

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:

NOR (RDC)	High quality reliabilities meant for Interbull test 4 are now being reported.
AUS (GUE,HOL,RDC)	New data provided for OFL since August 2018. Change in heritability, base change. Now the trait is calculated with the same model as the other conformation traits.
JPN (HOL)	Pedigree update causing small decrease in information
FRA (BSW,HOL)	Base change
DFS (ALL)	Change in EDC calculation EDC calculation now is the same as used in EBV estimation
ITA (BSW)	Base change, updated the data and pedigree editing procedures and fixed effects.
SVN (HOL,BSW)	Base change
EST (HOL,RDC)	Pedigree updates causing small changes in information
DEA (BSW)	Base changed to a cow base. The new base are cows of birthyears 2012 to 2015
CHE (ALL)	Slight changes in number of daughters, number of herds and EDC are due to manual edits in the database.
USA (HOL)	Parentage verification causing some drops in information
ITA (HOL)	Cut-off of one year of data causing decrease in information. Base change
IRL (ALL)	Pedigree verification causing some changes in information
DEU (ALL)	Base change, data editing causing drops in information
NZL (ALL)	Pedigree verification causing drops in information
CAN (ALL)	Update of heritabilities, base change
PRT (HOL)	Re-estimation of variance components
BEL (HOL)	Few bulls missing due to no longer having enough daughters. Some bulls changed in ToP due to the new program assigning such values.

INTERBULL CHANGES COMPARED TO THE PREVIOUS ROUTINE RUN

Post-processing Windows:

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

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

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

The new weights are as follows:

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

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

DATA AND METHOD OF ANALYSIS

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

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

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

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

SCIENTIFIC LITERATURE

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

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

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

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

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

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

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

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

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

NEXT ROUTINE INTERNATIONAL EVALUATION

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

NEXT TEST INTERNATIONAL EVALUATION

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

PUBLICATION OF INTERBULL ROUTINE RUN

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

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

PUBLICATION OF INTERBULL TEST RUN

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

^LTable 1. National evaluation data considered in the Interbull evaluation for conformation traits (April Routine Evaluation 2021).
 Number of records for stature by breed

Country	BSW	GUE	HOL	JER	RDC	SIM
AUS		45	3809	738	240	
BEL			1592			
CAN	232	100	11928	762	869	
CHE	2786		3350	46		
CZE			4166			
DEA	3582					
DEU			19685		241	
DFS			12013	2027	6285	
ESP			3977			
EST			766			
FRA	371		17026			
FRM						
GBR	22	216	6077	436	313	
HUN			2752			
IRL			1754			
ISR						
ITA	2121		8657	101		
JPN			5789			
KOR			1362			
LTU						
LVA						
NLD	127		14924	46	52	
NOR					2405	
NZL			6453	3996	596	
POL			8779			
PRT			2103			
SVK						
SVN	316		560			
URY						

USA	871	700	32937	4223	258
ZAF			847	546	
HRV					
CAM					35
No. Records	10428	1061	171306	12921	11294
Pub. Proofs	8356	903	137454	11242	11992
					0

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

BSW sta

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	6.28								
CHE	0.95	12.39							
FRA	0.98	0.96	0.93						
ITA	0.96	0.95	0.95	14.29					
NLD	0.95	0.95	0.96	0.92	4.18				
USA	0.98	0.95	0.97	0.95	0.94	1.64			
DEA	0.97	0.98	0.97	0.96	0.96	0.96	11.28		
SVN	0.92	0.90	0.91	0.93	0.91	0.91	0.92	15.99	
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	8.11								
CHE	0.89	10.21							
FRA	0.87	0.89	0.94						
ITA	0.81	0.85	0.87	21.76					
NLD	0.91	0.81	0.87	0.71	4.56				
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	22.73	
GBR	0.91	0.84	0.82	0.72	0.90	0.81	0.78	0.82	1.50

BSW bde

	CAN	CHE	FRA	ITA	NLD	DEA	SVN	GBR	USA
CAN	6.66								
CHE	0.84	10.31							
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	11.21			
SVN	0.78	0.75	0.79	0.82	0.79	0.73	25.76		
GBR	0.86	0.89	0.81	0.85	0.90	0.87	0.85	1.57	
USA	0.72	0.75	0.86	0.78	0.86	0.79	0.78	0.86	0.85

BSW ang

	CAN	CHE	FRA	NLD	USA	GBR
CAN	8.42					
CHE	0.70	10.98				
FRA	0.88	0.67	0.86			
NLD	0.80	0.68	0.70	3.81		
USA	0.89	0.67	0.78	0.77	1.09	
GBR	0.89	0.77	0.80	0.83	0.90	0.72

BSW ran

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
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CAN	6.87								
CHE	0.94	10.65							
FRA	0.97	0.96	0.94						
ITA	0.94	0.93	0.94	23.06					
NLD	0.95	0.92	0.96	0.92	4.55				
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	11.88		
SVN	0.91	0.90	0.91	0.90	0.91	0.91	0.90	21.57	
GBR	0.96	0.94	0.97	0.94	0.97	0.96	0.92	0.93	1.92

BSW rwi

	CAN	CHE	FRA	NLD	USA	DEA	GBR	SVN	ITA
CAN	6.85								
CHE	0.89	10.16							
FRA	0.96	0.87	0.95						
NLD	0.93	0.86	0.93	3.96					
USA	0.91	0.84	0.87	0.81	0.97				
DEA	0.93	0.89	0.93	0.80	0.90	13.32			
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	26.79	
ITA	0.87	0.80	0.89	0.80	0.85	0.87	0.88	0.87	20.30

BSW rls

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	7.71								
CHE	0.92	13.07							
FRA	0.91	0.91	1.03						
ITA	0.91	0.85	0.93	23.80					
NLD	0.88	0.84	0.88	0.84	5.12				
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	12.27		
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	1.23

BSW fan

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	8.71								
CHE	0.68	13.78							
FRA	0.78	0.73	1.10						
ITA	0.69	0.85	0.80	21.92					
NLD	0.74	0.68	0.84	0.70	5.19				
USA	0.82	0.72	0.85	0.85	0.81	0.87			
DEA	0.62	0.91	0.67	0.89	0.65	0.66	11.66		
SVN	0.67	0.84	0.70	0.85	0.66	0.70	0.94	24.73	
GBR	0.81	0.71	0.90	0.74	0.88	0.83	0.69	0.70	1.19

BSW hde

	CAN	CHE	FRA	ITA	NLD	DEA	SVN	USA
CAN	8.53							
CHE	0.87	12.57						
FRA	0.82	0.81	1.17					
ITA	0.79	0.83	0.85	22.08				
NLD	0.77	0.74	0.84	0.75	5.19			
DEA	0.78	0.87	0.84	0.92	0.77	12.25		
SVN	0.76	0.75	0.84	0.89	0.74	0.89	30.15	
USA	0.85	0.74	0.86	0.89	0.81	0.77	0.83	0.87

BSW fua

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
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CAN	7.00								
CHE	0.87	11.95							
FRA	0.89	0.87	0.90						
ITA	0.90	0.83	0.85	20.96					
NLD	0.90	0.85	0.90	0.84	4.57				
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	11.23		
SVN	0.76	0.75	0.84	0.85	0.77	0.76	0.90	21.55	
GBR	0.92	0.84	0.88	0.88	0.91	0.92	0.76	0.67	1.32

BSW ruh

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	7.52								
CHE	0.91	11.84							
FRA	0.85	0.84	0.94						
ITA	0.75	0.85	0.86	13.10					
NLD	0.77	0.85	0.87	0.86	4.27				
USA	0.84	0.84	0.88	0.87	0.87	1.10			
DEA	0.81	0.86	0.89	0.93	0.90	0.86	11.80		
SVN	0.82	0.84	0.80	0.86	0.89	0.83	0.90	19.38	
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	8.32								
CHE	0.91	11.91							
FRA	0.85	0.86	0.87						
ITA	0.79	0.88	0.79	13.43					
NLD	0.70	0.66	0.79	0.69	4.27				
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	12.32		
SVN	0.82	0.81	0.75	0.85	0.71	0.82	0.83	17.76	

BSW usu

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	8.45								
CHE	0.90	11.99							
FRA	0.83	0.91	0.91						
ITA	0.89	0.90	0.88	18.87					
NLD	0.83	0.83	0.89	0.82	4.16				
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	11.55		
SVN	0.85	0.83	0.72	0.83	0.69	0.73	0.85	23.79	
GBR	0.80	0.79	0.86	0.87	0.91	0.93	0.74	0.66	3.12

BSW ude

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	6.49								
CHE	0.96	12.05							
FRA	0.95	0.95	0.98						
ITA	0.94	0.96	0.95	20.78					
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	12.05		
SVN	0.94	0.96	0.91	0.97	0.94	0.93	0.96	21.40	
GBR	0.96	0.94	0.96	0.94	0.96	0.96	0.91	0.92	1.88

BSW ftp

	CAN	CHE	FRA	NLD	USA	DEA	SVN	GBR	ITA
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CAN	7.36									
CHE	0.97	13.96								
FRA	0.97	0.95	0.93							
NLD	0.96	0.95	0.95	5.03						
USA	0.92	0.90	0.88	0.91	1.32					
DEA	0.95	0.99	0.95	0.95	0.90	11.10				
SVN	0.94	0.93	0.92	0.93	0.90	0.92	17.84			
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	22.07	

BSW ft1

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR	
CAN	6.39									
CHE	0.90	14.65								
FRA	0.95	0.95	0.96							
ITA	0.93	0.94	0.95	18.48						
NLD	0.92	0.96	0.92	0.92	5.01					
USA	0.94	0.96	0.95	0.93	0.96	1.77				
DEA	0.90	0.98	0.98	0.96	0.94	0.96	11.12			
SVN	0.90	0.92	0.90	0.93	0.94	0.91	0.93	18.01		
GBR	0.95	0.94	0.93	0.94	0.97	0.96	0.93	0.94	1.29	

BSW rtp

	CAN	CHE	FRA	ITA	NLD	DEA	SVN	USA		
CAN	6.67									
CHE	0.97	14.52								
FRA	0.97	0.97	0.93							
ITA	0.92	0.95	0.93	21.09						
NLD	0.97	0.96	0.97	0.93	4.64					
DEA	0.96	0.99	0.97	0.96	0.94	12.10				
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	1.32		

BSW ocs

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR	
CAN	7.67									
CHE	0.85	9.22								
FRA	0.78	0.86	0.95							
ITA	0.81	0.82	0.89	9.31						
NLD	0.74	0.76	0.80	0.74	3.46					
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	10.67			
SVN	0.70	0.73	0.76	0.74	0.72	0.74	0.78	20.82		
GBR	0.82	0.87	0.86	0.81	0.87	0.89	0.74	0.73	1.77	

BSW ous

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR	
CAN	8.15									
CHE	0.89	13.73								
FRA	0.88	0.92	0.95							
ITA	0.82	0.89	0.90	10.50						
NLD	0.87	0.87	0.92	0.79	4.41					
USA	0.85	0.89	0.86	0.83	0.85	0.99				
DEA	0.86	0.96	0.91	0.90	0.85	0.89	12.44			
SVN	0.75	0.84	0.78	0.82	0.77	0.83	0.92	19.97		
GBR	0.82	0.85	0.76	0.81	0.77	0.87	0.77	0.74	1.44	

BSW of1

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR	
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CAN	8.40								
CHE	0.86	11.57							
FRA	0.66	0.67	1.26						
ITA	0.67	0.70	0.85	17.84					
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	11.36		
SVN	0.77	0.86	0.68	0.76	0.66	0.71	0.90	28.16	
GBR	0.74	0.77	0.82	0.68	0.73	0.72	0.68	0.65	1.62

BSW	ofr								
		CAN	CHE	DEA	ITA	SVN	USA	FRA	
CAN		6.99							
CHE		0.83	12.09						
DEA		0.84	0.90	11.60					
ITA		0.83	0.91	0.95	17.90				
SVN		0.78	0.81	0.79	0.85	22.08			
USA		0.81	0.85	0.91	0.86	0.79	1.64		
FRA		0.80	0.87	0.93	0.91	0.83	0.90	0.90	

BSW	tpl								
		CAN	CHE	DEA	ITA	SVN	FRA		
CAN		6.71							
CHE		0.90	12.00						
DEA		0.91	0.91	11.74					
ITA		0.92	0.92	0.94	24.18				
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		7.11							
CHE		0.75	16.20						
DEA		0.70	0.87	12.60					
ITA		0.91	0.76	0.75	18.00				
SVN		0.84	0.58	0.64	0.72	27.20			
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	1.10	

BSW	rle								
		CHE	DEA	ITA	SVN	USA	FRA		
CHE		11.77							
DEA		0.96	12.41						
ITA		0.83	0.87	20.31					
SVN		0.81	0.82	0.82	26.25				
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		7.78							
CHE		0.82	11.35						
DEA		0.77	0.85	12.17					
ITA		0.88	0.91	0.84	30.37				
SVN		0.80	0.84	0.85	0.88	36.33			
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	7.10					
CHE	0.92	12.00				
DEA	0.91	0.89	12.57			
ITA	0.92	0.83	0.86	19.86		
SVN	0.95	0.89	0.92	0.90	22.00	
FRA	0.91	0.84	0.89	0.88	0.91	1.03

BSW	ful					
	CHE	DEA	ITA	SVN	FRA	
CHE	11.70					
DEA	0.91	12.37				
ITA	0.92	0.96	12.90			
SVN	0.78	0.87	0.85	21.02		
FRA	0.69	0.82	0.74	0.75	0.95	

BSW	udb					
	CHE	DEA	ITA	SVN	FRA	
CHE	11.85					
DEA	0.97	13.35				
ITA	0.93	0.97	26.66			
SVN	0.82	0.86	0.81	25.64		
FRA	0.91	0.88	0.85	0.79	0.95	

BSW	tdi					
	CHE	DEA	ITA	SVN	FRA	
CHE	15.81					
DEA	0.96	11.39				
ITA	0.94	0.95	21.10			
SVN	0.91	0.93	0.93	17.72		
FRA	0.96	0.96	0.91	0.91	0.92	

BSW	tth					
	CHE	DEA	ITA	SVN	FRA	
CHE	14.39					
DEA	0.98	13.00				
ITA	0.93	0.94	23.25			
SVN	0.88	0.91	0.88	20.16		
FRA	0.93	0.93	0.95	0.88	0.87	

GUE	sta				
	CAN	GBR	USA	AUS	
CAN	6.39				
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	6.78				
GBR	0.92	1.74			
USA	0.86	0.86	1.56		
AUS	0.72	0.80	0.67	0.34	

GUE bde				
	CAN	GBR	USA	AUS
CAN	6.16			
GBR	0.87	1.53		
USA	0.75	0.89	1.80	
AUS	0.80	0.78	0.71	0.45

GUE ang				
	CAN	GBR	USA	AUS
CAN	7.96			
GBR	0.89	1.78		
USA	0.88	0.91	1.91	
AUS	0.65	0.76	0.68	0.39

GUE ran				
	CAN	GBR	USA	AUS
CAN	6.48			
GBR	0.97	1.61		
USA	0.97	0.97	2.01	
AUS	0.91	0.94	0.91	0.76

GUE rwi				
	CAN	GBR	USA	AUS
CAN	6.81			
GBR	0.93	1.52		
USA	0.92	0.92	1.74	
AUS	0.86	0.85	0.79	0.64

GUE rls				
	CAN	GBR	USA	AUS
CAN	8.48			
GBR	0.82	1.84		
USA	0.93	0.80	0.92	
AUS	0.72	0.81	0.72	0.32

GUE rlr				
	CAN	USA	AUS	
CAN	7.13			
USA	0.85	0.90		
AUS	0.62	0.55	0.20	

GUE fan				
	CAN	GBR	USA	AUS
CAN	8.46			
GBR	0.79	1.71		
USA	0.84	0.76	0.89	
AUS	0.64	0.77	0.66	0.26

GUE fua				
	CAN	GBR	USA	AUS
CAN	7.26			
GBR	0.94	1.69		
USA	0.92	0.91	1.84	
AUS	0.80	0.79	0.77	0.38

GUE ruh				
	CAN	GBR	USA	AUS
CAN	6.68			
GBR	0.74	2.08		
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	1.78		
USA	0.80	0.87	1.35	
AUS	0.77	0.79	0.76	0.29

GUE ude				
	CAN	GBR	USA	AUS
CAN	6.14			
GBR	0.97	1.60		
USA	0.95	0.95	1.86	
AUS	0.90	0.91	0.90	0.53

GUE ftp				
	CAN	GBR	USA	AUS
CAN	5.77			
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	4.61			
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	5.51			
AUS	0.90	0.35		
USA	0.93	0.90	1.62	

GUE ocs				
	CAN	GBR	USA	AUS
CAN	8.11			
GBR	0.83	2.17		
USA	0.79	0.87	0.90	
AUS	0.58	0.66	0.60	0.82

GUE ous				
	CAN	GBR	USA	AUS
CAN	7.86			
GBR	0.82	1.61		

USA	0.89	0.83	0.86	
AUS	0.70	0.81	0.71	1.07

GUE	ofl			
	CAN	GBR	USA	AUS
CAN	7.67			
GBR	0.74	1.41		
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	5.42																				
CHE	0.89	0.92	0.96	10.64																			
DEU	0.89	0.93	0.98	0.97	12.89																		
DFS	0.87	0.95	0.97	0.96	0.97	10.75																	
ESP	0.89	0.94	0.98	0.96	0.98	0.97	0.83																
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	0.97	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	0.94	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	0.83	0.87	0.89	0.83	0.83	0.86	0.84	0.83	0.43								
ZAF	0.91	0.91	0.91	0.89	0.90	0.87	0.89	0.91	0.93	0.86	0.86	0.91	0.89	0.86	0.89	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	0.86	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	0.84	0.92	0.96	13.22					
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	0.85	0.87	0.94	0.95	15.12				
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	0.90	0.91	0.93	0.88	0.72			
KOR	0.85	0.85	0.85	0.84	0.85	0.84	0.84	0.85	0.86	0.84	0.84	0.84	0.85	0.84	0.83	0.85	0.85	0.86	0.86	0.85	4.56		
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	0.93	0.88	0.85	14.63	
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	1.71																					
CAN	0.73	0.85	6.42																				
CHE	0.65	0.85	0.89	11.18																			
DEU	0.70	0.87	0.90	0.84	12.46																		
DFS	0.71	0.87	0.92	0.84	0.93	12.68																	
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	0.82	0.82	1.42														
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	5.02												
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	12.35									
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	0.83	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	14.14					
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	23.68				
IRL	0.78	0.77	0.83	0.79	0.86	0.81	0.74	0.76	0.93	0.66	0.84	0.74	0.73	0.74	0.83	0.82	0.64	0.82	0.72	1.35			
KOR	0.65	0.73	0.64	0.65	0.72	0.72	0.70	0.72	0.66	0.66	0.65	0.70	0.71	0.64	0.67	0.66	0.70	0.76	0.65	0.65	2.63		
SVN	0.65	0.77	0.83	0.81	0.85	0.85	0.83	0.78	0.80	0.69	0.84	0.80	0.84	0.79	0.64	0.85	0.69	0.81	0.73	0.66	0.66	20.89	
PRT	0.66	0.82	0.82	0.78	0.86	0.83	0.81	0.83	0.81	0.74	0.84	0.82	0.85	0.83	0.63	0.78	0.76	0.85	0.65	0.74	0.69	0.74	2.07

USA	0.91	0.95	0.97	0.95	0.96	0.96	0.96	0.96	0.97	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	0.92	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	18.89					
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	1.75				
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	4.90			
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	17.79		
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	0.93	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	5.78																				
CHE	0.86	0.95	0.93	11.07																			
DEU	0.83	0.93	0.95	0.89	11.43																		
DFS	0.81	0.92	0.94	0.89	0.97	12.43																	
ESP	0.90	0.93	0.97	0.91	0.95	0.94	1.00																
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	11.23									
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	0.89								
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	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	14.95					
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	17.36				
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	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	3.37		
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	21.48

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	0.31																						
BEL	0.79	1.83																					
CAN	0.72	0.95	6.21																				
CHE	0.80	0.92	0.93	11.67																			
DEU	0.74	0.94	0.95	0.91	11.94																		
DFS	0.71	0.94	0.97	0.91	0.96	13.47																	
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	12.05									
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	0.84							
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	1.77						
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	15.36					
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	21.05				
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	1.56				
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	22.60	
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

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	1.45											
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	11.18									
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	14.22						
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	16.30					
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	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	4.42			
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	17.58		
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	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	1.44																					
CAN	0.90	0.97	6.13																				
CHE	0.92	0.97	0.98	12.04																			
DEU	0.90	0.96	0.97	0.97	14.07																		
DFS	0.88	0.94	0.95	0.95	0.96	11.04																	
ESP	0.90	0.96	0.97	0.96	0.98	0.96	0.89																
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	0.89	0.93	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	0.98	0.91	5.09												
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	11.29										
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	1.58								
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	0.95	0.93	0.95	14.64							
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	16.73						
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	1.29					
KOR	0.88	0.91	0.93	0.93	0.93	0.93	0.95	0.93	0.90	0.91	0.93	0.91	0.90	0.90	0.94	0.88	0.90	0.90	2.22				
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	0.91	0.92	0.93	0.91	0.92	14.46			
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	0.91	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	0.88	0.88	0.86	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	0.96	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	5.69																				
CHE	0.62	0.79	0.92	11.48																			
DEU	0.58	0.71	0.82	0.85	12.94																		
DFS	0.65	0.71	0.75	0.81	0.87	10.25																	
ESP	0.65	0.72	0.78	0.81	0.86	0.87	0.80																
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													
NLD	0.59	0.72	0.75	0.83	0.89	0.88	0.86	0.85	0.88	0.79	2.88												
USA	0.61	0.72	0.81	0.87	0.88	0.88	0.86	0.87	0.90	0.84	0.86	0.89											
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	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	10.78									
NZL	0.79	0.52	0.65	0.66	0.63	0.61	0.61	0.57	0.72	0.51	0.65	0.69	0.57	0.40	0.31								
JPN	0.57	0.80	0.85	0.92	0.76	0.76	0.78	0.83	0.77	0.81	0.77	0.82	0.74	0.71	0.52	0.59							
CZE	0.62	0.73	0.82	0.82	0.86	0.76	0.79	0.78	0.81	0.75	0.77	0.79	0.83	0.68	0.68	0.73	13.42						
EST	0.56	0.72	0.71	0.73	0.75	0.72	0.70	0.73	0.71	0.70	0.74	0.70	0.74	0.70	0.49	0.71	0.75	19.03					
IRL	0.60	0.53	0.70	0.69	0.70	0.66	0.67	0.62	0.79	0.65	0.62	0.66	0.63	0.50	0.56	0.57	0.66	0.56	0.90				
KOR	0.56	0.68	0.64	0.69	0.69	0.68	0.71	0.71	0.68	0.71	0.69	0.69	0.69	0.70	0.42	0.69	0.68	0.72	0.51	6.52			
SVN	0.55	0.75	0.68	0.72	0.74	0.72	0.69	0.72	0.72	0.73	0.70	0.71	0.70	0.69	0.45	0.71	0.70	0.76	0.57	0.70	17.38		
PRT	0.56	0.72	0.72	0.74	0.79	0.78	0.78	0.78	0.81	0.77	0.78	0.76	0.73	0.71	0.50	0.75	0.74	0.70	0.61	0.71	0.69	0.29	

HOL	ous										NLD	USA	HUN	POL	NZL	JPN	CZE	EST	IRL	SVN	PRT	
	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA												
AUS	1.30																					
BEL	0.68	1.31																				
CAN	0.72	0.79	5.33																			
CHE	0.80	0.85	0.95	11.84																		
DEU	0.75	0.80	0.90	0.92	13.67																	
DFS	0.63	0.83	0.85	0.89	0.87	13.03																
ESP	0.75	0.70	0.83	0.88	0.84	0.77	0.87															
FRA	0.68	0.82	0.86	0.94	0.90	0.91	0.82	1.02														
GBR	0.84	0.69	0.83	0.87	0.84	0.70	0.88	0.75	1.40													
ITA	0.68	0.71	0.84	0.91	0.85	0.83	0.90	0.88	0.82	0.98												
NLD	0.67	0.82	0.87	0.94	0.92	0.89	0.82	0.94	0.77	0.84	4.68											
USA	0.75	0.74	0.90	0.92	0.87	0.79	0.87	0.84	0.88	0.87	0.85	1.20										
HUN	0.71	0.79	0.82	0.86	0.86	0.80	0.81	0.81	0.77	0.78	0.78	0.78	1.16									
POL	0.71	0.80	0.74	0.78	0.77	0.71	0.70	0.73	0.77	0.70	0.71	0.73	0.73	11.38								
NZL	0.82	0.72	0.85	0.89	0.79	0.70	0.77	0.81	0.84	0.73	0.80	0.88	0.75	0.71	0.43							
JPN	0.77	0.82	0.93	0.94	0.89	0.80	0.80	0.85	0.84	0.84	0.85	0.89	0.80	0.81	0.83	0.75						
CZE	0.71	0.86	0.87	0.91	0.93	0.90	0.80	0.92	0.76	0.83	0.89	0.82	0.88	0.75	0.76	0.85	13.16					
EST	0.71	0.82	0.81	0.88	0.86	0.90	0.77	0.90	0.75	0.81	0.87	0.77	0.80	0.70	0.77	0.89	16.38					
IRL	0.82	0.63	0.72	0.79	0.76	0.59	0.80	0.66	0.95	0.76	0.67	0.82	0.69	0.71	0.81	0.77	0.70	0.68	0.94			
SVN	0.69	0.75	0.69	0.73	0.72	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.80	0.68	0.71	0.70	0.71	0.66	18.08		
PRT	0.69	0.69	0.78	0.78	0.76	0.69	0.76	0.73	0.79	0.74	0.75	0.78	0.69	0.72	0.73	0.79	0.74	0.70	0.73	0.70	0.70	0.43

HOL	ofl										NLD	USA	HUN	POL	JPN	CZE	EST	IRL	SVN	PRT		
	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA												
AUS	0.77																					
BEL	0.62	1.75																				
CAN	0.40	0.70	6.54																			
CHE	0.55	0.77	0.91	11.52																		
DEU	0.38	0.75	0.83	0.78	11.82																	
DFS	0.35	0.65	0.86	0.77	0.80	13.12																
ESP	0.41	0.72	0.81	0.76	0.71	0.82	0.91															
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	1.52										
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	13.54								
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	16.89						
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	20.69					
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	1.35				
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	0.76	0.83	0.77	0.61	24.38			
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	0.66	0.19	

HOL	loc										USA	CZE	IRL	KOR	SVN	PRT	EST	HUN	POL		
	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD											
BEL	1.80																				
CAN	0.85	6.77																			
CHE	0.56	0.63	12.41																		
DEU	0.66	0.74	0.68	11.66																	
DFS	0.87	0.90	0.51	0.67	13.26																
ESP	0.62	0.73	0.68	0.73	0.73	0.96															
FRA	0.79	0.78	0.71	0.83	0.69	0.76	1.06														
GBR	0.67	0.69	0.88	0.82	0.64	0.79	0.86	1.51													
ITA	0.62	0.69	0.65	0.74	0.58	0.74	0.79	0.74	1.92												
NLD	0.85	0.83	0.70	0.82	0.77	0.69	0.82	0.78	0.64	4.30											
USA	0.64	0.76	0.50	0.77	0.70	0.72	0.75	0.68	0.76	0.66	1.59										
CZE	0.51	0.61	0.56	0.65	0.60	0.65	0.64	0.66	0.70	0.50	0.65	20.08									
IRL	0.59	0.56	0.51	0.65	0.52	0.64	0.69	0.73	0.61	0.63	0.56	0.50	1.66								
KOR	0.57	0.68	0.55	0.52	0.60	0.69	0.67	0.54	0.59	0.57	0.53	0.58	0.51	10.94							
SVN	0.71	0.64	0.55	0.66	0.66	0.67	0.75	0.66	0.64	0.57	0.63	0.69	0.53	0.56	28.97						

PRT	0.50	0.50	0.55	0.61	0.50	0.58	0.53	0.61	0.57	0.51	0.50	0.65	0.50	0.52	0.66	2.26							
EST	0.55	0.53	0.53	0.52	0.53	0.53	0.54	0.53	0.52	0.51	0.52	0.53	0.53	0.63	0.66	0.53	22.84						
HUN	0.69	0.70	0.51	0.68	0.72	0.60	0.75	0.68	0.65	0.66	0.64	0.82	0.51	0.67	0.68	0.57	0.64	1.17					
POL	0.51	0.57	0.51	0.67	0.50	0.56	0.67	0.58	0.62	0.50	0.70	0.74	0.51	0.51	0.77	0.51	0.53	0.67	15.56				

HOL bcs

	BEL	CHE	DEU	DFS	FRA	GBR	ITA	NLD	USA	CZE	JPN	IRL	KOR	CAN	PRT	ESP	SVN	EST	HUN	NZL	POL	
BEL	1.00																					
CHE	0.74	11.78																				
DEU	0.74	0.89	13.36																			
DFS	0.76	0.89	0.95	12.18																		
FRA	0.74	0.92	0.94	0.95	1.00																	
GBR	0.76	0.91	0.90	0.90	0.93	1.52																
ITA	0.74	0.90	0.95	0.95	0.96	0.90	6.63															
NLD	0.74	0.93	0.95	0.96	0.95	0.91	0.93	5.02														
USA	0.77	0.74	0.78	0.79	0.79	0.76	0.76	0.75	1.38													
CZE	0.75	0.86	0.96	0.95	0.92	0.89	0.94	0.93	0.76	13.88												
JPN	0.81	0.92	0.96	0.97	0.97	0.93	0.96	0.95	0.84	0.95	1.70											
IRL	0.74	0.87	0.80	0.85	0.87	0.93	0.82	0.85	0.74	0.78	0.86	1.02										
KOR	0.74	0.75	0.84	0.86	0.86	0.81	0.84	0.79	0.74	0.85	0.87	0.74	2.49									
CAN	0.75	0.92	0.96	0.94	0.95	0.95	0.94	0.95	0.80	0.94	0.98	0.88	0.84	6.10								
PRT	0.73	0.84	0.86	0.86	0.88	0.87	0.84	0.86	0.73	0.83	0.87	0.80	0.83	0.88	1.90							
ESP	0.75	0.87	0.93	0.93	0.95	0.93	0.92	0.92	0.75	0.92	0.94	0.83	0.87	0.95	0.88	1.05						
SVN	0.75	0.85	0.90	0.91	0.87	0.79	0.88	0.91	0.74	0.90	0.89	0.75	0.77	0.85	0.76	0.85	22.05					
EST	0.75	0.83	0.88	0.87	0.87	0.77	0.85	0.90	0.81	0.85	0.87	0.74	0.75	0.83	0.75	0.78	0.86	16.55				
HUN	0.74	0.87	0.93	0.92	0.93	0.87	0.94	0.90	0.75	0.95	0.93	0.76	0.85	0.92	0.83	0.91	0.84	0.82	0.99			
NZL	0.72	0.89	0.88	0.89	0.90	0.89	0.90	0.85	0.71	0.84	0.90	0.84	0.73	0.89	0.81	0.83	0.82	0.80	0.83	0.15		
POL	0.75	0.85	0.92	0.89	0.90	0.89	0.91	0.87	0.75	0.92	0.92	0.80	0.79	0.91	0.85	0.88	0.84	0.78	0.91	0.81	11.41	

JER sta

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.55									
CAN	0.89	6.79								
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	1.69			
ZAF	0.87	0.86	0.85	0.92	0.86	0.89	0.86	8.82		
NLD	0.89	0.95	0.97	0.94	0.92	0.85	0.93	0.87	4.55	
CHE	0.90	0.95	0.96	0.95	0.93	0.85	0.94	0.88	0.97	11.54

JER cwi

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.30									
CAN	0.71	6.57								
DFS	0.76	0.84	15.65							
GBR	0.80	0.92	0.85	1.80						
ITA	0.66	0.80	0.71	0.73	1.43					
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	1.03			
ZAF	0.69	0.79	0.72	0.83	0.71	0.78	0.77	8.71		
NLD	0.74	0.91	0.89	0.90	0.71	0.71	0.84	0.81	4.55	
CHE	0.68	0.88	0.86	0.83	0.84	0.67	0.87	0.73	0.86	12.39

JER bde

	AUS	CAN	DFS	GBR	ITA	NZL	ZAF	NLD	USA	CHE
AUS	0.33									
CAN	0.75	5.70								
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	8.85			
NLD	0.71	0.82	0.83	0.90	0.87	0.70	0.79	4.42		
USA	0.70	0.71	0.74	0.77	0.90	0.69	0.72	0.87	1.03	
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	7.67								
DFS	0.70	0.81	13.30							
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	8.80			
NLD	0.71	0.81	0.72	0.82	0.78	0.74	0.65	5.70		
CHE	0.63	0.80	0.71	0.72	0.73	0.73	0.65	0.75	9.75	

 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	11.60							
GBR	0.95	0.95	0.95	1.16						
ITA	0.90	0.96	0.94	0.94	1.24					
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	9.10		
NLD	0.91	0.96	0.96	0.96	0.94	0.89	0.95	0.92	4.80	
CHE	0.92	0.96	0.96	0.94	0.93	0.89	0.94	0.91	0.95	13.16

 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	12.14							
GBR	0.82	0.92	0.85	1.43						
ITA	0.80	0.85	0.82	0.86	1.62					
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	9.21		
NLD	0.85	0.94	0.91	0.88	0.80	0.86	0.81	0.81	5.00	
CHE	0.84	0.93	0.84	0.86	0.81	0.80	0.80	0.80	0.92	12.02

 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	1.72						
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	12.00		
NLD	0.74	0.91	0.91	0.85	0.85	0.67	0.87	0.75	3.57	
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	13.51						
ITA	0.56	0.80	0.65	1.05					
ZAF	0.54	0.55	0.54	0.58	12.91				
NLD	0.57	0.86	0.88	0.73	0.63	4.69			
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	11.94	

JER fan

	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE
AUS	0.22								
CAN	0.63	6.12							
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	1.71				
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	9.75		
NLD	0.68	0.75	0.78	0.86	0.73	0.78	0.71	3.91	
CHE	0.67	0.78	0.80	0.69	0.67	0.69	0.68	0.73	11.91

JER fua

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.38									
CAN	0.76	5.52								
DFS	0.75	0.86	12.79							
GBR	0.78	0.94	0.85	1.65						
ITA	0.70	0.86	0.78	0.87	1.43					
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	11.87		
NLD	0.77	0.92	0.89	0.92	0.83	0.82	0.87	0.86	4.72	
CHE	0.80	0.91	0.84	0.87	0.82	0.72	0.86	0.88	0.89	11.51

JER ruh

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.36									
CAN	0.74	6.85								
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	1.42					
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	9.28		
NLD	0.76	0.76	0.91	0.88	0.83	0.82	0.86	0.79	4.22	
CHE	0.80	0.91	0.85	0.83	0.79	0.77	0.84	0.79	0.83	12.96

JER usu

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.39									
CAN	0.76	6.36								
DFS	0.70	0.85	13.45							
GBR	0.81	0.87	0.84	1.83						
ITA	0.68	0.77	0.72	0.80	1.56					
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	10.14		
NLD	0.81	0.84	0.88	0.91	0.80	0.60	0.88	0.79	4.86	
CHE	0.75	0.90	0.86	0.79	0.78	0.61	0.84	0.76	0.86	9.77

JER ude									
	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE
AUS	0.35								
CAN	0.92	5.28							
DFS	0.91	0.94	12.21						
GBR	0.91	0.97	0.93	1.45					
ITA	0.92	0.94	0.93	0.93	1.35				
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	10.52		
NLD	0.91	0.96	0.95	0.96	0.94	0.95	0.92	4.23	
CHE	0.94	0.95	0.94	0.93	0.95	0.94	0.90	0.96	9.85

JER ftp										
	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.47									
CAN	0.89	6.35								
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	1.80					
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	10.22		
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	10.15

JER ftl									
	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE
AUS	0.32								
CAN	0.91	5.63							
DFS	0.92	0.91	13.87						
GBR	0.92	0.93	0.94	1.44					
ITA	0.90	0.92	0.91	0.93	1.67				
USA	0.91	0.92	0.94	0.97	0.92	1.12			
ZAF	0.93	0.90	0.92	0.95	0.90	0.97	10.96		
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	11.54

JER rtp								
	AUS	CAN	DFS	NZL	ZAF	NLD	USA	CHE
AUS	0.32							
CAN	0.88	6.46						
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	9.48			
NLD	0.90	0.97	0.96	0.93	0.89	4.91		
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	10.94

JER ocs									
	AUS	CAN	DFS	GBR	ITA	NZL	USA	NLD	CHE
AUS	0.79								
CAN	0.54	6.35							
DFS	0.57	0.70	12.79						
GBR	0.64	0.84	0.83	2.65					
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	2.85	
CHE	0.61	0.90	0.77	0.90	0.81	0.56	0.81	0.83	7.88

JER	ous							
	AUS	CAN	DFS	GBR	NZL	USA	NLD	CHE
AUS	0.79							
CAN	0.68	6.41						
DFS	0.60	0.84	12.88					
GBR	0.74	0.87	0.71	1.42				
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	4.58	
CHE	0.73	0.91	0.80	0.87	0.78	0.87	0.92	10.83

JER	ofl							
	AUS	CAN	DFS	GBR	ITA	USA	NLD	CHE
AUS	6.32							
CAN	0.52	6.06						
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	1.10			
USA	0.65	0.82	0.64	0.71	0.76	1.62		
NLD	0.42	0.69	0.65	0.73	0.67	0.67	4.68	
CHE	0.50	0.88	0.70	0.72	0.69	0.74	0.69	10.40

RDC	sta									
	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0.64									
CAN	0.88	6.22								
DEU	0.90	0.97	13.50							
DFS	0.87	0.97	0.97	8.61						
GBR	0.92	0.96	0.96	0.93	1.29					
NOR	0.89	0.94	0.95	0.98	0.93	13.37				
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	4.61	
CAM	0.92	0.91	0.91	0.92	0.92	0.92	0.91	0.91	0.91	5.83

RDC	cwi									
	AUS	CAN	DEU	DFS	GBR	NZL	USA	NLD	CAM	NOR
AUS	0.41									
CAN	0.74	7.32								
DEU	0.71	0.88	11.31							
DFS	0.78	0.82	0.89	13.69						
GBR	0.83	0.88	0.89	0.87	1.61					
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	4.46		
CAM	0.78	0.79	0.79	0.79	0.79	0.77	0.79	0.79	6.63	
NOR	0.80	0.80	0.80	0.84	0.82	0.80	0.82	0.87	0.79	15.12

RDC	bde									
	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0.49									
CAN	0.81	6.10								
DEU	0.78	0.87	9.76							
DFS	0.79	0.83	0.92	11.83						
GBR	0.78	0.86	0.92	0.89	1.56					
NOR	0.81	0.81	0.80	0.90	0.83	14.81				
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	1.29		

NLD	0.70	0.83	0.90	0.85	0.91	0.83	0.69	0.90	4.09	
CAM	0.83	0.82	0.84	0.84	0.84	0.83	0.86	0.84	0.84	4.86

RDC ang

	AUS	CAN	DEU	DFS	GBR	USA	NLD	CAM	NOR
AUS	0.47								
CAN	0.65	6.82							
DEU	0.64	0.78	12.60						
DFS	0.70	0.77	0.79	9.14					
GBR	0.76	0.82	0.74	0.83	1.38				
USA	0.69	0.86	0.81	0.83	0.85	1.21			
NLD	0.73	0.81	0.62	0.75	0.83	0.75	4.69		
CAM	0.80	0.76	0.78	0.78	0.77	0.78	0.79	7.05	
NOR	0.75	0.75	0.77	0.66	0.76	0.78	0.69	0.77	13.43

RDC ran

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0.42									
CAN	0.91	6.05								
DEU	0.92	0.97	8.97							
DFS	0.91	0.94	0.95	10.04						
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	1.68		
NLD	0.91	0.97	0.98	0.96	0.97	0.94	0.89	0.96	5.85	
CAM	0.93	0.94	0.93	0.94	0.94	0.94	0.93	0.94	0.93	5.65

RDC rwi

	AUS	CAN	DEU	DFS	GBR	NZL	USA	NLD	CAM	NOR
AUS	0.45									
CAN	0.85	5.92								
DEU	0.82	0.94	9.59							
DFS	0.80	0.93	0.93	10.47						
GBR	0.85	0.92	0.90	0.88	1.42					
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	6.03		
CAM	0.86	0.88	0.87	0.88	0.87	0.89	0.88	0.88	6.18	
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	9.30							
DFS	0.72	0.96	0.94	9.30						
GBR	0.80	0.77	0.86	0.79	1.61					
NOR	0.76	0.88	0.88	0.96	0.81	13.37				
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	5.21	
CAM	0.82	0.79	0.79	0.78	0.79	0.79	0.76	0.79	0.79	6.02

RDC rlr

	AUS	CAN	DEU	DFS	NOR	NLD	USA	CAM
AUS	0.19							
CAN	0.59	6.58						
DEU	0.61	0.87	10.23					

DFS	0.57	0.83	0.90	10.94					
NOR	0.63	0.75	0.84	0.88	15.34				
NLD	0.58	0.87	0.91	0.88	0.86	4.62			
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	6.63	

RDC fan

	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM
AUS	0.29								
CAN	0.66	6.40							
DEU	0.71	0.81	14.01						
DFS	0.65	0.71	0.80	9.34					
GBR	0.75	0.79	0.91	0.72	1.62				
NOR	0.70	0.73	0.84	0.64	0.77	14.34			
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	4.86	
CAM	0.80	0.80	0.77	0.77	0.77	0.77	0.79	0.79	7.95

RDC fua

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0.38									
CAN	0.77	5.57								
DEU	0.75	0.91	12.38							
DFS	0.73	0.81	0.82	11.71						
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	6.40

RDC ruh

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0.47									
CAN	0.78	5.73								
DEU	0.81	0.87	14.82							
DFS	0.77	0.87	0.89	10.77						
GBR	0.80	0.76	0.85	0.86	1.43					
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	1.37		
NLD	0.75	0.75	0.91	0.91	0.88	0.90	0.83	0.85	4.16	
CAM	0.84	0.82	0.82	0.83	0.84	0.82	0.85	0.82	0.82	5.98

RDC usu

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0.35									
CAN	0.75	5.64								
DEU	0.72	0.90	12.62							
DFS	0.68	0.75	0.77	13.05						
GBR	0.80	0.81	0.75	0.78	1.85					
NOR	0.69	0.73	0.69	0.78	0.77	13.68				
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	4.51	
CAM	0.81	0.77	0.76	0.76	0.78	0.76	0.78	0.78	0.77	6.09

RDC ude

	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM
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AUS	0.53									
CAN	0.90	5.53								
DEU	0.91	0.97	12.37							
DFS	0.90	0.96	0.94	10.64						
GBR	0.91	0.96	0.96	0.94	1.83					
NOR	0.92	0.93	0.93	0.91	0.94	11.98				
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	4.18		
CAM	0.93	0.94	0.94	0.94	0.94	0.93	0.93	0.93	4.39	

RDC ftp

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0.53									
CAN	0.92	5.56								
DEU	0.93	0.97	13.16							
DFS	0.89	0.94	0.92	11.93						
GBR	0.92	0.93	0.95	0.89	1.52					
NOR	0.89	0.90	0.89	0.88	0.92	11.87				
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	1.44		
NLD	0.93	0.98	0.97	0.95	0.94	0.88	0.91	0.90	4.64	
CAM	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	6.70

RDC ftl

	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM
AUS	0.53								
CAN	0.93	4.97							
DEU	0.94	0.94	13.91						
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	12.83			
USA	0.94	0.93	0.96	0.93	0.97	0.94	1.66		
NLD	0.93	0.93	0.98	0.97	0.97	0.94	0.95	5.33	
CAM	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	7.34

RDC rtp

	AUS	CAN	DEU	DFS	NOR	NZL	NLD	USA	CAM
AUS	0.39								
CAN	0.89	6.23							
DEU	0.89	0.96	14.29						
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	5.40		
USA	0.89	0.92	0.95	0.93	0.93	0.89	0.96	1.44	
CAM	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	6.25

RDC ocs

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	1.13									
CAN	0.61	5.25								
DEU	0.61	0.82	20.48							
DFS	0.66	0.69	0.81	10.42						
GBR	0.68	0.80	0.92	0.80	1.60					
NOR	0.62	0.76	0.76	0.76	0.82	11.71				
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	5.81

RDC	ous									
	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	1.47									
CAN	0.72	5.41								
DEU	0.75	0.88	17.21							
DFS	0.63	0.80	0.82	10.80						
GBR	0.83	0.83	0.84	0.73	1.57					
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	0.86	0.87	0.86	1.00		
NLD	0.69	0.87	0.91	0.88	0.77	0.82	0.81	0.86	4.00	
CAM	0.79	0.86	0.85	0.85	0.86	0.85	0.84	0.87	0.87	6.18

RDC	ofl									
	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM	
AUS	0.63									
CAN	0.43	5.66								
DEU	0.41	0.83	16.20							
DFS	0.38	0.80	0.79	13.49						
GBR	0.51	0.74	0.74	0.68	1.40					
NOR	0.50	0.72	0.75	0.62	0.75	14.94				
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	6.48		
CAM	0.72	0.75	0.75	0.75	0.76	0.75	0.77	0.75	6.86	

^LAPPENDIX II. Number of common bulls

BSW

common bulls below diagonal									
common three quarter sib group above diagonal									
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	125	75	124	41	148	110	28	17
CHE	110	0	155	455	65	264	517	62	15
FRA	66	115	0	174	55	90	175	45	14
ITA	108	396	136	0	88	204	554	80	16
NLD	33	62	44	70	0	56	81	32	11
USA	139	233	62	150	42	0	221	30	17
DEA	92	423	128	471	71	177	0	78	13
SVN	25	60	43	78	31	25	72	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	117	44	124	34	148	108	27	17
CHE	103	0	92	400	60	235	454	59	15
FRA	39	64	0	101	36	54	113	36	10
ITA	108	342	77	0	80	204	518	78	16
NLD	29	59	31	66	0	42	75	32	11
USA	139	200	36	150	33	0	203	29	17
DEA	91	364	79	434	69	152	0	76	12
SVN	24	57	35	76	31	24	71	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	125	75	124	34	110	21	17	148
CHE	110	0	155	455	64	517	48	15	264
FRA	66	115	0	174	51	175	33	14	90
ITA	108	396	136	0	80	554	62	16	204
NLD	29	62	41	66	0	76	24	11	42
DEA	92	423	128	471	70	0	59	13	221
SVN	19	45	33	59	24	55	0	6	22
GBR	14	13	13	14	9	11	4	0	17
USA	139	233	62	150	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	124	75	22	147	17
CHE	110	0	151	40	262	15
FRA	66	111	0	33	90	14
NLD	19	41	28	0	27	8
USA	138	233	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	125	75	124	41	148	110	28	17
CHE	110	0	155	455	65	264	517	62	15
FRA	66	115	0	174	55	90	175	45	14
ITA	108	396	136	0	88	204	554	80	16
NLD	33	62	44	70	0	56	81	32	11
USA	139	233	62	150	42	0	221	30	17
DEA	92	423	128	471	71	177	0	78	13
SVN	25	60	43	78	31	25	72	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	GBR	SVN	ITA
CAN	0	125	44	41	148	110	17	21	120	
CHE	110	0	92	65	264	517	15	48	448	
FRA	39	64	0	36	54	113	10	33	101	
NLD	33	62	31	0	56	81	11	24	86	
USA	139	233	36	42	0	221	17	22	190	
DEA	92	423	79	71	177	0	13	59	548	
GBR	14	13	9	9	15	11	0	6	16	
SVN	19	45	33	24	19	55	4	0	62	
ITA	105	390	77	69	136	463	14	59	0	

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	125	75	124	41	148	110	28	17
CHE	110	0	155	455	65	264	517	62	15
FRA	66	115	0	174	55	90	175	45	14
ITA	108	396	136	0	88	204	554	80	16
NLD	33	62	44	70	0	56	81	32	11
USA	139	233	62	150	42	0	221	30	17
DEA	92	423	128	471	71	177	0	78	13
SVN	25	60	43	78	31	25	72	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	125	75	124	33	148	110	28	17
CHE	110	0	155	455	63	264	517	62	15
FRA	66	115	0	174	51	90	175	45	14
ITA	108	396	136	0	79	204	554	80	16
NLD	28	61	41	65	0	41	75	32	11
USA	139	233	62	150	31	0	221	30	17
DEA	92	423	128	471	69	177	0	78	13
SVN	25	60	43	78	31	25	72	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	125	75	120	33	110	28	148
CHE	110	0	155	449	63	517	62	264
FRA	66	115	0	173	51	175	45	90
ITA	105	391	136	0	78	548	80	190
NLD	28	61	41	64	0	75	32	41
DEA	92	423	128	463	69	0	78	221
SVN	25	60	43	78	31	72	0	30
USA	139	233	62	136	31	177	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	125	44	81	33	148	77	22	17
CHE	110	0	92	284	64	263	323	49	15
FRA	39	64	0	93	35	54	103	34	10
ITA	73	235	70	0	59	106	271	56	13
NLD	28	62	30	54	0	41	63	24	11
USA	139	233	36	77	32	0	124	23	17
DEA	66	257	72	237	58	88	0	59	10
SVN	20	46	34	54	24	20	55	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	125	75	124	34	148	110	29	17
CHE	110	0	155	455	64	264	517	63	15
FRA	66	115	0	174	51	90	175	46	14
ITA	108	396	136	0	80	204	554	81	16
NLD	29	62	41	66	0	42	76	32	11
USA	139	233	62	150	33	0	221	31	17
DEA	92	423	128	471	70	177	0	80	13
SVN	26	61	44	79	31	26	74	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	125	75	124	34	148	110	29
CHE	110	0	155	455	64	264	517	63
FRA	66	115	0	174	51	90	175	46
ITA	108	396	136	0	80	204	554	81
NLD	29	62	41	66	0	42	76	32
USA	139	233	62	150	33	0	221	31
DEA	92	423	128	471	70	177	0	80
SVN	26	61	44	79	31	26	74	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	125	75	124	41	148	110	22	17
CHE	110	0	155	455	65	264	517	49	15
FRA	66	115	0	174	55	90	175	34	14
ITA	108	396	136	0	88	204	554	63	16
NLD	33	62	44	70	0	56	81	24	11
USA	139	233	62	150	42	0	221	23	17
DEA	92	423	128	471	71	177	0	61	13
SVN	20	46	34	60	24	20	57	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	125	75	124	41	146	110	29	17
CHE	110	0	155	455	65	264	517	63	15
FRA	66	115	0	174	55	90	175	46	14
ITA	108	396	136	0	88	204	554	81	16
NLD	33	62	44	70	0	56	81	32	11
USA	138	233	62	150	42	0	221	31	17
DEA	92	423	128	471	71	177	0	80	13
SVN	26	61	44	79	31	26	74	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	125	75	41	148	99	28	17	112
CHE	110	0	155	65	264	485	61	15	413
FRA	66	115	0	55	90	165	45	14	161
NLD	33	62	44	0	56	75	32	11	78
USA	139	233	62	42	0	196	30	17	160
DEA	84	392	120	69	149	0	78	12	460
SVN	25	59	43	31	25	73	0	8	78
GBR	14	13	13	9	15	11	6	0	16
ITA	98	359	124	65	117	398	76	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	125	75	124	41	148	110	28	17
CHE	110	0	155	455	65	264	517	62	15
FRA	66	115	0	174	55	90	175	45	14
ITA	108	396	136	0	88	202	554	80	16

NLD	33	62	44	70	0	56	81	32	11
USA	139	233	62	149	42	0	221	30	17
DEA	92	423	128	471	71	177	0	79	13
SVN	25	60	43	78	31	25	73	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	125	75	81	29	77	28	148
CHE	110	0	152	284	60	323	61	263
FRA	66	112	0	113	48	123	45	90
ITA	73	235	84	0	58	271	66	106
NLD	25	60	39	54	0	62	31	36
DEA	66	257	83	237	58	0	71	124
SVN	25	59	43	65	31	64	0	29
USA	139	233	62	77	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	117	65	124	41	148	77	21	17
CHE	103	0	117	399	60	235	318	48	15
FRA	60	87	0	140	45	75	112	33	14
ITA	108	340	112	0	86	201	307	62	16
NLD	33	59	39	70	0	56	63	24	11
USA	139	200	55	150	42	0	124	22	17
DEA	66	253	80	272	58	88	0	57	10
SVN	19	45	33	59	24	19	53	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	117	65	124	41	147	110	22	17
CHE	103	0	117	400	60	235	462	49	15
FRA	60	87	0	140	45	75	144	34	14
ITA	108	342	112	0	88	204	547	63	16
NLD	33	59	39	70	0	56	81	24	11
USA	138	200	55	150	42	0	219	23	17
DEA	91	374	106	467	71	173	0	61	13
SVN	20	46	34	60	24	20	57	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	117	65	120	41	148	110	21	17
CHE	103	0	117	399	60	235	462	48	15
FRA	60	87	0	139	45	75	144	33	14
ITA	105	341	112	0	86	190	542	62	16
NLD	33	59	39	69	0	56	81	24	11
USA	139	200	55	136	42	0	219	22	17
DEA	91	374	106	460	71	173	0	59	13
SVN	19	45	33	59	24	19	55	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	116	109	82	21	149	45
CHE	102	0	456	284	48	234	92
DEA	92	371	0	312	59	215	113
ITA	74	234	262	0	55	106	93
SVN	19	45	55	53	0	22	33
USA	139	200	172	77	19	0	54
FRA	40	64	79	70	33	36	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	CHE	DEA	ITA	SVN	FRA
CAN	0	123	111	125	28	76
CHE	109	0	517	455	61	155
DEA	92	423	0	552	78	175
ITA	109	396	470	0	79	174
SVN	25	60	72	78	0	45
FRA	67	115	128	136	43	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	CHE	DEA	ITA	SVN	USA	FRA
CAN	0	116	87	82	21	149	45
CHE	102	0	353	284	48	234	92
DEA	76	284	0	278	58	152	105
ITA	74	234	244	0	55	106	93
SVN	19	45	54	53	0	22	33
USA	139	200	112	77	19	0	54
FRA	40	64	74	70	33	36	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CHE	DEA	ITA	SVN	USA	FRA
CHE	0	499	284	48	263	153
DEA	408	0	311	59	206	171
ITA	235	261	0	55	106	113
SVN	45	55	53	0	22	33
USA	233	161	77	19	0	89
FRA	114	126	84	33	62	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	CHE	DEA	ITA	SVN	USA	FRA
CAN	0	73	61	63	19	81	33
CHE	63	0	353	284	45	234	92
DEA	50	284	0	278	53	152	105
ITA	57	234	244	0	49	106	93
SVN	17	43	49	48	0	20	32

USA	72	200	112	77	17	0	54
FRA	28	64	74	70	32	36	0

BSW

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

CAN	0	123	111	121	27	76
CHE	109	0	517	449	59	155
DEA	92	423	0	546	77	175
ITA	106	391	462	0	77	173
SVN	24	58	71	76	0	44
FRA	67	115	128	136	42	0

BSW

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

CHE	0	516	452	48	152
DEA	422	0	552	61	174
ITA	393	470	0	62	172
SVN	46	57	60	0	34
FRA	114	127	136	34	0

BSW

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

CHE	0	289	259	47	105
DEA	242	0	269	59	122
ITA	219	237	0	56	112
SVN	45	55	54	0	34
FRA	77	82	84	34	0

BSW

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

CHE	0	516	446	61	152
DEA	422	0	546	79	174
ITA	388	462	0	79	171
SVN	60	73	78	0	45
FRA	114	127	136	43	0

BSW

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

CHE	0	322	282	61	88
DEA	256	0	270	71	101
ITA	233	237	0	66	92
SVN	60	64	65	0	37
FRA	63	71	69	36	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
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

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-----
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
-----

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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
-----

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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
-----

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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
-----

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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
-----

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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
-----

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GUE
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GUE
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HOL

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-----
common bulls below diagonal
common three quarter sib group above diagonal
  AUS  BEL  CAN  CHE  DEU  DFS  ESP  FRA  GBR  ITA  NLD  USA  HUN  POL  NZL  ZAF  JPN  CZE  EST  IRL  KOR  SVN  PRT
-----
AUS    0  476  849  453  761  743  607  787  854  666  867 1032  456  536  491  304  538  523  88  409  303  121  476
BEL   410    0  617  506  793  643  559  736  695  654  990  730  398  538  276  246  408  507  87  392  249  149  494
CAN   766  589    0  835 1725 1108 1231 1265 1466 1676 1260 2969  872 1051 366 373 1115 1027 140 425 637 183 847
CHE   389  501  677    0  890  591  547  581  686  709  811  902  378  526  249  220  392  493  77  347  255  123  443
DEU   413  672  680  606    0 1871 1271 1928 1579 2103 2180 2455  939 1490 405 353 1082 1470 196 532 492 273 875
DFS   483  561  791  499  891    0  918 1400 1293 1279 1579 1615  712 1079 455 382  776 1038 147 530 421 206 757
ESP   456  538  737  429  589  637    0 1062 1024 1224 1021 1454  684  855 315 366  817  830 120 407 458 171 724
FRA   470  672  711  479  678  602  694    0 1370 1419 1733 2206  783 1287 478 355 1062 1110 137 522 463 169 735
GBR   703  700 1476  657  810  880  820  758    0 1462 1562 1979  758 1058 474 393  856  989 141 709 475 199 820
ITA   532  649 1386  631 1080  969  876  709 1226    0 1503 2326  890 1271 345 349  972 1184 169 472 563 240 884
NLD   709 1090 1094  765 1247 1135  858  877 1287 1242    0 2110  781 1248 594 381  877 1314 181 647 440 230 864
USA   844  625 2924  786  911  983  914  993 1787 1773 1648    0 1136 1499 537 464 1644 1485 189 551 794 214 1080
HUN   324  324  765  303  560  504  517  456  613  739  580 1021    0  705 271 298  580  814 110 325 405 135 560
POL   342  425  761  364  788  687  533  668  783  930  926 1212  531    0 304 288  711 1037 166 388 464 215 753
NZL   394  214  311  206  246  289  255  233  368  277  527  451  206  187    0 207  312  327  43 337 174  60 285
ZAF   278  209  345  190  253  298  336  250  364  308  341  491  254  212  187    0 304  300  52 236 226  74 312
JPN   268  218  369  205  252  287  287  255  325  337  311  427  232  227  145  192    0  713  103 325 473 131 532
CZE   329  377  686  343  867  591  555  631  694  859 1102 1082  685  704 212 222  211    0 132 392 451 197 687
EST    42   52   64   35   97   72   51   50   65   86  109  117   66   91   18   21   23   73   0   63   69   53  103
IRL   368  375  401  340  379  421  391  408  760  444  588  510  274  287 275 223  184  297  33    0 195  98 363
KOR   212  171  568  177  239  278  316  232  354  468  292  889  318  338 118  175  215  312  28  136    0   95 407
SVN    82  119  134   87  243  163  124  111  152  205  197  163   99  171   45   53   64  144  30   74   60    0  142
PRT   359  495  852  385  603  646  690  583  754  851  855 1102  538  694 220 297  255  565  64 313 344 113    0
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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  NZL  ZAF  JPN  CZE  EST  IRL  KOR  SVN  PRT
-----
AUS    0  469  849  453  761  742  619  645  854  666  812 1032  456  534  491  254  537  523  88  409  301  121  479
BEL   409    0  611  503  788  636  571  660  687  650  934  713  395  534 272 215  398  505  87 389 247 149 495
CAN   766  589    0  835 1724 1108 1241 1089 1466 1676 1186 2969  872 1050 366 320 1112 1027 140 425 629 183 849
CHE   389  500  677    0  890  591  555  531  686  709  788  902  378  524 249 197  391  493  77 347 253 123 444
DEU   413  672  680  606    0 1871 1297 1791 1578 2103 2139 2455  939 1484 405 318 1080 1470 196 532 488 273 875
DFS   483  560  791  499  891    0  941 1214 1291 1278 1500 1614  711 1074 454 328  775 1038 147 528 418 206 760
ESP   465  563  747  438  621  660    0  983 1046 1239 1010 1474  694  871 327 321  822  846 124 420 458 175 741
FRA   424  625  652  440  605  569  688    0 1209 1367 1382 1759  729 1194 387 269  894 1053 134 462 421 168 696
GBR   703  700 1476  657  810  880  850  704    0 1462 1495 1977  758 1056 474 337  854  989 141 706 470 199 822
ITA   532  649 1386  631 1080  969  902  693 1226    0 1482 2326  890 1271 345 335  970 1184 169 472 556 240 885
NLD   677 1028 1037  741 1225 1111  857  745 1233 1226    0 1874  760 1224 567 318  805 1295 179 633 419 230 848
USA   844  624 2924  786  911  982  932  790 1787 1773 1404    0 1136 1497 537 395 1641 1485 189 549 785 214 1083
HUN   324  324  765  303  560  504  527  439  613  739  563 1021    0  704 271 270  580  814 110 325 400 135 563
POL   342  425  761  364  788  687  551  625  782  930  915 1212  531    0 304 262  710 1037 166 388 458 215 755
NZL   394  214  311  206  246  289  264  204  368  277  505  451  206  187    0 170  312  327  43 337 173  60 286
ZAF   238  192  303  174  234  274  297  210  313  301  282  406  237  204 150    0 257  279  51 199 206  74 296
JPN   264  214  363  202  249  284  286  244  319  334  302  419  230  226 143  176    0  712  103 325 467 131 533
CZE   329  377  686  343  867  591  575  596  694  859 1085 1082  685  704 212 210 209    0 132 392 446 197 689
EST    42   52   64   35   97   72   54   50   65   86  108  117   66   91   18   21   23   73   0   63   68   53  103
IRL   368  375  401  340  379  421  408  377  758  444  574  510  274  287 275 192  182  297  33    0 193  98 364
KOR   211  171  564  177  239  277  318  223  351  465  281  880  315  334 118  159  212  310  28  136    0   94 405
SVN    82  119  134   87  243  163  130  111  152  205  195  163   99  171   45   53   64  144  30   74   59    0  142
PRT   360  497  854  385  603  648  709  575  757  851  842 1102  542  697 220 287  251  567  64 314 342 113    0
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HOL
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common bulls below diagonal
common three quarter sib group above diagonal
  AUS  BEL  CAN  CHE  DEU  DFS  ESP  FRA  GBR  ITA  NLD  USA  HUN  POL  NZL  ZAF  JPN  CZE  EST  IRL  KOR  PRT  SVN
-----
AUS    0  476  849  453  761  742  609  787  854  666  841 1032  456  536  491  304  538  523  88  409  302  479  94
BEL   410    0  617  506  793  642  563  736  695  654  966  730  398  538  276  246  408  507  87 392 247 496 117
CAN   766  589    0  835 1725 1108 1235 1265 1466 1676 1229 2969  872 1051 366 373 1114 1027 140 425 632 849 157
CHE   389  501  677    0  890  591  549  582  686  709  803  902  378  526 249 220  392  493  77 347 253 444  97
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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	431	767	453	760	742	608	519	851	665	774	1031	454	497	256	499	407	88	394	219	119	476
BEL	401	0	568	488	749	593	530	569	634	638	842	651	373	494	206	363	416	84	354	193	146	479
CAN	713	568	0	800	1664	1012	1167	941	1372	1657	1122	2775	850	1000	310	990	893	137	395	528	180	834
CHE	389	487	662	0	890	590	551	492	686	709	778	902	376	501	198	383	415	77	338	205	120	441
DEU	413	650	678	606	0	1870	1283	1584	1577	2102	2117	2454	935	1455	320	1054	1274	196	515	424	270	874
DFS	483	547	788	499	891	0	921	1002	1287	1276	1463	1613	707	1026	330	732	848	147	503	333	205	757
ESP	460	530	728	433	605	648	0	860	1028	1232	977	1458	686	830	322	783	730	122	398	378	173	734
FRA	367	542	584	406	568	514	605	0	1001	1259	1186	1418	648	1121	228	742	875	123	379	342	161	616
GBR	702	662	1403	656	810	878	833	604	0	1459	1446	1970	755	1013	339	807	834	140	664	385	196	818
ITA	532	644	1383	631	1080	969	888	648	1225	0	1478	2324	887	1253	334	960	1097	169	465	496	238	884
NLD	650	931	1017	736	1226	1106	830	684	1209	1230	0	1779	743	1174	314	773	1143	179	584	349	227	839
USA	844	600	2811	786	911	982	921	659	1786	1773	1371	0	1133	1447	397	1509	1276	189	523	653	211	1080
HUN	324	311	759	303	560	504	521	396	612	739	566	1021	0	678	271	565	698	110	311	346	133	563
POL	328	408	740	351	772	664	513	618	760	922	891	1182	513	0	249	675	933	165	351	411	212	734
ZAF	241	191	302	175	235	275	298	176	316	301	283	408	238	196	0	250	238	51	196	161	73	296
JPN	259	212	360	201	248	282	278	221	314	333	298	411	228	219	176	0	601	101	298	380	131	528
CZE	277	321	610	287	763	511	463	486	582	795	990	930	576	648	174	193	0	125	311	376	188	616
EST	42	51	64	35	97	72	52	46	65	86	108	117	66	90	21	23	68	0	61	63	53	103
IRL	366	360	398	337	377	419	395	319	726	442	558	504	272	274	193	181	242	33	0	140	97	350
KOR	152	147	477	151	208	234	252	204	277	413	235	727	267	312	117	179	266	26	102	0	86	348
SVN	81	116	133	86	241	163	127	107	151	203	194	162	98	170	53	64	140	30	74	57	0	141
PRT	357	488	835	383	604	647	702	530	755	854	838	1103	543	686	287	249	508	64	311	298	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	449	849	453	510	742	619	782	854	666	831	1032	455	535	304	537	523	88	408	301	121	485
BEL	407	0	595	498	604	618	555	681	662	646	894	682	383	525	234	384	493	87	376	239	150	491
CAN	766	579	0	835	1351	1108	1241	1249	1466	1676	1215	2969	871	1049	373	1112	1027	140	425	630	183	855
CHE	389	497	677	0	681	591	555	575	686	707	799	902	378	524	220	391	492	77	347	253	123	449
DEU	338	546	601	492	0	1280	1030	1330	1145	1773	1592	1777	715	1220	235	779	1111	171	372	398	251	675
DFS	483	556	791	499	754	0	941	1372	1291	1277	1524	1613	710	1076	382	775	1038	147	529	419	206	768
ESP	465	554	747	438	488	660	0	1073	1046	1239	1024	1474	693	870	371	821	846	124	420	458	175	748
FRA	469	655	711	479	521	601	730	0	1355	1419	1563	2165	780	1278	354	1046	1105	135	516	453	169	744
GBR	703	683	1476	657	653	880	850	758	0	1462	1517	1976	757	1054	392	853	989	141	703	471	199	828
ITA	532	649	1386	630	946	969	902	709	1226	0	1489	2326	890	1270	349	970	1184	169	472	557	240	888
NLD	700	990	1081	763	1011	1132	883	835	1266	1240	0	1939	765	1225	369	834	1304	180	633	428	230	862
USA	844	610	2924	786	740	982	932	957	1787	1773	1590	0	1135	1495	464	1640	1485	189	549	784	214	1089
HUN	324	320	765	303	438	503	527	456	613	739	578	1021	0	704	297	580	813	110	324	400	135	565
POL	342	422	761	363	692	685	550	668	782	930	918	1212	530	0	287	711	1034	165	386	458	214	758
ZAF	278	207	345	190	172	298	340	250	364	308	335	491	254	212	0	302	300	52	236	225	75	318
JPN	264	213	362	201	215	283	284	248	317	333	301	417	229	225	187	0	712	103	325	467	131	540
CZE	329	374	686	343	693	591	574	631	694	859	1100	1082	685	704	222	208	0	131	392	447	197	691
EST	42	52	64	35	84	72	54	50	65	86	109	117	66	90	21	23	73	0	63	69	53	102
IRL	368	369	401	340	294	421	408	408	754	444	584	510	274	287	223	182	297	33	0	193	98	365
KOR	211	171	565	177	212	278	316	229	352	466	286	874	315	335	174	211	310	28	136	0	95	407
SVN	83	120	135	88	233	163	131	112	153	206	198	164	100	171	53	65	145	30	75	60	0	143
PRT	362	497	859	389	508	654	717	590	763	855	857	1111	547	702	299	250	571	63	315	344	114	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	469	849	453	761	742	619	736	854	666	812	1032	456	535	491	304	537	523	88	409	302	121	479
BEL	409	0	613	505	789	638	573	711	689	652	936	715	395	535	272	244	399	505	87	390	247	149	496
CAN	766	589	0	835	1724	1108	1241	1187	1466	1676	1186	2969	872	1051	366	373	1112	1027	140	425	634	183	850
CHE	389	500	677	0	890	591	555	574	686	709	788	902	378	526	249	220	391	493	77	347	253	123	444

DEU	413	672	680	606	0	1871	1297	1910	1579	2103	2140	2455	939	1489	405	353	1080	1470	196	532	490	273	876
DFS	483	560	791	499	891	0	941	1321	1292	1278	1500	1614	711	1078	454	382	775	1038	147	529	420	206	762
ESP	465	562	747	438	621	660	0	1047	1047	1239	1011	1474	694	872	327	371	822	846	124	420	460	175	741
FRA	468	668	708	479	677	599	730	0	1315	1413	1528	2006	769	1276	445	340	982	1098	136	504	443	169	733
GBR	703	700	1476	657	810	880	850	753	0	1462	1496	1978	758	1058	474	393	854	989	141	707	472	199	824
ITA	532	649	1386	631	1080	969	902	708	1226	0	1482	2326	890	1271	345	349	970	1184	169	472	561	240	886
NLD	677	1028	1038	741	1225	1110	857	824	1234	1226	0	1876	760	1226	567	362	805	1295	179	633	421	230	849
USA	844	624	2924	786	911	983	932	922	1787	1773	1404	0	1136	1499	537	464	1641	1485	189	550	790	214	1084
HUN	324	324	765	303	560	504	527	455	613	739	563	1021	0	705	271	298	580	814	110	325	404	135	564
POL	342	425	761	364	788	687	551	668	783	930	917	1212	531	0	304	288	711	1037	166	388	462	215	756
NZL	394	214	311	206	246	289	264	231	368	277	505	451	206	187	0	207	312	327	43	337	173	60	286
ZAF	278	209	345	190	253	298	340	248	364	308	321	491	254	212	187	0	303	300	52	236	225	74	312
JPN	264	214	363	202	249	284	286	250	319	334	302	419	230	226	143	188	0	712	103	325	469	131	534
CZE	329	377	686	343	867	591	574	629	694	859	1085	1082	685	704	212	222	209	0	132	392	449	197	690
EST	42	52	64	35	97	72	54	50	65	86	108	117	66	91	18	21	23	73	0	63	69	53	103
IRL	368	375	401	340	379	421	408	406	758	444	573	510	274	287	275	223	182	297	33	0	194	98	364
KOR	212	171	567	177	239	278	319	231	353	468	282	884	318	337	118	174	213	311	28	136	0	95	407
SVN	82	119	134	87	243	163	130	111	152	205	195	163	99	171	45	53	64	144	30	74	60	0	142
PRT	360	497	854	385	603	648	709	585	757	852	843	1103	543	698	220	297	251	567	64	314	344	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	469	849	453	761	696	611	783	854	666	841	1032	456	536	491	304	538	523	88	409	302	121	478
BEL	409	0	613	505	789	627	562	722	689	652	951	715	395	535	272	244	400	505	87	390	247	149	495
CAN	766	589	0	835	1725	1030	1236	1250	1466	1676	1229	2969	872	1051	366	373	1113	1027	140	425	634	183	847
CHE	389	500	677	0	890	572	551	579	686	709	803	902	378	526	249	220	391	493	77	347	253	123	444
DEU	413	672	680	606	0	1818	1281	1924	1579	2103	2166	2455	939	1490	405	353	1081	1470	196	532	490	273	873
DFS	483	560	791	499	891	0	884	1290	1234	1270	1503	1521	695	1058	427	355	722	1004	145	512	407	206	751
ESP	458	544	740	433	600	644	0	1057	1031	1229	1014	1460	686	861	320	369	819	835	122	410	457	172	729
FRA	470	671	711	479	677	601	704	0	1357	1419	1611	2167	781	1284	474	354	1048	1105	136	517	457	169	736
GBR	703	699	1475	657	809	879	825	757	0	1462	1533	1978	758	1058	474	393	855	989	141	707	472	199	822
ITA	532	649	1386	631	1080	968	884	709	1225	0	1497	2326	890	1271	345	349	971	1184	169	472	561	240	884
NLD	705	1060	1087	764	1245	1134	864	853	1274	1241	0	1982	772	1239	581	371	842	1309	180	640	433	230	860
USA	844	624	2924	786	911	982	919	958	1787	1773	1606	0	1136	1499	537	464	1642	1485	189	550	791	214	1081
HUN	324	324	765	303	560	504	520	456	613	739	580	1021	0	705	271	298	580	814	110	325	404	135	563
POL	342	425	761	364	788	687	538	668	783	930	925	1212	531	0	304	288	711	1037	166	388	462	215	753
NZL	394	214	311	206	246	289	258	233	368	277	525	451	206	187	0	207	312	327	43	337	173	60	286
ZAF	278	209	345	190	253	298	339	250	364	308	339	491	254	212	187	0	304	300	52	236	225	74	311
JPN	264	215	364	202	250	285	285	251	320	335	305	420	230	226	143	189	0	713	103	325	470	131	534
CZE	329	377	686	343	867	591	560	631	694	859	1101	1082	685	704	212	222	209	0	132	392	449	197	689
EST	42	52	64	35	97	72	52	50	65	86	109	117	66	91	18	21	23	73	0	63	69	53	102
IRL	368	375	401	340	379	421	394	408	758	444	585	510	274	287	275	223	182	297	33	0	194	98	364
KOR	212	171	567	177	239	278	317	232	353	468	289	885	318	337	118	175	214	311	28	136	0	95	407
SVN	82	119	134	87	243	163	126	111	152	205	197	163	99	171	45	53	64	144	30	74	60	0	142
PRT	360	496	854	385	603	645	697	587	756	851	854	1102	541	697	220	297	252	567	64	314	344	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	469	849	453	761	743	622	787	854	666	867	1032	456	536	491	304	537	523	88	409	301	122	479
BEL	409	0	613	505	789	639	576	725	689	652	959	715	395	535	272	244	399	505	87	390	246	150	496
CAN	766	589	0	835	1725	1108	1243	1265	1466	1676	1260	2969	872	1051	366	373	1112	1027	140	425	628	184	850
CHE	389	500	677	0	890	591	556	581	686	709	811	902	378	526	249	220	391	493	77	347	253	124	444
DEU	413	672	680	606	0	1871	1306	1928	1579	2103	2180	2455	939	1490	405	353	1080	1470	196	532	488	274	876
DFS	483	560	792	499	891	0	948	1400	1293	1279	1579	1615	712	1079	455	382	775	1038	147	530	418	207	762
ESP	466	567	748	439	636	668	0	1092	1052	1244	1057	1479	696	880	329	371	825	851	126	423	458	177	746
FRA	470	671	711	479	678	602	744	0	1370	1419	1733	2206	783	1287	478	355	1060	1110	137	522	456	170	741
GBR	703	700	1476	657	810	880	857	758	0	1462	1562	1979	758	1058	474	393	854	989	141	709	470	200	824
ITA	532	649	1386	631	1080	969	909	709	1226	0	1503	2326	890	1271	345	349	970	1184	169	472	555	241	887
NLD	709	1067	1094	765	1247	1135	901	877	1287	1242	0	2110	781	1248	594	381	875	1314	181	647	433	231	867
USA	844	624	2924	786	911	984	934	993	1787	1773	1648	0	1136	1499	537	464	1641	1485	189	551	783	215	1085
HUN	324	324	765	303	560	505	530	456	613	739	580	1021	0	705	271	298	580	814	110	325	400	136	564

POL	342	425	761	364	788	687	560	668	783	930	926	1212	531	0	304	288	711	1037	166	388	458	216	756
NZL	394	214	311	206	246	289	265	233	368	277	527	451	206	187	0	207	312	327	43	337	173	60	286
ZAF	278	209	345	190	253	299	340	250	364	308	341	491	254	212	187	0	303	300	52	236	225	75	313
JPN	264	213	362	201	248	283	285	249	318	333	304	418	229	225	143	188	0	712	103	325	465	132	534
CZE	329	377	686	343	867	591	579	631	694	859	1102	1082	685	704	212	222	208	0	132	392	446	198	690
EST	42	52	64	35	97	72	56	50	65	86	109	117	66	91	18	21	23	73	0	63	68	53	103
IRL	368	375	401	340	379	421	411	408	760	444	588	510	274	287	275	223	182	297	33	0	193	99	364
KOR	211	171	564	177	239	277	317	229	351	465	290	878	315	334	118	174	211	310	28	136	0	94	404
SVN	83	120	135	88	244	164	132	112	153	206	198	164	100	172	45	53	65	145	30	75	60	0	143
PRT	360	497	854	385	603	648	713	587	758	854	859	1106	544	698	220	298	250	568	64	314	343	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	472	849	453	761	743	608	787	854	666	867	1032	456	536	304	538	523	88	408	302	122	479
BEL	408	0	613	504	787	638	559	729	689	653	982	724	395	535	243	404	505	87	387	244	150	495
CAN	766	585	0	835	1725	1108	1233	1265	1466	1676	1260	2969	872	1051	373	1114	1027	140	425	633	184	849
CHE	389	499	677	0	890	591	548	581	686	709	811	902	378	526	220	392	493	77	347	253	124	444
DEU	413	671	680	606	0	1871	1272	1928	1579	2103	2180	2455	939	1490	353	1082	1470	196	532	489	274	875
DFS	483	560	792	499	891	0	920	1400	1293	1279	1579	1615	712	1079	382	776	1038	147	530	419	207	761
ESP	456	537	737	429	591	638	0	1062	1026	1225	1023	1454	685	857	366	817	832	122	408	455	172	729
FRA	470	670	711	479	678	602	694	0	1370	1419	1733	2206	783	1287	355	1062	1110	137	522	460	170	740
GBR	703	696	1476	657	810	880	821	758	0	1462	1562	1979	758	1058	393	856	989	141	706	472	200	824
ITA	532	649	1386	631	1080	969	877	709	1226	0	1503	2326	890	1271	349	972	1184	169	472	560	241	885
NLD	709	1079	1094	765	1247	1135	859	877	1287	1242	0	2110	781	1248	381	877	1314	181	647	436	231	866
USA	844	621	2924	786	911	984	914	993	1787	1773	1648	0	1136	1499	464	1643	1485	189	551	789	215	1083
HUN	324	323	765	303	560	505	518	456	613	739	580	1021	0	705	298	580	814	110	325	403	136	563
POL	342	425	761	364	788	687	534	668	783	930	926	1212	531	0	288	711	1037	166	388	461	216	755
ZAF	278	209	345	190	253	299	336	250	364	308	341	491	254	212	0	304	300	52	236	225	75	312
JPN	266	216	366	203	250	285	255	253	323	335	309	424	230	226	190	0	713	103	325	470	132	534
CZE	329	377	686	343	867	591	556	631	694	859	1102	1082	685	704	222	210	0	132	392	449	198	690
EST	42	52	64	35	97	72	52	50	65	86	109	117	66	91	21	23	73	0	63	69	53	103
IRL	368	374	401	340	379	421	391	408	757	444	588	510	274	287	223	182	297	33	0	194	99	364
KOR	212	171	567	177	239	278	316	232	353	468	292	885	318	337	175	214	311	28	136	0	96	407
SVN	83	120	135	88	244	164	125	112	153	206	198	164	100	172	53	65	145	30	75	61	0	143
PRT	360	495	854	385	603	648	694	587	756	851	857	1102	541	697	297	253	567	64	314	344	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	469	849	453	761	743	611	787	854	666	867	1032	456	536	491	304	538	523	88	409	302	120	479
BEL	409	0	613	505	789	639	562	725	689	652	959	715	395	535	272	244	401	505	87	390	247	148	496
CAN	766	589	0	835	1725	1108	1235	1265	1466	1676	1260	2969	872	1051	366	373	1114	1027	140	425	634	181	849
CHE	389	500	677	0	890	591	550	581	686	709	811	902	378	526	249	220	392	493	77	347	253	121	444
DEU	413	672	680	606	0	1871	1280	1928	1579	2103	2180	2455	939	1490	405	353	1082	1470	196	532	490	271	875
DFS	483	560	792	499	891	0	925	1400	1293	1279	1579	1615	712	1079	455	382	776	1038	147	530	420	205	761
ESP	458	544	739	432	599	643	0	1068	1030	1228	1028	1459	685	860	320	368	818	834	122	409	456	172	730
FRA	470	671	711	479	678	602	703	0	1370	1419	1733	2206	783	1287	478	355	1062	1110	137	522	461	168	740
GBR	703	700	1476	657	810	880	826	758	0	1462	1562	1979	758	1058	474	393	856	989	141	709	472	197	824
ITA	532	649	1386	631	1080	969	883	709	1226	0	1503	2326	890	1271	345	349	972	1184	169	472	561	240	885
NLD	709	1067	1094	765	1247	1135	865	877	1287	1242	0	2110	781	1248	594	381	877	1314	181	647	438	228	866
USA	844	624	2924	786	911	983	918	993	1787	1773	1648	0	1136	1499	537	464	1643	1485	189	551	791	212	1083
HUN	324	324	765	303	560	505	519	456	613	739	580	1021	0	705	271	298	580	814	110	325	404	134	563
POL	342	425	761	364	788	687	537	668	783	930	926	1212	531	0	304	288	711	1037	166	388	462	214	755
NZL	394	214	311	206	246	289	258	233	368	277	527	451	206	187	0	207	312	327	43	337	173	60	286
ZAF	278	209	345	190	253	299	338	250	364	308	341	491	254	212	187	0	304	300	52	236	225	74	312
JPN	265	216	366	203	250	285	285	252	322	335	308	423	230	226	143	190	0	713	103	325	470	131	534
CZE	329	377	686	343	867	591	559	631	694	859	1102	1082	685	704	212	222	209	0	132	392	449	195	690
EST	42	52	64	35	97	72	52	50	65	86	109	117	66	91	18	21	23	73	0	63	69	52	103
IRL	368	375	401	340	379	421	393	408	760	444	588	510	274	287	275	223	182	297	33	0	194	98	364
KOR	212	171	567	177	239	278	316	232	353	468	292	885	318	337	118	175	214	311	28	136	0	95	407
SVN	83	119	135	88	242	163	127	112	153	205	197	163	99	171	45	53	65	145	30	75	61	0	142
PRT	360	496	854	385	603	648	696	587	756	851	857	1102	541	697	220	297	253	567	64	314	344	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	476	849	453	761	743	608	787	854	666	867	1032	444	536	304	530	523	88	408	303	120	479
BEL	410	0	617	506	793	643	562	736	695	654	990	730	391	538	246	407	507	87	392	249	148	496
CAN	766	589	0	835	1725	1108	1234	1265	1466	1677	1260	2969	858	1051	373	1107	1027	140	425	637	181	849
CHE	389	501	677	0	890	591	549	581	686	709	811	902	373	526	220	392	493	77	347	255	121	444
DEU	413	672	680	606	0	1871	1273	1928	1579	2103	2180	2455	930	1490	353	1080	1470	196	532	492	271	875
DFS	483	561	792	499	891	0	921	1400	1293	1279	1579	1615	698	1079	382	770	1038	147	530	421	205	761
ESP	456	540	738	430	593	639	0	1063	1026	1226	1024	1455	676	858	366	807	833	122	408	458	171	729
FRA	470	672	711	479	678	602	695	0	1370	1419	1733	2206	766	1287	355	1049	1110	137	522	463	168	740
GBR	703	700	1476	657	810	880	822	758	0	1462	1562	1979	744	1058	393	851	989	141	706	475	197	824
ITA	532	649	1386	631	1080	969	879	709	1226	0	1503	2327	887	1271	349	971	1184	169	472	563	240	885
NLD	709	1090	1094	765	1247	1135	861	877	1287	1242	0	2110	764	1248	381	871	1314	181	647	440	228	866
USA	844	625	2924	786	911	984	915	993	1787	1773	1648	0	1107	1499	464	1623	1485	189	551	794	212	1083
HUN	312	315	751	299	553	496	504	448	597	735	567	995	0	700	290	571	802	110	319	404	134	561
POL	342	425	761	364	788	687	535	668	783	930	926	1212	527	0	288	709	1037	166	388	464	214	755
ZAF	278	209	345	190	253	299	336	250	364	308	341	491	243	212	0	301	300	52	236	226	74	312
JPN	265	216	366	203	250	285	285	252	322	335	308	423	224	226	190	0	712	102	323	472	131	534
CZE	329	377	686	343	867	591	557	631	694	859	1102	1082	674	704	222	209	0	132	392	451	195	690
EST	42	52	64	35	97	72	52	50	65	86	109	117	66	91	21	23	73	0	63	69	52	103
IRL	368	375	401	340	379	421	392	408	757	444	588	510	266	287	223	182	297	33	0	195	98	364
KOR	212	171	568	177	239	278	316	232	354	468	292	889	316	338	175	214	312	28	136	0	95	407
SVN	83	119	135	88	242	163	125	112	153	205	197	163	99	171	53	65	145	30	75	61	0	142
PRT	360	496	854	385	603	648	695	587	756	851	857	1102	538	697	297	253	567	64	314	344	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	462	848	437	758	618	613	785	718	665	713	752	433	484	342	406	87	342	184	120	396	163	301
BEL	408	0	605	480	777	583	563	710	609	648	844	611	450	267	299	421	87	330	167	148	424	143	283
CAN	765	584	0	799	1719	951	1236	1264	1287	1675	1109	2557	947	361	812	897	139	360	457	181	732	224	702
CHE	385	476	647	0	807	528	545	567	633	689	684	791	440	243	309	402	76	301	178	119	376	131	284
DEU	412	670	679	554	0	1730	1283	1904	1424	2101	2039	2145	1363	398	857	1271	195	461	364	271	767	211	726
DFS	447	522	761	457	858	0	821	1170	1049	1234	1359	1219	922	366	535	823	141	416	274	201	637	210	507
ESP	459	548	741	430	604	595	0	1074	921	1231	932	1289	763	321	637	729	121	340	327	173	635	217	525
FRA	470	668	711	470	663	563	713	0	1086	1417	1335	1510	1125	469	725	928	135	408	316	168	616	189	579
GBR	617	634	1320	601	758	776	718	650	0	1405	1264	1605	913	366	600	808	130	515	324	195	681	219	545
ITA	532	649	1386	617	1080	939	888	709	1190	0	1453	2202	1197	342	849	1097	168	434	426	240	799	240	752
NLD	618	923	979	652	1190	1037	789	760	1055	1215	0	1500	1087	469	622	1126	175	510	293	225	715	210	567
USA	674	585	2654	705	859	883	812	727	1566	1743	1202	0	1303	363	1083	1226	179	425	551	209	878	255	837
POL	287	361	703	300	700	608	446	582	689	870	818	1091	0	225	584	901	154	304	363	204	653	185	562
NZL	391	212	309	203	245	258	260	233	300	277	428	322	143	0	196	236	42	272	104	59	218	103	151
JPN	226	188	325	184	228	254	243	222	274	310	266	364	203	119	0	543	90	220	314	119	398	160	407
CZE	277	321	610	278	762	507	463	502	575	795	984	914	628	162	187	0	124	298	323	188	580	200	614
EST	42	52	64	35	97	69	52	50	62	86	105	114	82	18	23	68	0	56	60	52	95	44	98
IRL	322	336	360	303	352	360	341	342	530	419	492	435	235	232	158	240	33	0	113	96	292	124	215
KOR	139	128	414	133	180	200	213	178	235	354	199	625	281	77	157	226	25	84	0	83	282	122	280
SVN	83	119	135	87	241	161	128	112	151	205	195	163	161	45	61	141	30	75	56	0	136	65	125
PRT	301	419	711	319	525	536	576	489	612	767	700	895	611	168	210	478	59	255	247	107	0	202	415
ZAF	155	129	207	109	149	183	188	151	193	208	180	258	155	93	118	151	19	116	85	46	192	0	169
HUN	231	230	628	230	427	377	366	347	435	611	419	769	437	115	178	516	59	189	217	92	408	148	0

HOL

common bulls below diagonal

common three quarter sib group above diagonal

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	JPN	CZE	EST	IRL	KOR	SVN	PRT
AUS	0	476	849	453	761	743	608	664	854	666	867	1029	456	535	491	538	523	88	409	303	94	479
BEL	410	0	615	504	792	641	565	680	693	652	988	725	398	537	276	407	507	87	391	249	117	495
CAN	766	589	0	835	1725	1108	1226	1106	1466	1676	1260	2954	872	1050	366	1114	1027	140	425	639	156	849

CHE	389	501	677	0	890	591	551	547	686	709	811	898	378	524	249	392	493	77	347	255	96	444
DEU	413	671	680	606	0	1871	1283	1811	1579	2103	2180	2448	939	1486	405	1082	1470	196	532	492	236	875
DFS	483	561	792	499	891	0	924	1237	1293	1279	1579	1613	712	1076	455	776	1038	147	529	422	171	760
ESP	460	550	741	433	606	648	0	995	1032	1232	1035	1455	689	865	325	815	839	122	414	460	143	737
FRA	453	646	678	465	630	594	705	0	1233	1379	1452	1781	738	1205	399	908	1064	134	477	434	144	700
GBR	703	700	1476	657	810	880	834	746	0	1462	1562	1973	758	1057	474	856	989	141	708	475	164	822
ITA	532	649	1386	631	1080	969	888	705	1226	0	1503	2320	890	1271	345	972	1184	169	472	564	209	885
NLD	709	1090	1094	765	1247	1135	875	808	1287	1242	0	2104	781	1246	594	877	1314	181	647	440	188	866
USA	841	623	2900	781	904	981	918	835	1779	1766	1641	0	1133	1494	536	1639	1480	188	548	796	181	1080
HUN	324	324	765	303	560	505	521	453	613	739	580	1019	0	704	271	580	814	110	325	405	117	563
POL	342	425	761	364	788	687	541	636	783	930	926	1208	531	0	304	710	1037	166	388	464	189	755
NZL	394	214	311	206	246	289	261	227	368	277	527	449	206	187	0	312	327	43	337	175	49	286
JPN	265	215	364	203	250	285	285	252	322	335	308	422	230	226	143	0	713	103	325	473	107	534
CZE	329	377	686	343	867	591	564	615	694	859	1102	1077	685	704	212	210	0	132	392	451	166	689
EST	42	52	64	35	97	72	52	50	65	86	109	117	66	91	18	23	73	0	63	69	49	103
IRL	368	375	401	340	379	421	399	404	760	444	588	509	274	287	275	182	297	33	0	195	75	364
KOR	212	171	568	177	239	278	318	229	354	468	292	889	318	338	118	214	312	28	136	0	82	407
SVN	65	92	117	72	215	135	105	95	126	178	163	141	85	151	38	49	123	26	60	53	0	115
PRT	360	496	854	385	603	648	702	578	756	851	857	1095	541	697	220	252	567	64	314	344	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	476	849	453	761	743	614	787	854	666	867	1032	456	536	491	538	523	88	396	95	479		
BEL	410	0	617	506	793	643	569	736	695	654	990	730	398	538	276	408	507	87	380	118	496		
CAN	766	589	0	835	1725	1108	1237	1265	1466	1676	1260	2969	872	1051	366	1114	1027	140	411	157	849		
CHE	389	501	677	0	890	591	552	581	686	709	811	902	378	526	249	392	493	77	338	98	444		
DEU	413	672	680	606	0	1871	1286	1928	1579	2103	2180	2455	939	1490	405	1082	1470	196	515	238	875		
DFS	483	561	792	499	891	0	931	1400	1293	1279	1579	1615	712	1079	455	776	1038	147	506	173	761		
ESP	460	550	741	433	606	648	0	1076	1038	1232	1038	1466	689	867	326	821	840	122	401	144	737		
FRA	470	672	711	479	678	602	713	0	1370	1419	1733	2206	783	1287	478	1062	1110	137	493	145	740		
GBR	703	698	1475	657	808	879	831	757	0	1462	1562	1979	758	1058	474	856	989	141	671	166	824		
ITA	532	649	1386	631	1080	969	888	709	1224	0	1503	2326	890	1271	345	972	1184	169	465	211	885		
NLD	709	1090	1094	765	1247	1135	875	877	1285	1242	0	2110	781	1248	594	877	1314	181	611	190	866		
USA	844	625	2924	786	911	984	924	993	1787	1773	1648	0	1136	1499	537	1643	1485	189	525	183	1083		
HUN	324	324	765	303	560	505	521	456	613	739	580	1021	0	705	271	580	814	110	314	118	563		
POL	342	425	761	364	788	687	541	668	783	930	926	1212	531	0	304	711	1037	166	377	191	755		
NZL	394	214	311	206	246	289	262	233	368	277	527	451	206	187	0	312	327	43	323	49	286		
JPN	265	215	364	203	250	285	285	253	322	335	308	422	230	226	143	0	713	103	311	108	534		
CZE	329	377	686	343	867	591	564	631	693	859	1102	1082	685	704	212	210	0	132	377	168	690		
EST	42	52	64	35	97	72	52	50	65	86	109	117	66	91	18	23	73	0	62	49	103		
IRL	366	374	400	338	377	420	396	403	736	442	580	504	272	287	271	182	296	33	0	76	353		
SVN	66	93	118	73	216	136	106	96	127	180	165	142	86	152	38	50	124	26	61	0	116		
PRT	360	497	854	385	603	648	703	587	756	851	858	1102	542	697	220	252	567	64	314	344	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	468	849	453	761	743	615	645	854	666	847	1030	444	534	529	523	88	395	94	485		
BEL	409	0	610	501	786	636	566	660	686	649	941	708	387	532	394	504	87	377	117	497		
CAN	766	588	0	835	1725	1108	1238	1089	1466	1676	1229	2961	858	1050	1098	1027	140	411	156	859		
CHE	389	498	677	0	890	591	553	531	686	709	800	899	373	524	390	493	77	338	96	451		
DEU	413	671	680	606	0	1871	1289	1791	1579	2103	2157	2455	930	1485	1077	1470	196	515	236	884		
DFS	483	559	792	499	891	0	934	1215	1293	1279	1551	1601	698	1076	765	1038	147	506	171	772		
ESP	460	556	742	435	610	652	0	977	1039	1235	1023	1464	680	868	810	841	123	402	143	748		
FRA	424	625	652	440	605	569	677	0	1210	1367	1406	1752	724	1195	888	1053	134	452	144	702		
GBR	703	697	1475	657	808	879	836	703	0	1462	1537	1972	744	1057	844	989	141	668	164	829		
ITA	532	649	1386	631	1080	969	893	693	1224	0	1491	2324	887	1271	969	1184	169	465	209	891		
NLD	684	1031	1047	743	1227	1112	852	747	1247	1227	0	2000	757	1235	839	1303	180	605	188	863		
USA	840	620	2924	786	911	984	924	790	1786	1773	1438	0	1107	1497	1590	1483	189	523	181	1096		
HUN	312	315	751	299	553	496	508	435	597	735	551	995	0	699	570	802	110	309	117	566		
POL	342	424	761	364	788	687	543	625	783	930	918	1212	527	0	708	1037	166	377	189	762		
JPN	264	215	364	202	250	285	286	245	320	335	304	420	224	226	0	710	102	307	107	540		

CZE	329	376	686	343	867	591	566	596	693	859	1085	1081	674	704	209	0	132	377	166	693
EST	42	52	64	35	97	72	53	50	65	86	108	117	66	91	23	73	0	62	49	103
IRL	366	374	400	338	377	420	398	375	733	442	570	504	265	287	182	296	33	0	75	355
SVN	65	92	117	72	215	135	105	95	126	178	163	141	85	151	49	123	26	60	0	117
PRT	362	500	860	389	608	657	714	579	763	855	849	1113	545	703	252	571	64	315	94	0

HOL

common bulls below diagonal
common three quarter sib group above diagonal

	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	CZE	IRL	KOR	SVN	PRT	EST	HUN	POL
BEL	0	565	408	632	589	507	620	631	527	786	650	407	352	153	100	412	54	281	311
CAN	568	0	690	1414	1012	1124	1060	1371	1447	1042	2773	877	395	396	133	720	91	701	662
CHE	409	569	0	659	474	452	460	568	577	599	726	370	274	157	80	348	53	275	292
DEU	564	617	463	0	1428	1074	1420	1239	1531	1682	1926	1135	404	307	182	661	130	687	866
DFS	543	789	411	790	0	844	1210	1281	959	1318	1594	830	503	244	142	634	92	512	632
ESP	504	675	339	502	604	0	925	938	1008	881	1334	715	364	290	122	620	81	521	544
FRA	607	650	376	524	569	652	0	1208	1019	1211	1751	897	451	279	123	598	85	577	790
GBR	661	1402	526	681	877	733	704	0	1164	1272	1963	817	663	285	139	688	93	552	642
ITA	544	1245	518	825	796	716	600	1010	0	1117	1836	917	360	362	164	682	114	689	768
NLD	861	948	564	1043	1031	725	705	1057	1003	0	1523	1091	526	260	153	689	116	560	715
USA	600	2810	624	777	983	789	790	1784	1534	1174	0	1244	522	474	153	899	114	851	901
CZE	318	597	258	703	497	461	487	566	685	954	902	0	301	272	139	560	78	610	633
IRL	360	397	264	311	420	355	375	727	358	502	504	234	0	102	60	290	37	217	219
KOR	119	370	120	161	184	195	165	211	311	182	543	191	78	0	66	242	37	244	261
SVN	80	102	60	165	115	90	82	112	145	130	120	104	48	46	0	101	32	98	141
PRT	410	707	298	494	533	563	485	604	663	674	894	460	252	216	79	0	60	411	458
EST	33	43	23	59	43	33	33	46	57	68	56	42	22	16	13	38	0	68	99
HUN	229	621	220	416	377	363	345	428	579	413	762	507	188	189	72	403	38	0	438
POL	239	490	200	420	404	317	385	481	565	499	676	404	178	187	112	420	49	336	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	466	620	302	473	635	547	844	649	376	241	324	161	465	298	518	116	67	241	200	379
CHE	465	0	737	261	421	649	640	748	857	377	256	296	177	657	274	517	97	65	247	189	384
DEU	547	524	0	770	1212	1243	1671	1733	1935	1070	665	358	346	1263	532	1078	233	159	605	236	1116
DFS	241	205	321	0	424	624	530	788	686	437	220	276	132	322	263	415	85	60	225	199	419
FRA	444	348	479	173	0	800	993	950	1152	703	530	275	277	784	411	744	138	104	481	179	875
GBR	660	619	684	352	515	0	1251	1420	1928	750	491	601	322	1068	492	968	165	115	484	325	802
ITA	556	568	850	362	559	1062	0	1229	2000	944	672	359	413	1394	561	1082	200	140	649	218	1002
NLD	923	711	1070	503	594	1178	1064	0	1734	1051	489	516	289	898	501	932	190	146	487	406	935
USA	586	755	779	343	565	1774	1610	1318	0	1150	887	477	548	2144	660	1389	182	143	763	325	1172
CZE	293	265	676	231	405	526	699	921	850	0	444	251	312	747	424	661	165	103	527	180	783
JPN	152	153	193	107	183	231	266	225	311	163	0	157	288	625	281	537	98	70	344	128	481
IRL	332	298	287	206	247	661	351	490	466	195	117	0	101	287	178	348	70	42	168	221	229
KOR	122	133	180	77	174	233	347	198	625	220	154	76	0	421	254	322	78	53	265	98	347
CAN	490	578	603	247	520	1147	1231	896	2385	553	278	311	397	0	509	935	154	105	601	199	791
PRT	295	234	395	193	361	433	542	474	686	349	167	156	220	514	0	450	109	75	322	138	507
ESP	519	405	494	273	529	783	760	786	866	415	207	352	211	615	394	0	143	99	467	219	654
SVN	90	72	217	58	93	126	176	164	141	123	48	55	52	117	86	105	0	46	112	49	181
EST	42	29	76	25	43	55	74	91	81	59	21	25	25	57	52	45	25	0	85	33	134
HUN	195	195	368	148	300	384	532	359	692	441	152	143	208	573	327	322	83	53	0	116	497
NZL	169	171	185	129	137	270	200	372	284	133	96	185	77	204	117	188	38	16	93	0	146
POL	304	272	612	253	489	624	756	720	1017	553	180	190	271	670	491	389	148	75	400	116	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	143	86	96	44	150	243	129	17	13
CAN	148	0	85	122	48	75	404	137	13	18
DFS	62	72	0	95	56	87	143	117	21	31

GBR	94	125	90	0	51	76	152	104	15	31
ITA	43	46	55	51	0	36	64	57	14	16
NZL	152	77	66	77	32	0	149	102	16	16
USA	238	403	109	159	68	157	0	245	31	32
ZAF	133	137	100	102	57	99	252	0	26	22
NLD	13	8	15	12	11	13	32	21	0	4
CHE	11	16	30	28	17	14	32	22	3	0

JER

common bulls below diagonal										
common three quarter sib group above diagonal										
	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0	143	86	96	44	150	243	122	17	21
CAN	148	0	85	122	48	75	404	126	13	24
DFS	62	72	0	95	56	87	143	108	21	42
GBR	94	125	90	0	51	76	152	99	15	39
ITA	43	46	55	51	0	36	64	57	14	24
NZL	152	77	66	77	32	0	149	93	16	23
USA	238	403	109	159	68	157	0	225	31	40
ZAF	127	128	94	98	57	91	234	0	26	35
NLD	13	8	15	12	11	13	32	21	0	8
CHE	18	22	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	143	86	96	44	150	122	17	243	25
CAN	148	0	85	122	48	75	126	13	404	28
DFS	62	72	0	95	56	87	108	21	143	45
GBR	94	125	90	0	51	76	99	15	152	42
ITA	43	46	55	51	0	36	57	14	64	27
NZL	152	77	66	77	32	0	93	16	149	27
ZAF	127	128	94	98	57	91	0	26	225	39
NLD	13	8	15	12	11	13	21	0	31	10
USA	238	403	109	159	68	157	234	32	0	44
CHE	21	24	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	143	82	95	44	243	128	5	25	
CAN	148	0	84	122	48	404	137	5	28	
DFS	59	71	0	92	56	142	115	10	45	
GBR	93	125	87	0	51	152	104	9	42	
ITA	43	46	55	51	0	64	57	5	27	
USA	238	403	108	159	68	0	244	14	44	
ZAF	132	137	98	102	57	251	0	11	39	
NLD	2	3	9	7	4	13	9	0	5	
CHE	21	24	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	143	86	96	44	150	243	129	17	25
CAN	148	0	85	122	48	75	404	137	13	28
DFS	62	72	0	95	56	87	143	117	21	45
GBR	94	125	90	0	51	76	152	104	15	42
ITA	43	46	55	51	0	36	64	57	14	27

NZL	152	77	66	77	32	0	149	102	16	27
USA	238	403	109	159	68	157	0	245	31	44
ZAF	133	137	100	102	57	99	252	0	26	39
NLD	13	8	15	12	11	13	32	21	0	10
CHE	21	24	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	143	82	96	44	150	243	129	17	25
CAN	148	0	77	122	48	75	404	137	13	28
DFS	55	61	0	93	52	81	135	112	19	44
GBR	94	125	85	0	51	76	152	104	15	42
ITA	43	46	49	51	0	36	64	57	14	27
NZL	152	77	59	77	32	0	149	102	16	27
USA	238	403	99	159	68	157	0	245	31	44
ZAF	133	137	92	102	57	99	252	0	26	39
NLD	13	8	13	12	11	13	32	21	0	10
CHE	21	24	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	143	86	96	44	150	243	129	17	25
CAN	148	0	85	122	48	75	404	137	13	28
DFS	62	72	0	95	56	87	143	117	21	45
GBR	94	125	90	0	51	76	152	104	15	42
ITA	43	46	55	51	0	36	64	57	14	27
NZL	152	77	66	77	32	0	149	102	16	27
USA	238	403	109	159	68	157	0	245	31	44
ZAF	133	137	100	102	57	99	252	0	26	39
NLD	13	8	15	12	11	13	32	21	0	10
CHE	21	24	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	143	79	44	101	17	243	25
CAN	148	0	77	48	112	13	404	28
DFS	53	61	0	52	82	19	135	44
ITA	43	46	49	0	51	14	64	27
ZAF	102	108	68	49	0	23	191	39
NLD	13	8	13	11	16	0	31	10
USA	238	403	99	68	188	32	0	44
CHE	21	24	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	143	83	95	44	243	128	17	25
CAN	148	0	85	122	48	404	137	13	28
DFS	60	72	0	93	56	143	116	21	45
GBR	93	125	88	0	51	152	104	15	42
ITA	43	46	55	51	0	64	57	14	27
USA	238	403	109	159	68	0	244	31	44
ZAF	132	137	99	102	57	251	0	26	39
NLD	13	8	15	12	11	32	21	0	10

CHE 21 24 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	143	86	96	44	150	243	129	17	25
CAN	148	0	85	122	48	75	404	137	13	28
DFS	62	72	0	95	56	87	143	117	21	45
GBR	94	125	90	0	51	76	152	104	15	42
ITA	43	46	55	51	0	36	64	57	14	27
NZL	152	77	66	77	32	0	149	102	16	27
USA	238	403	109	159	68	157	0	245	31	44
ZAF	133	137	100	102	57	99	252	0	26	39
NLD	13	8	15	12	11	13	32	21	0	10
CHE	21	24	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	143	79	96	44	150	243	129	17	25
CAN	148	0	71	122	48	75	404	137	13	28
DFS	53	59	0	85	52	75	128	107	19	44
GBR	94	125	81	0	51	76	152	104	15	42
ITA	43	46	49	51	0	36	64	57	14	27
NZL	152	77	54	77	32	0	149	102	16	27
USA	238	403	94	159	68	157	0	245	31	44
ZAF	133	137	90	102	57	99	252	0	26	39
NLD	13	8	13	12	11	13	32	21	0	10
CHE	21	24	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	143	86	96	44	150	243	129	17	25
CAN	148	0	85	122	48	75	404	137	13	28
DFS	62	72	0	95	56	87	143	117	21	45
GBR	94	125	90	0	51	76	152	104	15	42
ITA	43	46	55	51	0	36	64	57	14	27
NZL	152	77	66	77	32	0	149	102	16	27
USA	238	403	109	159	68	157	0	245	31	44
ZAF	133	137	100	102	57	99	252	0	26	39
NLD	13	8	15	12	11	13	32	21	0	10
CHE	21	24	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	143	84	95	44	243	129	17	25
CAN	148	0	85	121	48	401	137	13	28
DFS	61	72	0	93	56	143	117	21	45
GBR	93	124	88	0	51	152	104	15	42
ITA	43	46	55	51	0	64	57	14	27
USA	238	401	109	159	68	0	244	31	44
ZAF	133	137	100	102	57	251	0	26	39
NLD	13	8	15	12	11	32	21	0	10
CHE	21	24	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	143	86	96	44	150	243	129	17	25
CAN	148	0	85	122	48	75	404	137	13	28
DFS	62	72	0	95	56	87	143	117	21	45
GBR	94	125	90	0	51	76	152	104	15	42
ITA	43	46	55	51	0	36	64	57	14	27
NZL	152	77	66	77	32	0	149	102	16	27
USA	238	403	109	159	68	157	0	245	31	44
ZAF	133	137	100	102	57	99	252	0	26	39
NLD	13	8	15	12	11	13	32	21	0	10
CHE	21	24	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	143	83	95	44	243	121	17	25	
CAN	148	0	85	122	48	404	126	13	28	
DFS	60	72	0	93	56	143	107	21	45	
GBR	93	125	88	0	51	152	99	15	42	
ITA	43	46	55	51	0	64	57	14	27	
USA	238	403	109	159	68	0	224	31	44	
ZAF	126	128	93	98	57	233	0	26	39	
NLD	13	8	15	12	11	32	21	0	10	
CHE	21	24	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	143	71	150	119	17	243	25		
CAN	148	0	66	75	123	13	404	28		
DFS	48	56	0	67	94	19	121	44		
NZL	152	77	49	0	88	16	149	27		
ZAF	122	122	78	82	0	26	220	39		
NLD	13	8	13	13	21	0	31	10		
USA	238	403	89	157	221	32	0	44		
CHE	21	24	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	143	86	35	44	150	243	17	21	
CAN	148	0	85	38	48	75	404	13	24	
DFS	62	72	0	32	56	87	143	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	66	41	32	0	149	16	23	
USA	238	403	109	40	68	157	0	31	40	
NLD	13	8	15	5	11	13	32	0	8	
CHE	18	22	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	143	86	35	44	150	243	17	21
CAN	148	0	85	38	48	75	404	13	24
DFS	62	72	0	32	56	87	143	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	66	41	32	0	149	16	23
USA	238	403	109	40	68	157	0	31	40
NLD	13	8	15	5	11	13	32	0	8
CHE	18	22	40	4	24	20	40	6	0

AUS	0	143	83	96	150	243	17	21
CAN	148	0	79	121	75	401	13	24
DFS	60	70	0	86	80	136	21	42
GBR	94	124	85	0	73	152	15	39
NZL	152	77	60	74	0	149	16	23
USA	238	401	104	159	157	0	31	40
NLD	13	8	15	12	13	32	0	8
CHE	18	22	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	85	121	48	404	13	24
DFS	50	72	0	93	56	143	21	42
GBR	81	124	88	0	51	152	15	39
ITA	38	46	55	51	0	64	14	24
USA	201	403	109	159	68	0	31	40
NLD	11	8	15	12	11	32	0	8
CHE	16	22	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	130	61	4	33	140	3	0
DEU	9	7	0	30	1	8	4	1	8	0
DFS	30	131	20	0	43	76	56	71	30	0
GBR	8	60	1	41	0	0	25	49	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	67	45	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	NZL	USA	NLD	CAM	NOR
AUS	0	23	9	41	9	21	13	8	2	4
CAN	23	0	7	130	61	33	140	3	0	1
DEU	9	7	0	30	1	4	1	8	0	3
DFS	30	131	20	0	43	54	71	28	0	34
GBR	8	60	1	41	0	25	49	1	0	0
NZL	20	31	4	51	22	0	21	2	3	2
USA	13	134	1	67	45	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	12	21	13	8	2
CAN	23	0	7	130	61	4	33	140	3	0
DEU	9	7	0	30	1	8	4	1	8	0
DFS	30	131	20	0	43	76	56	71	30	0
GBR	8	60	1	41	0	0	25	49	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	67	45	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

AUS	0	23	9	41	9	4	21	13	8	2
CAN	23	0	7	130	61	1	33	138	3	0
DEU	9	7	0	30	1	3	4	1	8	0
DFS	30	131	20	0	43	50	54	71	28	0
GBR	8	60	1	41	0	0	25	48	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	67	44	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	130	61	140	3	0	1
DEU	9	7	0	30	1	1	8	0	3
DFS	30	131	20	0	43	71	27	0	47
GBR	8	60	1	41	0	49	1	0	0
USA	13	134	1	67	45	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	32	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	130	61	4	33	140	3	0
DEU	9	7	0	30	1	9	4	1	8	0
DFS	30	131	20	0	43	85	53	71	29	0
GBR	8	60	1	41	0	0	25	49	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	67	45	0	20	0	2	0
NLD	8	3	8	28	1	19	2	2	0	0
CAM	2	0	0	0	0	0	3	0	0	0

RDC

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	GBR	NZL	USA	NLD	CAM	NOR
AUS	0	23	9	41	9	21	13	8	2	4
CAN	23	0	7	130	61	33	140	3	0	1
DEU	9	7	0	30	1	4	1	8	0	3
DFS	30	131	20	0	43	54	71	29	0	34
GBR	8	60	1	41	0	25	49	1	0	0
NZL	20	31	4	51	22	0	21	2	3	2
USA	13	134	1	67	45	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	130	61	4	33	140	3	0

DEU	9	7	0	30	1	9	4	1	8	0
DFS	30	131	20	0	43	88	56	71	30	0
GBR	8	60	1	41	0	0	25	49	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	67	45	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 NOR NLD USA CAM

AUS	0	23	9	41	12	8	13	2
CAN	23	0	7	129	4	3	140	0
DEU	9	7	0	30	9	8	1	0
DFS	30	130	20	0	85	27	71	0
NOR	8	4	8	62	0	19	0	0
NLD	8	3	8	26	19	0	2	0
USA	13	134	1	67	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	130	61	4	140	3	0
DEU	6	5	0	22	1	7	1	8	0
DFS	30	131	15	0	43	85	71	28	0
GBR	8	60	1	41	0	0	49	1	0
NOR	8	4	6	62	0	0	0	19	0
USA	13	134	1	67	45	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	130	61	4	33	140	3	0
DEU	9	7	0	30	1	9	4	1	8	0
DFS	30	131	20	0	43	88	56	71	28	0
GBR	8	60	1	41	0	0	25	49	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	67	45	0	20	0	2	0
NLD	8	3	8	27	1	19	2	2	0	0
CAM	2	0	0	0	0	0	3	0	0	0

RDC

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

AUS	0	23	9	41	9	12	21	13	8	2
CAN	23	0	7	130	61	4	33	140	3	0
DEU	9	7	0	30	1	9	4	1	8	0
DFS	30	131	20	0	43	85	54	71	28	0
GBR	8	60	1	41	0	0	25	49	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	67	45	0	20	0	2	0
NLD	8	3	8	27	1	19	2	2	0	0
CAM	2	0	0	0	0	0	3	0	0	0

RDC

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0	23	9	41	9	12	21	13	8	2
CAN	23	0	7	130	61	4	33	140	3	0
DEU	9	7	0	30	1	9	4	1	8	0
DFS	30	131	20	0	43	78	56	71	30	0
GBR	8	60	1	41	0	0	25	49	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	67	45	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	USA	NLD	CAM
AUS	0	23	9	41	9	12	13	8	2
CAN	23	0	7	130	61	4	137	3	0
DEU	9	7	0	30	1	9	1	8	0
DFS	30	131	20	0	43	88	71	30	0
GBR	8	60	1	41	0	0	49	1	0
NOR	8	4	8	64	0	0	0	19	0
USA	13	133	1	67	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	GBR	NOR	NZL	USA	NLD	CAM
AUS	0	23	9	41	9	12	21	13	8	2
CAN	23	0	7	130	61	4	33	140	3	0
DEU	9	7	0	30	1	9	4	1	8	0
DFS	30	131	20	0	43	85	54	71	29	0
GBR	8	60	1	41	0	0	25	49	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	67	45	0	20	0	2	0
NLD	8	3	8	28	1	19	2	2	0	0
CAM	2	0	0	0	0	0	3	0	0	0

RDC

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM
AUS	0	23	9	41	9	12	13	8	2
CAN	23	0	7	130	61	4	138	3	0
DEU	9	7	0	30	1	9	1	8	0
DFS	30	131	20	0	43	82	71	30	0
GBR	8	60	1	41	0	0	48	1	0
NOR	8	4	8	59	0	0	0	19	0
USA	13	133	1	67	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

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	124	4	33	3	140	0
DEU	9	7	0	27	9	4	8	1	0
DFS	27	124	20	0	77	49	27	66	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	63	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	130	58	4	33	140	3	0
DEU	9	7	0	30	1	9	4	1	8	0
DFS	30	131	20	0	43	93	56	71	30	0
GBR	7	57	1	41	0	0	22	47	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	67	43	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
AUS	0	23	9	41	8	12	21	13	8	2
CAN	23	0	7	130	58	4	33	137	3	0
DEU	9	7	0	30	1	9	4	1	8	0
DFS	30	131	20	0	43	88	56	71	30	0
GBR	7	57	1	41	0	0	22	47	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	67	43	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	USA	NLD	CAM
AUS	0	23	9	41	8	12	13	8	2
CAN	23	0	7	130	58	4	140	3	0
DEU	9	7	0	31	1	9	1	8	0
DFS	30	131	21	0	43	88	71	30	0
GBR	7	57	1	41	0	0	47	1	0
NOR	8	4	8	64	0	0	0	19	0
USA	13	134	1	67	43	0	0	2	0
NLD	8	3	8	29	1	19	2	0	0
CAM	2	0	0	0	0	0	0	0	0

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