	855	385	604	649	699	587	756	852	854	1102	542	699	221	298	253	568	64	314	346	0	115
SVN	67	93	121	73	229	140	110	98	130	185	169	144	88	156	39	40	50	128	26	62	53	93	0

HOL

common bulls below diagonal

common three quarter sib group above diagonal

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	ZAF	JPN	CZE	EST	IRL	KOR	PRT	SVN
AUS	0	465	857	442	764	748	629	650	863	675	459	1041	460	541	301	548	527	86	410	307	471	95
BEL	409	0	611	483	785	633	578	660	683	657	592	706	396	537	235	400	507	85	383	247	485	119
CAN	777	591	0	812	1744	1124	1281	1106	1501	1712	833	3022	884	1078	370	1129	1043	139	432	644	845	160
CHE	389	482	660	0	822	585	560	542	689	700	535	858	374	510	217	394	480	74	349	256	429	96
DEU	420	677	707	567	0	1877	1332	1802	1599	2130	1347	2467	948	1510	350	1092	1482	196	529	499	859	246
DFS	489	563	814	496	907	0	963	1215	1301	1291	902	1620	717	1083	379	784	1048	146	529	427	747	175
ESP	481	580	800	451	659	690	0	1013	1078	1287	702	1514	711	908	369	839	872	127	424	470	740	153
FRA	432	630	671	449	617	578	718	0	1225	1380	807	1774	739	1215	300	899	1063	132	462	429	682	146
GBR	718	697	1519	664	836	896	890	720	0	1494	891	2011	770	1073	388	865	1005	140	706	483	808	168
ITA	545	658	1435	631	1114	991	968	707	1259	0	1089	2365	904	1300	345	983	1204	167	480	569	875	215
NLD	434	648	830	499	935	824	623	573	846	1021	486	905	206	443	905	142	362	293	544	185		
USA	858	622	3003	741	932	994	983	807	1832	1824	916	0	1146	1525	460	1657	1506	188	556	800	1071	184
HUN	327	327	784	299	571	512	552	449	626	762	381	1038	0	722	296	592	823	110	327	410	557	121
POL	351	428	793	348	813	700	584	645	805	965	771	1246	552	0	284	727	1058	165	387	473	747	195
ZAF	277	207	345	187	252	297	339	217	363	306	184	489	255	212	0	302	296	49	234	224	307	52
JPN	271	218	376	206	256	291	296	246	329	345	236	433	237	230	188	0	724	105	323	476	531	111
CZE	333	378	702	336	881	600	604	602	709	882	868	1111	695	718	220	214	0	133	393	456	683	171
EST	42	51	64	35	97	73	58	50	66	87	92	117	66	91	21	24	75	0	61	69	101	49
IRL	372	375	409	341	380	423	414	380	760	453	363	519	277	288	223	182	298	33	0	194	357	76
KOR	215	174	584	179	246	285	330	226	361	478	214	898	319	341	174	218	319	28	137	0	407	83
PRT	360	493	855	375	603	646	715	575	755	851	555	1102	542	693	295	251	568	63	314	344	0	115
SVN	67	93	121	72	225	139	114	98	130	184	167	144	88	154	37	50	128	26	62	52	93	0

HOL

common bulls below diagonal

common three quarter sib group above diagonal

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT
AUS	0	479	857	457	766	749	613	792	866	676	875	1044	461	546	492	305	549	527	88	412	309	124	479
BEL	412	0	625	510	801	649	565	740	704	664	997	738</td											

HOL

common bulls below diagonal

common three quarter sib group above diagonal

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	PRT	SVN
AUS	0	454	857	457	766	749	613	792	866	676	873	1044	461	546	492	305	354	527	88	412	307	479	96
BEL	409	0	605	503	781	628	549	693	673	657	908	691	390	536	264	235	305	498	86	378	243	488	120
CAN	777	586	0	848	1746	1128	1267	1282	1503	1712	1281	3022	884	1080	369	375	829	1043	140	433	645	850	162
CHE	393	503	690	0	905	599	557	598	702	720	819	915	382	532	251	221	314	501	77	352	257	444	99
DEU	421	674	707	620	0	1889	1291	1940	1602	2131	2197	2471	951	1520	409	355	871	1483	197	530	499	875	250
DFS	489	561	814	506	908	0	934	1407	1314	1297	1590	1631	722	1098	457	383	560	1050	148	532	426	762	177
ESP	468	543	785	442	602	654	0	1081	1050	1261	1048	1486	699	884	317	367	649	848	122	408	466	726	148
FRA	478	665	730	494	691	611	708	0	1387	1432	1732	2222	794	1310	481	356	730	1120	137	523	466	740	147
GBR	718	689	1519	674	837	896	849	774	0	1495	1589	2018	774	1084	476	394	627	1006	143	717	483	824	170
ITA	545	658	1435	645	1115	991	927	723	1261	0	1536	2365	904	1304	348	350	862	1204	169	481	571	886	216
NLD	719	1000	1123	777	1269	1154	890	891	1319	1278	0	2122	789	1274	595	382	639	1329	181	652	444	866	196
USA	859	616	3003	796	933	994	960	1010	1833	1824	1669	0	1148	1529	539	466	1138	1507	189	561	802	1083	186
HUN	327	325	784	304	571	512	536	466	627	762	593	1039	0	725	274	299	474	823	110	330	412	563	121
POL	351	428	793	368	813	702	553	688	809	965	952	1246	552	0	308	289	623	1061	166	390	474	756	198
NZL	395	210	314	207	252	292	259	236	371	278	529	453	207	188	0	209	202	329	43	338	175	287	51
ZAF	279	207	347	190	254	299	338	250	365	309	343	493	256	214	189	0	208	301	52	236	226	313	55
JPN	233	192	338	188	235	262	252	224	284	321	273	378	209	220	122	146	0	582	93	236	393	420	108
CZE	333	375	702	348	881	600	574	637	709	882	1116	1111	695	718	214	224	196	0	135	394	457	691	172
EST	42	51	64	35	97	73	52	50	66	87	110	117	66	91	18	21	24	75	0	63	69	103	49
IRL	372	371	409	345	381	423	392	411	769	453	597	519	277	289	276	223	158	298	33	0	194	364	76
KOR	216	174	586	180	246	285	328	235	362	480	299	902	322	343	120	175	205	320	28	137	0	408	84
PRT	360	493	855	385	604	649	695	587	756	852	857	1102	542	699	221	297	223	568	64	314	346	0	115
SVN	67	93	121	73	229	140	108	98	130	185	169	144	88	156	39	40	50	128	26	62	53	93	0

HOL

common bulls below diagonal

common three quarter sib group above diagonal

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT
AUS	0	479	857	457	766	749	617	792	866	676	875	1044	461	546	492	305	548	527	88	412	308	124	479
BEL	412	0	625	510	801	649	572	740	704	664	997	738	405	548	279	247	413	512	86	393	252	153	496
CAN	777	596	0	848	1746	1128	1272	1282	1503	1712	1284	3022	884	1080	369	375	1129	1043	140	433	645	189	851
CHE	393	507	690	0	905	599	560	597	702	720	821	915	382	532	251	221	395	501	77	352	258	126	444
DEU	421	679	707	620	0	1889	1305	1939	1602	2131	2199	2471	951	1520	409	355	1093	1483	197	530	499	286	876
DFS	489	566	814	506	908	0	943	1407	1314	1297	1598	1631	722	1098	457	383	787	1050	148	532	427	211	763
ESP	472	556	788	447	618	663	0	1088	1058	1268	1061	1493	701	891	321	368	831	853	124	411	467	180	730
FRA	478	677	730	493	690	611	717	0	1387	1432	1743	2222	794	1310	481	356	1065	1120	137	523	465	173	741
GBR	718	706	1519	674	837	896	858	774	0	1495	1592	2018	774	1084	476	394	866	1006	143	717	483	205	824
ITA	545	658	1435	645	1115	991	938	723	1261	0	1536	2365	904	1304	348	350	983	1204	169	481	570	247	888
NLD	719	1097	1123	777	1270	1154	902																

CHE	393	493	675	0	905	598	562	508	702	720	788	915	380	507	199	387	423	77	343	210	122	441
DEU	421	657	705	620	0	1888	1310	1597	1600	2130	2137	2470	947	1486	323	1068	1288	197	514	435	282	875
DFS	489	552	811	506	908	0	940	1009	1308	1294	1482	1629	717	1045	331	744	860	148	505	342	209	758
ESP	474	544	779	448	626	670	0	882	1058	1273	1011	1494	703	862	323	797	750	124	400	390	180	734
FRA	375	547	603	420	580	523	622	0	1018	1272	1196	1434	659	1144	229	747	885	123	380	350	164	616
GBR	717	668	1446	673	837	894	867	620	0	1492	1476	2009	771	1039	340	819	851	142	672	398	201	818
ITA	545	653	1432	645	1115	991	945	662	1260	0	1511	2364	901	1286	335	973	1117	169	474	510	244	885
NLD	660	938	1046	748	1249	1125	868	697	1242	1266	0	1798	751	1201	315	781	1158	180	590	359	233	839
USA	859	606	2890	796	933	994	971	676	1832	1824	1395	0	1145	1477	399	1525	1298	189	533	669	215	1080
HUN	327	316	778	304	571	512	543	406	626	762	579	1039	0	698	272	577	707	110	316	356	137	563
POL	337	414	772	355	797	679	536	638	786	957	917	1216	534	0	250	692	957	165	353	426	221	735
ZAF	243	192	305	176	237	277	301	177	318	303	286	411	241	199	0	252	239	51	196	163	73	297
JPN	266	216	373	205	255	289	288	223	324	344	305	425	235	223	177	0	613	103	297	390	135	528
CZE	281	322	626	292	777	520	485	492	597	818	1004	959	586	662	176	198	0	128	313	386	192	617
EST	42	50	64	35	97	73	53	46	66	87	109	117	66	90	21	24	70	0	61	64	53	103
IRL	370	362	406	342	379	421	397	322	735	451	567	513	275	276	194	181	243	33	0	141	98	350
KOR	156	150	497	154	215	242	264	207	287	426	242	746	271	319	118	185	275	26	103	0	88	350
SVN	83	117	137	87	253	166	133	110	155	209	199	165	101	175	53	65	144	30	76	57	0	141
PRT	357	488	836	383	605	648	706	530	755	855	838	1103	544	688	288	249	509	64	311	300	113	0

HOL

common bulls below diagonal

common three quarter sib group above diagonal

AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT	
AUS	0	452	857	457	516	748	626	787	866	676	839	1044	460	545	305	548	527	88	411	307	123	485
BEL	409	0	603	502	613	624	564	685	671	656	901	690	390	535	235	391	498	86	377	244	153	491
CAN	777	586	0	848	1373	1128	1278	1266	1503	1712	1239	3022	883	1078	375	1129	1043	140	433	644	188	856
CHE	393	503	690	0	697	599	566	591	702	718	809	915	382	530	221	395	500	77	352	258	125	449
DEU	346	553	628	506	0	1300	1057	1343	1169	1802	1613	1795	728	1251	238	793	1125	172	374	409	263	676
DFS	489	561	814	506	771	0	959	1379	1312	1295	1543	1629	720	1095	383	787	1050	148	531	427	210	769
ESP	479	569	797	453	509	681	0	1094	1075	1279	1058	1509	709	902	372	835	866	126	422	470	182	748
FRA	477	660	730	493	533	610	747	0	1372	1432	1573	2181	791	1301	355	1051	1115	135	517	460	172	744
GBR	718	689	1519	674	680	896	883	774	0	1495	1547	2015	773	1080	393	865	1006	143	711	483	204	828
ITA	545	658	1435	644	981	991	958	723	1261	0	1522	2365	904	1303	350	983	1204	169	481	569	246	889
NLD	710	997	1110	775	1034	1151	921	848	1299	1276	0	1958	773	1252	370	842	1319	181	639	438	236	862
USA	859	616	3003	796	762	994	981	974	1833	1824	1614	0	1147	1525	466	1656	1507	189	559	799	218	1089
HUN	327	325	784	304	449	511	548	466	627	762	591	1039	0	724	298	592	822	110	329	410	139	565
POL	351	428	793	367	717	700	573	688	808	965	944	1246	551	0	288	728	1058	165	388	472	223	759
ZAF	280	208	348	191	174	300	343	251	366	310	338	494	257	215	0	304	301	52	236	227	75	319
JPN	271	217	375	205	222	290	294	250	327	344	308	431	236	229	188	0	724	105	324	476	135	540
CZE	333	375	702	348	707	600	597	637	709	882	1114	1111	695	718	224	213	0	134	394	456	201	692
EST</																						

NZL	395	216	314	207	252	292	268	234	371	278	507	453	207	188	0	209	316	329	43	338	176	62	287
ZAF	280	210	348	191	255	300	343	249	366	310	324	494	257	215	189	0	305	301	52	236	227	74	313
JPN	271	218	376	206	256	291	296	252	329	345	309	433	237	230	146	189	0	724	105	324	477	135	534
CZE	333	378	702	348	881	600	597	635	709	882	1099	1111	695	718	214	224	214	0	135	394	458	201	691
EST	42	51	64	35	97	73	55	50	66	87	109	117	66	91	18	21	24	75	0	63	69	53	103
IRL	372	377	409	345	381	423	410	409	767	453	582	519	277	289	276	224	182	298	33	0	195	99	364
KOR	216	174	586	180	246	285	331	234	362	480	289	902	322	343	120	175	219	320	28	137	0	97	409
SVN	84	120	138	88	252	166	136	114	156	210	199	166	102	174	46	53	65	148	30	76	60	0	142
PRT	360	497	855	385	604	649	713	585	757	853	843	1103	544	700	221	298	251	568	64	314	346	113	0

HOL

common bulls below diagonal

common three quarter sib group above diagonal

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT
AUS	0	472	857	457	766	702	618	788	866	676	849	1044	461	546	492	305	549	527	88	412	308	123	478
BEL	411	0	621	509	797	633	571	726	698	662	958	723	402	545	275	245	407	510	86	391	252	152	495
CAN	777	596	0	848	1746	1050	1273	1267	1503	1712	1253	3022	884	1080	369	375	1130	1043	140	433	647	188	848
CHE	393	506	690	0	905	580	562	595	702	720	813	915	382	532	251	221	395	501	77	352	258	125	444
DEU	421	679	707	620	0	1836	1307	1935	1602	2131	2186	2471	951	1520	409	355	1094	1483	197	530	501	285	873
DFS	489	565	814	506	908	0	902	1297	1255	1288	1522	1537	705	1077	429	356	734	1016	146	514	415	210	752
ESP	472	558	790	448	620	665	0	1078	1060	1269	1048	1495	702	893	322	370	833	854	124	412	469	179	729
FRA	478	676	730	493	689	610	720	0	1374	1432	1621	2183	792	1307	477	355	1053	1115	136	518	464	172	736
GBR	718	705	1518	674	836	895	858	773	0	1495	1563	2017	774	1084	476	394	867	1006	143	715	484	204	822
ITA	545	658	1435	645	1115	990	940	723	1260	0	1530	2365	904	1304	348	350	984	1204	169	481	573	246	885
NLD	715	1067	1116	776	1268	1153	902	866	1307	1277	0	2001	780	1266	583	372	850	1324	181	646	443	236	860
USA	859	630	3003	796	933	994	968	975	1833	1824	1630	0	1148	1529	539	466	1658	1507	189	560	806	218	1081
HUN	327	329	784	304	571	512	541	466	627	762	593	1039	0	725	274	299	592	823	110	330	414	139	563
POL	351	431	793	368	813	702	561	688	809	965	951	1246	552	0	308	289	728	1061	166	390	476	224	754
NZL	395	216	314	207	252	292	262	236	371	278	527	453	207	188	0	209	316	329	43	338	176	62	287
ZAF	280	210	348	191	255	300	342	251	366	310	342	494	257	215	189	0	306	301	52	236	227	74	312
JPN	271	219	377	206	257	292	295	253	330	346	312	434	237	230	146	190	0	725	105	324	478	135	534
CZE	333	378	702	348	881	600	581	637	709	882	1115	1111	695	718	214	224	214	0	135	394	458	201	690
EST	42	51	64	35	97	73	53	50	66	87	110	117	66	91	18	21	24	75	0	63	69	53	102
IRL	372	377	409	345	381	423	396	411	767	453	594	519	277	289	276	224	182	298	33	0	195	99	364
KOR	216	174	586	180	246	285	329	235	362	480	296	903	322	343	120	176	220	320	28	137	0	97	409
SVN	84	120	138	88	255	166	132	114	156	211	202	166	102	176	46	53	65	148	30	76	60	0	142
PRT	360	496	855	385	604	646	701	587	756	852	854	1102	542	699	221	298	252	568	64	314	346	113	0

HOL

common bulls below diagonal

common three quarter sib group above diagonal

	AUS	BEL	CAN	CHE	DE
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HOL

common bulls below diagonal

common three quarter sib group above diagonal

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT
AUS	0	475	857	457	766	749	615	792	866	676	875	1044	461	546	305	549	527	88	411	308	124	479
BEL	410	0	621	508	795	644	569	733	698	663	989	732	402	545	244	411	510	86	388	249	153	495
CAN	777	592	0	848	1746	1128	1270	1282	1503	1712	1284	3022	884	1080	375	1131	1043	140	433	646	189	850
CHE	393	505	690	0	905	599	559	597	702	720	821	915	382	532	221	396	501	77	352	258	126	444
DEU	421	678	707	620	0	1889	1297	1939	1602	2131	2199	2471	951	1520	355	1095	1483	197	530	500	286	875
DFS	489	565	815	506	908	0	939	1407	1314	1297	1598	1631	722	1098	383	788	1050	148	532	427	211	762
ESP	469	551	785	444	609	658	0	1084	1055	1265	1057	1489	700	888	367	832	851	124	410	467	178	729
FRA	478	675	730	493	690	611	710	0	1387	1432	1743	2222	794	1310	356	1067	1120	137	523	467	173	740
GBR	718	702	1519	674	837	896	853	774	0	1495	1592	2018	774	1084	394	868	1006	143	714	484	205	824
ITA	545	658	1435	645	1115	991	931	723	1261	0	1536	2365	904	1304	350	985	1204	169	481	572	247	886
NLD	719	1086	1123	777	1270	1154	896	890	1320	1278	0	2129	789	1275	382	885	1329	182	653	446	237	866
USA	859	627	3003	796	933	996	962	1010	1833	1824	1672	0	1148	1529	466	1659	1507	189	561	804	219	1083
HUN	327	328	784	304	571	513	537	466	627	762	593	1039	0	725	299	592	823	110	330	413	140	563
POL	351	431	793	368	813	702	556	688	809	965	952	1246	552	0	289	728	1061	166	390	475	225	756
ZAF	280	210	348	191	255	301	339	251	366	310	344	494	257	215	0	306	301	52	236	227	75	313
JPN	274	221	379	208	258	293	296	256	334	347	317	438	238	230	192	0	725	105	324	478	136	534
CZE	333	378	702	348	881	600	576	637	709	882	1116	1111	695	718	224	216	0	135	394	458	202	691
EST	42	51	64	35	97	73	53	50	66	87	110	117	66	91	21	24	75	0	63	69	53	103
IRL	372	376	409	345	381	423	393	411	766	453	597	519	277	289	224	183	298	33	0	195	100	364
KOR	216	174	586	180	246	285	328	235	362	480	299	903	322	343	176	220	320	28	137	0	98	409
SVN	85	121	139	89	256	167	130	115	157	212	203	166	103	177	53	66	149	30	77	61	0	143
PRT	360	495	855	385	604	649	698	587	756	852	857	1102	542	699	298	254	568	64	314	346	113	0

HOL

common bulls below diagonal

common three quarter sib group above diagonal

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT
AUS	0	472	857	457	766	749	618	792	866	676	875	1044	461	546	492	305	549	527	88	412	308	121	479
BEL	411	0	621	509	797	645	571	729	698	662	966	723	402	545	275	245	408	510	86	391	252	150	496
CAN	777	596	0	848	1746	1128	1272	1282	1503	1713	1284	3022	884	1080	369	375	1131	1043	140	433	647	185	850
CHE	393	506	690	0	905	599	561	597	702	720	821	915	382	532	251	221	396	501	77	352	258	122	444
DEU	421	679	707	620	0	1889	1306	1939	1602	2131	2199	2471	951	1520	409	355	1095	1483	197	530	501	280	875
DFS	489	565	815	506	908	0	943	1407	1314	1297	1598	1631	722	1098	457	383	788	1050	148	532	428	208	762
ESP	472	557	788	447	618	663	0	1089	1059	1268	1062	1494	701	892	322	369	832	853	124	411	468	179	730
FRA	478	676	730	493	690	611	718	0	1387	1432	1743	2222	794	1310	481	356	1067	1120	137	523	468	170	740
GBR	718	706	1519	674	837	896	858	774	0	1495	1592	2018	774	1084	476	394	868	1006	143	717	484	201	824
ITA	545	658	1435	645	1115	991	938	723	1261	0	1536	2366	904	1304	348	350	985	1204	169	481	573	245	886
NLD	719	1074	1123	777	1270	1154	902	890	1320	1278	0	2129	789	1275	596	382	885	1329	182	653	448	232	866
USA	859	630	3003	796	933	995	967	1010	1833	1824	1672	0	1148	1529	539	466	1659	1507	189	561	806	215	1083
HUN	327	329</td																					

CHE	393	507	690	0	905	599	560	597	702	720	821	915	377	532	221	396	501	77	352	259	122	444
DEU	421	679	707	620	0	1889	1298	1939	1602	2132	2199	2471	942	1520	355	1093	1483	197	530	502	280	875
DFS	489	566	815	506	908	0	940	1407	1314	1297	1598	1631	708	1098	383	782	1050	148	532	429	208	762
ESP	470	554	787	445	611	660	0	1085	1055	1266	1058	1490	691	889	367	822	852	124	410	469	177	729
FRA	478	677	730	493	690	611	712	0	1387	1433	1743	2222	777	1310	356	1054	1120	137	523	469	170	740
GBR	718	706	1519	674	837	896	854	774	0	1495	1592	2018	760	1084	394	863	1006	143	714	485	201	824
ITA	545	658	1435	645	1115	991	934	723	1261	0	1537	2366	901	1305	350	984	1204	169	481	574	245	886
NLD	719	1097	1123	777	1270	1154	898	890	1320	1278	0	2129	772	1275	382	879	1329	182	653	449	232	866
USA	859	631	3003	796	933	996	964	1010	1833	1824	1672	0	1119	1529	466	1639	1507	189	561	807	215	1083
HUN	315	320	770	300	564	504	524	458	611	758	580	1013	0	720	291	583	811	110	324	413	138	561
POL	351	431	793	368	813	702	557	688	809	965	952	1246	548	0	289	726	1061	166	390	476	220	756
ZAF	280	210	348	191	255	301	339	251	366	310	344	494	246	215	0	303	301	52	236	228	74	313
JPN	272	220	378	207	257	292	295	254	332	346	315	436	231	230	191	0	724	104	322	479	135	534
CZE	333	378	702	348	881	600	578	637	709	882	1116	1111	684	718	224	214	0	135	394	458	199	691
EST	42	51	64	35	97	73	53	50	66	87	110	117	66	91	21	24	75	0	63	69	52	103
IRL	372	377	409	345	381	423	394	411	766	453	597	519	269	289	224	182	298	33	0	196	99	364
KOR	216	174	586	180	246	285	328	235	362	480	299	906	320	343	176	220	320	28	137	0	97	409
SVN	85	120	139	89	251	166	130	115	157	210	201	166	102	174	53	66	149	30	77	61	0	142
PRT	360	496	855	385	604	649	699	587	756	852	857	1102	539	699	298	253	568	64	314	346	113	0

HOL

common bulls below diagonal

common three quarter sib group above diagonal

AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	POL	NZL	JPN	CZE	EST	IRL	KOR	SVN	PRT	ZAF	HUN	
AUS	0	465	856	441	763	624	621	790	730	675	721	764	443	485	353	410	87	345	190	121	396	164	306
BEL	410	0	613	484	785	589	572	714	618	658	851	619	460	270	306	426	86	331	171	150	424	144	290
CAN	776	591	0	812	1740	971	1274	1281	1324	1711	1133	2610	976	364	829	913	139	368	468	185	733	226	714
CHE	389	482	660	0	822	536	556	583	649	700	694	804	446	245	313	410	76	306	182	120	376	132	288
DEU	420	677	706	568	0	1749	1310	1915	1448	2130	2059	2162	1394	402	871	1285	196	461	374	280	768	214	739
DFS	453	527	784	464	875	0	840	1177	1070	1252	1378	1235	941	368	835	142	418	282	204	638	211	517	
ESP	473	562	792	445	625	617	0	1096	951	1272	966	1325	795	323	651	749	123	342	338	180	635	218	542
FRA	478	673	730	484	675	572	730	0	1103	1431	1345	1526	1148	472	730	938	135	409	322	170	616	190	590
GBR	632	640	1363	618	785	792	752	666	0	1438	1294	1644	939	368	612	825	132	523	334	199	681	220	560
ITA	545	658	1435	631	1115	961	945	723	1225	0	1487	2241	1231	345	862	1117	168	443	437	245	800	241	766
NLD	628	930	1008	664	1213	1056	827	773	1088	1251	0	1519	1114	471	630	1141	176	516	302	229	715	211	575
USA	689	591	2733	715	881	895	862	744	1612	1794	1226	0	1333	365	1099	1248	179	435	564	212	878	257	849
POL	296	367	735	304	725	623	469	602	715	905	844	1125	0	229	601	925	154	306	375	210	654	186	582
NZL	392	214	312	204	251	261	264	236	303	278	430	324	144	0	200	238	42	273	107	61	219	105	154
JPN	233	192	338	188	235	261	253	224	284	321	273	378	207	122	0	555	92	219	321	123	398	162	419
CZE	281	322	626	283	776	516	485	508	590	818	998	943	642	164	192	300	330	192	581	201	623		
EST	42	51	64	35	97	70	53	50	63	87													

POL	351	431	793	368	813	702	564	656	809	965	952	1242	552	0	308	727	1061	166	390	476	198	756
NZL	395	216	314	207	252	292	265	230	371	278	529	451	207	188	0	316	329	43	338	178	51	287
JPN	272	219	377	207	257	292	295	254	332	346	315	436	237	230	146	0	725	105	324	480	111	534
CZE	333	378	702	348	881	600	586	621	709	882	1116	1105	695	718	214	215	0	135	394	458	170	690
EST	42	51	64	35	97	73	53	50	66	87	110	117	66	91	18	24	75	0	63	69	49	103
IRL	372	377	409	345	381	423	401	407	769	453	597	518	277	289	276	182	298	33	0	196	76	364
KOR	216	174	586	180	246	285	330	232	362	480	299	906	322	343	120	220	320	28	137	0	84	409
SVN	67	93	121	73	227	138	111	98	130	184	168	144	88	156	39	50	127	26	62	53	0	115
PRT	360	496	855	385	604	649	706	578	756	852	857	1095	542	699	221	252	568	64	314	346	93	0

HOL

common bulls below diagonal

common three quarter sib group above diagonal

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	JPN	CZE	EST	IRL	SVN	PRT
AUS	0	479	857	457	766	749	622	792	866	676	875	1044	461	546	492	549	527	88	399	96	479
BEL	412	0	625	510	801	649	578	740	704	664	997	738	405	548	279	415	512	86	381	120	496
CAN	777	596	0	848	1746	1128	1275	1282	1503	1712	1284	3022	884	1080	369	1131	1043	140	419	161	850
CHE	393	507	690	0	905	599	563	597	702	720	821	915	382	532	251	396	501	77	343	99	444
DEU	421	679	707	620	0	1889	1313	1939	1602	2131	2199	2471	951	1520	409	1095	1483	197	514	247	875
DFS	489	566	815	506	908	0	950	1407	1314	1297	1598	1631	722	1098	457	788	1050	148	508	176	762
ESP	474	564	792	448	627	670	0	1098	1068	1273	1072	1502	706	899	328	835	860	124	403	151	737
FRA	478	677	730	493	690	611	730	0	1387	1432	1743	2222	794	1310	481	1067	1120	137	494	147	740
GBR	718	704	1518	674	835	895	865	773	0	1495	1592	2018	774	1084	476	868	1006	143	679	170	824
ITA	545	658	1435	645	1115	991	945	723	1259	0	1536	2365	904	1304	348	985	1204	169	474	216	886
NLD	719	1097	1123	777	1270	1154	913	890	1318	1278	0	2129	789	1275	596	885	1329	182	617	194	866
USA	859	631	3003	796	933	996	974	1010	1833	1824	1672	0	1148	1529	539	1659	1507	189	535	186	1083
HUN	327	329	784	304	571	513	543	466	627	762	593	1039	0	725	274	592	823	110	319	122	563
POL	351	431	793	368	813	702	564	688	809	965	952	1246	552	0	308	728	1061	166	379	197	756
NZL	395	216	314	207	252	292	266	236	371	278	529	453	207	188	0	316	329	43	324	51	287
JPN	272	219	377	207	257	292	295	255	332	346	315	436	237	230	146	0	725	105	310	112	534
CZE	333	378	702	348	881	600	586	637	708	882	1116	1111	695	718	214	215	0	135	379	172	691
EST	42	51	64	35	97	73	53	50	66	87	110	117	66	91	18	24	75	0	62	49	103
IRL	370	376	408	343	379	422	398	406	745	451	589	513	275	289	272	182	297	33	0	77	353
SVN	68	94	122	74	225	139	112	99	131	185	169	145	89	155	39	51	128	26	63	0	116
PRT	360	497	855	385	604	649	707	587	756	852	858	1102	543	699	221	252	568	64	314	93	0

HOL

common bulls below diagonal

common three quarter sib group above diagonal

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	JPN	CZE	EST	IRL	SVN	PRT
AUS	0	471	857	457	766	749	624	650	866	676	855	1042	449	544	540	527	88	398	96	485
BEL	411	0	618	505	794	642	576	664	695	948	716	394	542	401	509	86	378	120	497	
CAN	777	595	0	848	1746	1128	1277	1106	1503	1712	1253	3014	870	1079	1115	1043	140	419	161	860
CHE	393	504	690	0	905	599	565	547	702	720	810	912	377	530	394	501	77	343	98	451
DEU	421	678	707	620	0	1889	13													

	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	CZE	IRL	KOR	SVN	PRT	EST	HUN	POL
BEL	0	573	412	641	595	517	624	640	537	793	658	412	353	159	103	412	53	287	323
CAN	575	0	703	1436	1032	1161	1077	1408	1478	1066	2826	893	403	407	142	721	91	712	678
CHE	415	582	0	675	482	464	476	584	586	609	739	378	279	162	83	348	53	279	300
DEU	571	644	476	0	1448	1099	1433	1263	1555	1702	1944	1149	405	316	191	662	131	699	886
DFS	548	812	418	807	0	863	1217	1302	975	1337	1610	842	505	251	148	635	93	522	646
ESP	517	720	354	521	623	0	947	967	1052	916	1370	737	366	300	129	620	83	536	570
FRA	612	669	390	536	578	667	0	1225	1030	1221	1767	907	452	285	125	598	85	588	804
GBR	667	1445	543	708	893	762	720	0	1196	1302	2002	834	671	293	146	688	95	566	658
ITA	554	1288	530	855	816	769	613	1046	0	1147	1876	937	369	371	176	683	114	703	791
NLD	868	977	576	1065	1050	759	718	1090	1036	0	1542	1106	531	268	161	689	116	567	735
USA	606	2889	634	799	995	835	807	1830	1580	1198	0	1265	532	486	164	899	114	862	918
CZE	319	614	264	718	506	484	493	582	709	970	931	0	303	277	145	561	80	617	656
IRL	362	405	269	313	422	358	378	736	367	510	513	235	0	104	62	290	37	221	223
KOR	124	386	123	168	189	207	169	218	320	189	560	198	80	0	69	245	37	251	267
SVN	82	110	63	175	120	96	85	118	156	139	130	110	51	47	0	102	32	103	145
PRT	410	708	298	495	534	567	485	604	665	674	894	461	252	218	80	0	60	411	459
EST	32	43	23	59	44	34	33	47	57	68	56	43	22	16	13	38	0	68	99
HUN	233	641	223	427	384	380	355	443	601	425	781	516	190	193	76	404	38	0	449
POL	248	511	205	440	418	333	401	494	590	516	697	421	180	189	116	422	50	352	0

HOL

common bulls below diagonal

common three quarter sib group above diagonal

	BEL	CHE	DEU	DFS	FRA	GBR	ITA	NLD	USA	CZE	JPN	IRL	KOR	CAN	PRT	ESP	SVN	EST	HUN	NZL	POL
BEL	0	470	630	302	477	642	555	851	656	380	247	325	166	472	298	527	118	67	247	203	390
CHE	472	0	753	261	437	665	650	758	870	385	260	301	182	670	274	529	99	65	251	192	390
DEU	556	538	0	770	1225	1267	1695	1754	1953	1084	679	359	357	1285	533	1105	245	160	618	242	1147
DFS	241	205	321	0	424	625	530	788	686	437	220	276	132	322	263	416	85	60	225	199	419
FRA	450	362	491	173	0	816	1004	960	1168	713	535	277	285	801	411	766	141	104	492	183	898
GBR	666	636	711	352	531	0	1281	1450	1967	767	503	609	335	1105	492	997	170	117	499	328	828
ITA	565	581	884	363	572	1095	0	1258	2037	961	685	367	428	1426	561	1121	206	140	664	221	1033
NLD	930	723	1093	503	607	1211	1097	0	1753	1066	497	522	300	922	501	966	196	147	495	409	962
USA	593	765	801	343	582	1820	1657	1342	0	1172	903	487	564	2197	660	1424	186	143	775	328	1202
CZE	294	270	690	231	411	541	719	935	879	0	456	253	322	763	425	681	169	106	536	183	807
JPN	156	158	201	107	186	242	278	233	326	169	0	157	299	642	281	552	102	72	356	132	498
IRL	335	303	289	206	250	670	360	499	475	196	117	0	102	295	178	351	71	42	173	223	232
KOR	125	136	187	77	177	243	361	205	644	229	161	77	0	437	256	335	81	54	275	102	362
CAN	498	591	630	247	539	1190	1274	925	2464	569	292	319	417	0	510	972	159	105	613	202	820
PRT	295	234	396	193	361	433	542	474	686	350	168	156	222	515	0	451	109	75	322	140	508
ESP	534	420	514	273	545	815	812	823	914	436	218	355	224	663	399	0	149	101	482	223	686
SVN	90	73	229	58	96	130	182	169	144	127	49	57	52	121	86	110	0	46	116	52	190
EST	42	29	76	25	43	56	75	92	81	61	22	25	25	57	52	46	25	0	85	33	134
HUN	199	196	379	148	310	398	555	372	710	451	160	146	212	592	328	341	86	53	0	120	517
NZL	172	173	192	129	141	273	202	375	287	136	99	187	80	207	119	193	40	16	95	0	151
POL	313	276	637	254	509	650	790	746	1051	567	185	19									

common bulls below diagonal										
common three quarter sib group above diagonal										
AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE	
AUS	0	145	86	98	44	150	246	123	17	21
CAN	150	0	86	125	48	75	413	127	13	25
DFS	62	73	0	96	56	88	144	109	21	42
GBR	96	128	91	0	51	76	156	101	15	39
ITA	43	46	55	51	0	36	64	57	14	24
NZL	152	77	67	77	32	0	149	93	16	23
USA	240	412	110	163	68	157	0	226	32	40
ZAF	128	129	95	100	57	91	235	0	26	35
NLD	13	8	15	12	11	13	33	21	0	8
CHE	18	23	40	36	24	20	40	34	6	0

JER										

common bulls below diagonal										
common three quarter sib group above diagonal										
AUS	CAN	DFS	GBR	ITA	NZL	ZAF	NLD	USA	CHE	
AUS	0	145	86	98	44	150	123	17	246	25
CAN	150	0	86	125	48	75	127	13	413	29
DFS	62	73	0	96	56	88	109	21	144	45
GBR	96	128	91	0	51	76	101	15	156	42
ITA	43	46	55	51	0	36	57	14	64	27
NZL	152	77	67	77	32	0	93	16	149	27
ZAF	128	129	95	100	57	91	0	26	226	39
NLD	13	8	15	12	11	13	21	0	32	10
USA	240	412	110	163	68	157	235	33	0	44
CHE	21	25	43	39	26	24	37	7	44	0

JER										

common bulls below diagonal										
common three quarter sib group above diagonal										
AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE		
AUS	0	145	82	97	44	246	129	5	25	
CAN	150	0	85	125	48	413	138	5	29	
DFS	59	72	0	93	56	143	116	10	45	
GBR	95	128	88	0	51	156	106	9	42	
ITA	43	46	55	51	0	64	57	5	27	
USA	240	412	109	163	68	0	245	15	44	
ZAF	133	138	99	104	57	252	0	11	39	
NLD	2	3	9	7	4	14	9	0	5	
CHE	21	25	43	39	26	44	37	5	0	

JER										

common bulls below diagonal										
common three quarter sib group above diagonal										
AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE	
AUS	0	145	86	98	44	150	246	130	17	25
CAN	150	0	86	125	48	75	413	138	13	29
DFS	62	73	0	96	56	88	144	118	21	45
GBR	96	128	91	0	51	76	156	106	15	42
ITA	43	46	55	51	0	36	64	57	14	27
NZL	152	77	67	77	32	0	149	102	16	27
USA	240	412	110	163	68	157	0	246	32	44
ZAF	134	138	101	104	57	99	253	0	26	39
NLD	13	8	15	12	11	13	33	21	0	10
CHE	21	25	43	39	26	24	44	37	7	0

JER										

common bulls below diagonal										
common three quarter sib group above diagonal										

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0	145	82	98	44	150	246	130	17	25
CAN	150	0	78	125	48	75	413	138	13	29
DFS	55	62	0	94	52	82	136	113	19	44
GBR	96	128	86	0	51	76	156	106	15	42
ITA	43	46	49	51	0	36	64	57	14	27
NZL	152	77	60	77	32	0	149	102	16	27
USA	240	412	100	163	68	157	0	246	32	44
ZAF	134	138	93	104	57	99	253	0	26	39
NLD	13	8	13	12	11	13	33	21	0	10
CHE	21	25	42	39	26	24	44	37	7	0

JER

common bulls below diagonal

common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0	145	86	98	44	150	246	130	17	25
CAN	150	0	86	125	48	75	413	138	13	29
DFS	62	73	0	96	56	88	144	118	21	45
GBR	96	128	91	0	51	76	156	106	15	42
ITA	43	46	55	51	0	36	64	57	14	27
NZL	152	77	67	77	32	0	149	102	16	27
USA	240	412	110	163	68	157	0	246	32	44
ZAF	134	138	101	104	57	99	253	0	26	39
NLD	13	8	15	12	11	13	33	21	0	10
CHE	21	25	43	39	26	24	44	37	7	0

JER

common bulls below diagonal

common three quarter sib group above diagonal

	AUS	CAN	DFS	ITA	ZAF	NLD	USA	CHE
AUS	0	145	79	44	102	17	246	25
CAN	150	0	78	48	113	13	413	29
DFS	53	62	0	52	83	19	136	44
ITA	43	46	49	0	51	14	64	27
ZAF	103	109	69	49	0	23	192	39
NLD	13	8	13	11	16	0	32	10
USA	240	412	100	68	189	33	0	44
CHE	21	25	42	26	37	7	44	0

JER

common bulls below diagonal

common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE
AUS	0	145	83	97	44	246	129	17	25
CAN	150	0	86	125	48	413	138	13	29
DFS	60	73	0	94	56	144	117	21	45
GBR	95	128	89	0	51	156	106	15	42
ITA	43	46	55	51	0	64	57	14	27
USA	240	412	110	163	68	0	245	32	44
ZAF	133	138	100	104	57	252	0	26	39
NLD	13	8	15	12	11	33	21	0	10
CHE	21	25	43	39	26	44	37	7	0

JER

common bulls below diagonal

common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0	145	82	98	44	150	246	130	17	25
CAN	150	0	86	125	48	75	413	138	13	29

DFS	62	73	0	96	56	88	144	118	21	45
GBR	96	128	91	0	51	76	156	106	15	42
ITA	43	46	55	51	0	36	64	57	14	27
NZL	152	77	67	77	32	0	149	102	16	27
USA	240	412	110	163	68	157	0	246	32	44
ZAF	134	138	101	104	57	99	253	0	26	39
NLD	13	8	15	12	11	13	33	21	0	10
CHE	21	25	43	39	26	24	44	37	7	0

JER

common bulls below diagonal

common three quarter sib group above diagonal

AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
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AUS	0	145	79	98	44	150	246	130	17	25
CAN	150	0	72	125	48	75	413	138	13	29
DFS	53	60	0	85	52	75	129	108	19	44
GBR	96	128	82	0	51	76	156	106	15	42
ITA	43	46	49	51	0	36	64	57	14	27
NZL	152	77	55	77	32	0	149	102	16	27
USA	240	412	95	163	68	157	0	246	32	44
ZAF	134	138	91	104	57	99	253	0	26	39
NLD	13	8	13	12	11	13	33	21	0	10
CHE	21	25	42	39	26	24	44	37	7	0

JER

common bulls below diagonal

common three quarter sib group above diagonal

AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
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AUS	0	145	86	98	44	150	246	130	17	25
CAN	150	0	86	125	48	75	413	138	13	29
DFS	62	73	0	96	56	88	144	118	21	45
GBR	96	128	91	0	51	76	156	106	15	42
ITA	43	46	55	51	0	36	64	57	14	27
NZL	152	77	67	77	32	0	149	102	16	27
USA	240	412	110	163	68	157	0	246	32	44
ZAF	134	138	101	104	57	99	253	0	26	39
NLD	13	8	15	12	11	13	33	21	0	10
CHE	21	25	43	39	26	24	44	37	7	0

JER

common bulls below diagonal

common three quarter sib group above diagonal

AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE
-----	-----	-----	-----	-----	-----	-----	-----	-----

AUS	0	145	84	97	44	246	130	17	25
CAN	150	0	86	124	48	410	138	13	29
DFS	61	73	0	94	56	144	118	21	45
GBR	95	127	89	0	51	156	106	15	42
ITA	43	46	55	51	0	64	57	14	27
USA	240	410	110	163	68	0	245	32	44
ZAF	134	138	101	104	57	252	0	26	39
NLD	13	8	15	12	11	33	21	0	10
CHE	21	25	43	39	26	44	37	7	0

JER

common bulls below diagonal

common three quarter sib group above diagonal

AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

AUS	0	145	86	98	44	150	246	130	17	25
CAN	150	0	86	125	48	75	413	138	13	29
DFS	62	73	0	96	56	88	144	118	21	45
GBR	96	128	91	0	51	76	156	106	15	42

ITA	43	46	55	51	0	36	64	57	14	27
NZL	152	77	67	77	32	0	149	102	16	27
USA	240	412	110	163	68	157	0	246	32	44
ZAF	134	138	101	104	57	99	253	0	26	39
NLD	13	8	15	12	11	13	33	21	0	10
CHE	21	25	43	39	26	24	44	37	7	0

JER

common bulls below diagonal

common three quarter sib group above diagonal

AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE
-----	-----	-----	-----	-----	-----	-----	-----	-----

AUS	0	145	83	97	44	246	122	17	25
CAN	150	0	86	125	48	413	127	13	29
DFS	60	73	0	94	56	144	108	21	45
GBR	95	128	89	0	51	156	101	15	42
ITA	43	46	55	51	0	64	57	14	27
USA	240	412	110	163	68	0	225	32	44
ZAF	127	129	94	100	57	234	0	26	39
NLD	13	8	15	12	11	33	21	0	10
CHE	21	25	43	39	26	44	37	7	0

JER

common bulls below diagonal

common three quarter sib group above diagonal

AUS	CAN	DFS	NZL	ZAF	NLD	USA	CHE
-----	-----	-----	-----	-----	-----	-----	-----

AUS	0	145	71	150	120	17	246	25
CAN	150	0	67	75	124	13	413	29
DFS	48	57	0	68	95	19	122	44
NZL	152	77	50	0	88	16	149	27
ZAF	123	123	79	82	0	26	221	39
NLD	13	8	13	13	21	0	32	10
USA	240	412	90	157	222	33	0	44
CHE	21	25	42	24	37	7	44	0

JER

common bulls below diagonal

common three quarter sib group above diagonal

AUS	CAN	DFS	GBR	ITA	NZL	USA	NLD	CHE
-----	-----	-----	-----	-----	-----	-----	-----	-----

AUS	0	145	86	35	44	150	246	17	21
CAN	150	0	86	38	48	75	413	13	25
DFS	62	73	0	32	56	88	144	21	42
GBR	40	43	30	0	14	37	37	4	3
ITA	43	46	55	15	0	36	64	14	24
NZL	152	77	67	41	32	0	149	16	23
USA	240	412	110	40	68	157	0	32	40
NLD	13	8	15	5	11	13	33	0	8
CHE	18	23	40	4	24	20	40	6	0

JER

common bulls below diagonal

common three quarter sib group above diagonal

AUS	CAN	DFS	GBR	NZL	USA	NLD	CHE
-----	-----	-----	-----	-----	-----	-----	-----

AUS	0	145	83	98	150	246	17	21
CAN	150	0	80	124	75	410	13	25
DFS	60	71	0	86	80	137	21	42
GBR	96	127	86	0	73	156	15	39
NZL	152	77	61	74	0	149	16	23
USA	240	410	105	163	157	0	32	40
NLD	13	8	15	12	13	33	0	8
CHE	18	23	40	36	20	40	6	0

JER

common bulls below diagonal

common three quarter sib group above diagonal
AUS CAN DFS GBR ITA USA NLD CHE

AUS	0	124	72	83	40	212	15	19
CAN	129	0	86	124	48	413	13	25
DFS	50	73	0	94	56	144	21	42
GBR	81	127	89	0	51	156	15	39
ITA	38	46	55	51	0	64	14	24
USA	201	412	110	163	68	0	32	40
NLD	11	8	15	12	11	33	0	8
CHE	16	23	40	36	24	40	6	0

JER

JER

RDC

common bulls below diagonal

common three quarter sib group above diagonal
AUS CAN DEU DFS GBR NOR NZL USA NLD CAM

AUS	0	23	9	41	9	12	21	13	8	2
CAN	23	0	7	133	62	4	33	140	3	0
DEU	9	7	0	30	1	8	4	1	8	0
DFS	30	134	20	0	44	76	56	74	30	0
GBR	8	62	1	42	0	0	25	50	1	0
NOR	8	4	7	55	0	0	7	0	19	0
NZL	20	31	4	53	22	6	0	21	2	3
USA	13	134	1	70	46	0	20	0	2	0
NLD	8	3	8	29	1	19	2	2	0	0
CAM	2	0	0	0	0	0	3	0	0	0

RDC

common bulls below diagonal

common three quarter sib group above diagonal
AUS CAN DEU DFS GBR NOR NZL USA NLD CAM NOR

AUS	0	23	9	41	9	21	13	8	2	4
CAN	23	0	7	133	62	33	140	3	0	1
DEU	9	7	0	30	1	4	1	8	0	3
DFS	30	134	20	0	44	54	74	28	0	34
GBR	8	62	1	42	0	25	50	1	0	0
NZL	20	31	4	51	22	0	21	2	3	2
USA	13	134	1	70	46	20	0	2	0	0
NLD	8	3	8	27	1	2	2	0	0	9
CAM	2	0	0	0	0	3	0	0	0	0
NOR	3	1	2	21	0	2	0	9	0	0

RDC

common bulls below diagonal

common three quarter sib group above diagonal
AUS CAN DEU DFS GBR NOR NZL USA NLD CAM

AUS	0	23	9	41	9	4	21	13	8	2
CAN	23	0	7	133	62	1	33	138	3	0
DEU	9	7	0	30	1	3	4	1	8	0
DFS	30	134	20	0	44	50	54	74	28	0
GBR	8	62	1	42	0	0	25	49	1	0
NOR	3	1	2	33	0	0	3	0	14	0
NZL	20	31	4	51	22	3	0	21	2	3
USA	13	133	1	70	45	0	20	0	2	0
NLD	8	3	8	27	1	14	2	2	0	0
CAM	2	0	0	0	0	0	3	0	0	0

RDC

common bulls below diagonal

common three quarter sib group above diagonal

AUS CAN DEU DFS GBR USA NLD CAM NOR

AUS	0	23	9	41	9	13	8	2	5
CAN	23	0	7	133	62	140	3	0	1
DEU	9	7	0	30	1	1	8	0	3
DFS	30	134	20	0	44	74	27	0	48
GBR	8	62	1	42	0	50	1	0	0
USA	13	134	1	70	46	0	2	0	0
NLD	8	3	8	26	1	2	0	0	10
CAM	2	0	0	0	0	0	0	0	0
NOR	4	1	2	33	0	0	10	0	0

RDC

common bulls below diagonal

common three quarter sib group above diagonal

AUS CAN DEU DFS GBR NOR NZL USA NLD CAM

AUS	0	23	9	41	9	12	21	13	8	2
CAN	23	0	7	133	62	4	33	140	3	0
DEU	9	7	0	30	1	9	4	1	8	0
DFS	30	134	20	0	44	85	53	74	29	0
GBR	8	62	1	42	0	0	25	50	1	0
NOR	8	4	8	62	0	0	7	0	19	0
NZL	20	31	4	48	22	6	0	21	2	3
USA	13	134	1	70	46	0	20	0	2	0
NLD	8	3	8	28	1	19	2	2	0	0
CAM	2	0	0	0	0	3	0	0	0	0

RDC

common bulls below diagonal

common three quarter sib group above diagonal

AUS CAN DEU DFS GBR NZL USA NLD CAM NOR

AUS	0	23	9	41	9	21	13	8	2	4
CAN	23	0	7	133	62	33	140	3	0	1
DEU	9	7	0	30	1	4	1	8	0	3
DFS	30	134	20	0	44	54	74	29	0	34
GBR	8	62	1	42	0	25	50	1	0	0
NZL	20	31	4	51	22	0	21	2	3	2
USA	13	134	1	70	46	20	0	2	0	0
NLD	8	3	8	28	1	2	2	0	0	9
CAM	2	0	0	0	0	3	0	0	0	0
NOR	3	1	2	21	0	2	0	9	0	0

RDC

common bulls below diagonal

common three quarter sib group above diagonal

AUS CAN DEU DFS GBR NOR NZL USA NLD CAM

AUS	0	23	9	41	9	12	21	13	8	2
CAN	23	0	7	133	62	4	33	140	3	0
DEU	9	7	0	30	1	9	4	1	8	0
DFS	30	134	20	0	44	88	56	74	30	0
GBR	8	62	1	42	0	0	25	50	1	0
NOR	8	4	8	64	0	0	7	0	19	0
NZL	20	31	4	53	22	6	0	21	2	3
USA	13	134	1	70	46	0	20	0	2	0
NLD	8	3	8	29	1	19	2	2	0	0
CAM	2	0	0	0	0	3	0	0	0	0

RDC

common bulls below diagonal
common three quarter sib group above diagonal
AUS CAN DEU DFS NOR NLD USA CAM

AUS	0	23	9	41	12	8	13	2
CAN	23	0	7	132	4	3	140	0
DEU	9	7	0	30	9	8	1	0
DFS	30	133	20	0	85	27	74	0
NOR	8	4	8	62	0	19	0	0
NLD	8	3	8	26	19	0	2	0
USA	13	134	1	70	0	2	0	0
CAM	2	0	0	0	0	0	0	0

RDC

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

AUS	0	23	6	41	9	12	13	8	2
CAN	23	0	5	133	62	4	140	3	0
DEU	6	5	0	22	1	7	1	8	0
DFS	30	134	15	0	44	85	74	28	0
GBR	8	62	1	42	0	0	50	1	0
NOR	8	4	6	62	0	0	0	19	0
USA	13	134	1	70	46	0	0	2	0
NLD	8	3	8	27	1	19	2	0	0
CAM	2	0	0	0	0	0	0	0	0

RDC

common bulls below diagonal
common three quarter sib group above diagonal
AUS CAN DEU DFS GBR NOR NZL USA NLD CAM

AUS	0	23	9	41	9	12	21	13	8	2
CAN	23	0	7	133	62	4	33	140	3	0
DEU	9	7	0	30	1	9	4	1	8	0
DFS	30	134	20	0	44	88	56	74	28	0
GBR	8	62	1	42	0	0	25	50	1	0
NOR	8	4	8	64	0	0	7	0	19	0
NZL	20	31	4	53	22	6	0	21	2	3
USA	13	134	1	70	46	0	20	0	2	0
NLD	8	3	8	27	1	19	2	2	0	0
CAM	2	0	0	0	0	3	0	0	0	0

RDC

common bulls below diagonal
common three quarter sib group above diagonal
AUS CAN DEU DFS GBR NOR NZL USA NLD CAM

AUS	0	23	9	41	9	12	21	13	8	2
CAN	23	0	7	133	62	4	33	140	3	0
DEU	9	7	0	30	1	9	4	1	8	0
DFS	30	134	20	0	44	85	54	74	28	0
GBR	8	62	1	42	0	0	25	50	1	0
NOR	8	4	8	62	0	0	7	0	19	0
NZL	20	31	4	50	22	6	0	21	2	3
USA	13	134	1	70	46	0	20	0	2	0
NLD	8	3	8	27	1	19	2	2	0	0
CAM	2	0	0	0	0	3	0	0	0	0

RDC

common bulls below diagonal
common three quarter sib group above diagonal
AUS CAN DEU DFS GBR NOR NZL USA NLD CAM

AUS	0	23	9	41	9	12	21	13	8	2
CAN	23	0	7	133	62	4	33	140	3	0
DEU	9	7	0	30	1	9	4	1	8	0
DFS	30	134	20	0	44	78	56	74	30	0
GBR	8	62	1	42	0	0	25	50	1	0
NOR	8	4	8	57	0	0	7	0	19	0
NZL	20	31	4	53	22	6	0	21	2	3
USA	13	134	1	70	46	0	20	0	2	0
NLD	8	3	8	29	1	19	2	2	0	0
CAM	2	0	0	0	0	3	0	0	0	0

RDC

common bulls below diagonal

common three quarter sib group above diagonal

AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM
-----	-----	-----	-----	-----	-----	-----	-----	-----

AUS	0	23	9	41	9	12	13	8	2
CAN	23	0	7	133	62	4	137	3	0
DEU	9	7	0	30	1	9	1	8	0
DFS	30	134	20	0	44	88	74	30	0
GBR	8	62	1	42	0	0	50	1	0
NOR	8	4	8	64	0	0	0	19	0
USA	13	133	1	70	46	0	0	2	0
NLD	8	3	8	29	1	19	2	0	0
CAM	2	0	0	0	0	0	0	0	0

RDC

common bulls below diagonal

common three quarter sib group above diagonal

AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

AUS	0	23	9	41	9	12	21	13	8	2
CAN	23	0	7	133	62	4	33	140	3	0
DEU	9	7	0	30	1	9	4	1	8	0
DFS	30	134	20	0	44	85	54	74	29	0
GBR	8	62	1	42	0	0	25	50	1	0
NOR	8	4	8	62	0	0	7	0	19	0
NZL	20	31	4	51	22	6	0	21	2	3
USA	13	134	1	70	46	0	20	0	2	0
NLD	8	3	8	28	1	19	2	2	0	0
CAM	2	0	0	0	0	3	0	0	0	0

RDC

common bulls below diagonal

common three quarter sib group above diagonal

AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM
-----	-----	-----	-----	-----	-----	-----	-----	-----

AUS	0	23	9	41	9	12	13	8	2
CAN	23	0	7	133	62	4	138	3	0
DEU	9	7	0	30	1	9	1	8	0
DFS	30	134	20	0	44	82	74	30	0
GBR	8	62	1	42	0	0	49	1	0
NOR	8	4	8	59	0	0	0	19	0
USA	13	133	1	70	45	0	0	2	0
NLD	8	3	8	29	1	19	2	0	0
CAM	2	0	0	0	0	0	0	0	0

RDC

common bulls below diagonal

common three quarter sib group above diagonal

AUS	CAN	DEU	DFS	NOR	NZL	NLD	USA	CAM
-----	-----	-----	-----	-----	-----	-----	-----	-----

AUS	0	23	9	36	12	21	8	13	2
CAN	23	0	7	127	4	33	3	140	0

DEU	9	7	0	27	9	4	8	1	0
DFS	27	127	20	0	77	49	27	69	0
NOR	8	4	8	57	0	7	19	0	0
NZL	20	31	4	47	6	0	1	21	3
NLD	8	3	8	26	19	1	0	2	0
USA	13	134	1	66	0	20	2	0	0
CAM	2	0	0	0	0	3	0	0	0

RDC

common bulls below diagonal
 common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
--	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

AUS	0	23	9	41	8	12	21	13	8	2
CAN	23	0	7	133	59	4	33	140	3	0
DEU	9	7	0	30	1	9	4	1	8	0
DFS	30	134	20	0	44	93	56	74	30	0
GBR	7	59	1	42	0	0	22	48	1	0
NOR	8	4	8	69	0	0	7	0	19	0
NZL	20	31	4	53	19	6	0	21	2	3
USA	13	134	1	70	44	0	20	0	2	0
NLD	8	3	8	29	1	19	2	2	0	0
CAM	2	0	0	0	0	3	0	0	0	0

RDC

common bulls below diagonal
 common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
--	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

AUS	0	23	9	41	8	12	21	13	8	2
CAN	23	0	7	133	59	4	33	137	3	0
DEU	9	7	0	30	1	9	4	1	8	0
DFS	30	134	20	0	44	88	56	74	30	0
GBR	7	59	1	42	0	0	22	48	1	0
NOR	8	4	8	64	0	0	7	0	19	0
NZL	20	31	4	53	19	6	0	21	2	3
USA	13	133	1	70	44	0	20	0	2	0
NLD	8	3	8	29	1	19	2	2	0	0
CAM	2	0	0	0	0	3	0	0	0	0

RDC

common bulls below diagonal
 common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM
--	-----	-----	-----	-----	-----	-----	-----	-----	-----

AUS	0	23	9	41	8	12	13	8	2
CAN	23	0	7	133	59	4	140	3	0
DEU	9	7	0	31	1	9	1	8	0
DFS	30	134	21	0	44	88	74	30	0
GBR	7	59	1	42	0	0	48	1	0
NOR	8	4	8	64	0	0	0	19	0
USA	13	134	1	70	44	0	0	2	0
NLD	8	3	8	29	1	19	2	0	0
CAM	2	0	0	0	0	0	0	0	0

RDC

RDC

SIM

SIM

SIM

SIM

