

## Introduction

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The latest routine international evaluation for conformation traits took place as scheduled at the Interbull Centre. Data from twenty (22) countries were included in this evaluation.

International genetic evaluations for calving traits of bulls from Australia, Belgium, Canada, Switzerland, Czech Republic, Germany, Denmark-Finland-Sweden, Spain, France, United Kingdom, Hungary, Ireland, Italy, Japan, Korea, The Netherlands, Norway, New Zealand, Poland, South Africa, Estonia, Slovenia, Portugal and the United States of America were computed.

Brown Swiss, Guernsey, Holstein, Jersey and Red Dairy Cattle breed data were included in this evaluation.

## Changes in national procedures

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

NOR RDC Introduced new model for ofl + fixed a bug that was preventing new bulls from being added

ZAF JER For this run we included data for ARC herds since 2012 that were previously not available.

This caused some changes in averages and sds for certain birth years, especially 2004 and 2005.

Reliabilities based on PEVs for longevity, fertility and conformation traits instead of effective daughters and heritability

KOR HOL Some of the sires used for test run had been corrected afterwards using interbull pedigree info (from CAN bulls to USA bulls).

And the outcomes of daughter records had been updated accordingly .

DEA BSW Base change.

ITA HOL Reduction of reliability for some traits due to database corrections.

EST HOL,RDC Decrease in number of daughters of some bulls is due to the pedigree check of cows

SVN HOL,BSW Changes are mostly consequences of changes in data base related to the pedigree completeness as well as phenotypic data improvement.

NLD RDC ang - 8,7 % change in std: This is due to the small number of animals in the angularity evaluation (21).

A few bulls have changes one point upwards or downwards, which easily causes the change of standard deviation.

It is very sensitive due to the small numbers. This would definitely be more stable when we get more bulls in the evaluation in the future.

ESP HOL Change in conformation proofs using now Snell transformation for all traits and new genetic parameters(drop in EDC ==> related to changes in heritability)

CHE BSW Reductions in effective daughter contributions for conformation traits and milkability are due to slight changes in definition

of contemporary groups (herd\*3 year period, starting with the most recent year with data). Due to this fact decreases in reliabilities are explainable.

Introduced changes in pedigree: Each animal with unverified pedigree got a missing dam, sire or both.

HUN HOL Base change

CHE HOL In our evaluation for conformation traits we changed the definition of the fixed effect that describes the classification scheme.

This affected our estimates for the traits ocs, ous and ofl. Change in type of proofs and publication rules

USA JER Heterosis variance adjustment

AUS RDC        Testing the rescaling of RDC ABVs to the standard deviation of 5. We have 4 breeds that are considered as RDC.

              Last time only one breed was properly scaled due to the error in one of the conversion files.

              That is why you observe changes in the standard deviations for some bulls.

DFS JER        -ous - Changed weights for Overall udder score. Overall udder score is based on the ebvs for linear type traits, and no changes has been made for these.

ITA BSW        Updated calculation of the reliability and the calculation procedure of the EDC

PRT HOL        New variance components and new heritabilities. There are minimal changes and some corrections in the pedigree and base change+

              Did a major review of the data and updated our definitions of official and unofficial bulls.

#### INTERBULL CHANGES COMPARED TO THE DECEMBER ROUTINE RUN

##### ----- Subsetting: -----

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

##### Window: -----

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

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

#### DATA AND METHOD OF ANALYSIS

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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 in the 01x-proof file.

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

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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

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

NEXT TEST INTERNATIONAL EVALUATION

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

PUBLICATION OF INTERBULL TEST RUN

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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 (December Routine Evaluation 2015).  
Number of records for stature by breed

Country	BSW	GUE	HOL	JER	RDC	SIM
AUS		51	3301	647	245	
BEL			1012			
CAN	179	92	9933	575	754	
CHE	2435		2729			
CZE			3483			
DEA	3074					
DEU			19343		234	
DFS			10831	1763	5641	
ESP			2990			
EST			522			
FRA	295		15394			
FRM						
FRR			208			
GBR	15	185	4946	374	261	
HUN			2205			
IRL			1363			
ISR						
ITA	1719		8660	93		
JPN			4706			
KOR			914			
LTU						
LVA						
NLD	104		13265	35	35	
NOR					1970	
NZL			5155	3370	528	
POL			7123			
PRT			1723			
SVK						
SVN	245		337			
URY						
USA	745	642	29355	3370	218	
ZAF			771	478		
HRV						
No. Records	8811	970	150269	10705	9886	
Pub. Proofs	7106	828	125308	9411	10742	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	6.87									
CHE	0.93	12.32								
FRA	0.97	0.95	0.90							
ITA	0.95	0.95	0.95	13.66						
NLD	0.95	0.93	0.96	0.92	4.51					
USA	0.98	0.94	0.96	0.96	0.94	1.45				
DEA	0.95	0.97	0.97	0.96	0.94	0.95	11.35			
SVN	0.87	0.87	0.88	0.90	0.90	0.87	0.90	16.54		
GBR	0.95	0.93	0.94	0.94	0.93	0.95	0.89	0.85	0.84	

BSW cwi

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	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	8.88								
CHE	0.88	10.21							
FRA	0.84	0.82	0.89						
ITA	0.81	0.86	0.86	16.18					
NLD	0.88	0.76	0.75	0.69	4.32				
USA	0.94	0.90	0.86	0.89	0.82	0.80			
DEA	0.86	0.84	0.69	0.76	0.75	0.83	12.01		
SVN	0.84	0.80	0.77	0.84	0.74	0.82	0.91	22.47	
GBR	0.91	0.86	0.83	0.74	0.90	0.82	0.82	0.79	1.37

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BSW bde

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	CAN	CHE	FRA	ITA	NLD	DEA	SVN	GBR
CAN	6.82							
CHE	0.85	9.58						
FRA	0.78	0.87	0.88					
ITA	0.81	0.91	0.91	14.90				
NLD	0.84	0.82	0.83	0.82	3.91			
DEA	0.90	0.90	0.93	0.92	0.82	11.53		
SVN	0.79	0.82	0.79	0.89	0.77	0.83	26.04	
GBR	0.86	0.87	0.83	0.86	0.90	0.82	0.81	1.39

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BSW ang

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	CAN	CHE	FRA	NLD	USA	GBR
CAN	8.19					
CHE	0.68	11.02				
FRA	0.88	0.66	0.90			
NLD	0.70	0.59	0.66	3.54		
USA	0.82	0.70	0.74	0.62	1.01	
GBR	0.86	0.75	0.77	0.76	0.88	0.85

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BSW ran

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	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	6.40								
CHE	0.93	10.62							
FRA	0.96	0.96	0.95						
ITA	0.95	0.94	0.95	15.87					
NLD	0.95	0.91	0.94	0.93	4.47				
USA	0.97	0.94	0.97	0.93	0.94	1.08			
DEA	0.95	0.95	0.95	0.96	0.90	0.96	11.99		
SVN	0.89	0.92	0.91	0.94	0.89	0.89	0.93	22.14	
GBR	0.95	0.93	0.95	0.94	0.96	0.95	0.89	0.86	2.05

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BSW rwi

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	CAN	CHE	FRA	NLD	USA	DEA	GBR	SVN
CAN	7.14							
CHE	0.88	9.74						
FRA	0.83	0.83	0.96					
NLD	0.93	0.85	0.82	4.02				
USA	0.88	0.82	0.86	0.79	0.68			
DEA	0.90	0.89	0.78	0.80	0.86	12.57		
GBR	0.90	0.86	0.89	0.87	0.91	0.74	1.21	
SVN	0.85	0.83	0.80	0.84	0.78	0.83	0.80	27.52

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BSW rls

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	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	6.83								
CHE	0.91	13.04							
FRA	0.92	0.90	1.00						
ITA	0.90	0.88	0.93	17.35					
NLD	0.88	0.81	0.89	0.88	5.27				
USA	0.93	0.90	0.91	0.87	0.86	0.73			
DEA	0.90	0.91	0.93	0.93	0.80	0.91	12.11		
SVN	0.83	0.82	0.85	0.87	0.82	0.86	0.86	22.41	
GBR	0.85	0.90	0.91	0.85	0.87	0.85	0.85	0.80	1.14

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BSW fan

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	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	7.99								
CHE	0.68	13.84							
FRA	0.74	0.72	1.03						
ITA	0.69	0.86	0.77	16.68					
NLD	0.66	0.63	0.80	0.70	5.80				
USA	0.73	0.68	0.84	0.82	0.82	0.68			
DEA	0.45	0.89	0.67	0.88	0.61	0.62	11.41		
SVN	0.54	0.83	0.69	0.85	0.64	0.65	0.92	25.90	
GBR	0.78	0.69	0.87	0.70	0.85	0.83	0.62	0.69	1.06

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BSW hde

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	CAN	CHE	FRA	ITA	NLD	DEA	SVN		
CAN	8.32								
CHE	0.87	12.87							
FRA	0.87	0.81	1.12						
ITA	0.76	0.82	0.85	16.64					
NLD	0.81	0.71	0.86	0.75	5.80				
DEA	0.83	0.87	0.85	0.90	0.76	12.22			
SVN	0.71	0.77	0.82	0.92	0.74	0.87	31.64		

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BSW fua

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	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	7.10								
CHE	0.75	11.68							
FRA	0.69	0.73	0.97						
ITA	0.78	0.90	0.73	12.55					
NLD	0.89	0.64	0.80	0.64	4.80				
USA	0.90	0.71	0.73	0.79	0.85	1.15			
DEA	0.77	0.69	0.83	0.69	0.82	0.83	11.78		
SVN	0.60	0.72	0.72	0.70	0.71	0.60	0.82	23.75	
GBR	0.87	0.82	0.81	0.86	0.85	0.87	0.71	0.61	1.37

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BSW ruh

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	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	7.08								
CHE	0.90	11.44							
FRA	0.87	0.83	0.94						
ITA	0.76	0.85	0.84	11.91					
NLD	0.80	0.83	0.85	0.88	4.48				
USA	0.87	0.82	0.86	0.88	0.87	1.02			
DEA	0.80	0.86	0.88	0.91	0.92	0.85	12.52		
SVN	0.76	0.77	0.74	0.83	0.85	0.76	0.85	19.62	
GBR	0.78	0.83	0.84	0.86	0.87	0.89	0.76	0.69	1.30

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BSW ruw

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	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN
CAN	7.97							
CHE	0.91	11.61						
FRA	0.88	0.88	0.89					
ITA	0.80	0.87	0.78	12.58				
NLD	0.71	0.62	0.76	0.73	4.48			
USA	0.89	0.87	0.83	0.89	0.80	0.92		
DEA	0.82	0.90	0.74	0.95	0.55	0.86	12.18	
SVN	0.74	0.74	0.69	0.80	0.72	0.74	0.78	18.19

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BSW usu

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	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	8.02								
CHE	0.90	11.86							
FRA	0.83	0.90	0.92						
ITA	0.91	0.87	0.87	14.39					
NLD	0.84	0.82	0.89	0.85	4.67				
USA	0.85	0.87	0.82	0.83	0.89	1.00			
DEA	0.90	0.90	0.85	0.92	0.79	0.73	11.75		
SVN	0.78	0.74	0.64	0.75	0.66	0.65	0.75	25.55	
GBR	0.85	0.80	0.87	0.88	0.91	0.92	0.75	0.62	2.53

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BSW ude

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	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	6.49								
CHE	0.94	11.85							
FRA	0.94	0.95	0.99						
ITA	0.94	0.98	0.96	15.81					
NLD	0.95	0.96	0.95	0.95	4.24				
USA	0.92	0.94	0.94	0.95	0.93	1.12			
DEA	0.91	0.98	0.92	0.98	0.94	0.90	12.04		
SVN	0.87	0.93	0.88	0.94	0.91	0.87	0.93	21.91	
GBR	0.95	0.92	0.94	0.93	0.95	0.94	0.88	0.84	2.03

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BSW ftp

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	CAN	CHE	FRA	NLD	USA	DEA	SVN	GBR
CAN	6.87							
CHE	0.98	14.24						
FRA	0.96	0.95	0.93					
NLD	0.96	0.94	0.95	4.90				
USA	0.92	0.91	0.89	0.90	1.09			
DEA	0.96	0.99	0.95	0.94	0.90	11.45		
SVN	0.89	0.92	0.91	0.87	0.84	0.88	18.57	
GBR	0.94	0.92	0.89	0.93	0.93	0.87	0.86	1.28

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BSW ftl

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	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	5.89								
CHE	0.89	14.72							
FRA	0.87	0.95	0.97						
ITA	0.90	0.95	0.96	14.92					
NLD	0.87	0.94	0.91	0.92	4.87				
USA	0.86	0.95	0.96	0.96	0.95	1.36			
DEA	0.81	0.97	0.96	0.96	0.90	0.96	11.50		
SVN	0.80	0.88	0.83	0.90	0.90	0.84	0.87	19.24	
GBR	0.90	0.90	0.90	0.93	0.95	0.93	0.86	0.81	1.34

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BSW rtp

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	CAN	CHE	FRA	ITA	NLD	DEA	SVN
CAN	7.08						
CHE	0.98	14.66					
FRA	0.98	0.97	0.94				
ITA	0.90	0.89	0.90	15.08			
NLD	0.97	0.96	0.96	0.90	4.61		
DEA	0.95	0.98	0.96	0.89	0.94	11.43	
SVN	0.89	0.94	0.89	0.90	0.90	0.91	18.12

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BSW ocs

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	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	7.53								
CHE	0.86	8.68							
FRA	0.85	0.89	1.00						
ITA	0.81	0.83	0.89	10.04					
NLD	0.78	0.72	0.80	0.74	3.98				
USA	0.87	0.77	0.84	0.85	0.83	0.55			
DEA	0.72	0.89	0.89	0.88	0.72	0.70	10.93		
SVN	0.70	0.79	0.76	0.78	0.76	0.74	0.82	24.62	
GBR	0.84	0.88	0.88	0.84	0.88	0.89	0.77	0.70	1.68

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BSW ous

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	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	7.75								
CHE	0.90	12.91							
FRA	0.90	0.94	1.06						
ITA	0.85	0.93	0.88	11.83					
NLD	0.88	0.89	0.91	0.85	4.65				
USA	0.83	0.89	0.88	0.92	0.87	0.86			
DEA	0.85	0.95	0.93	0.93	0.89	0.87	11.87		
SVN	0.68	0.83	0.71	0.84	0.75	0.69	0.85	22.88	
GBR	0.81	0.84	0.75	0.84	0.81	0.87	0.71	0.62	1.37

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BSW ofl

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	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	7.18								
CHE	0.85	11.19							
FRA	0.56	0.68	1.34						
ITA	0.69	0.72	0.85	15.61					
NLD	0.57	0.57	0.68	0.58	4.44				
USA	0.53	0.68	0.81	0.74	0.61	0.95			
DEA	0.68	0.82	0.70	0.84	0.53	0.49	11.58		
SVN	0.74	0.83	0.67	0.78	0.64	0.65	0.87	30.45	
GBR	0.74	0.77	0.77	0.71	0.73	0.72	0.60	0.63	1.62

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GUE sta

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	CAN	GBR	USA	AUS
CAN	6.26			
GBR	0.97	1.09		
USA	0.98	0.95	2.33	
AUS	0.86	0.89	0.87	4.43

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GUE cwi

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	CAN	GBR	USA	AUS
CAN	6.63			
GBR	0.94	1.64		
USA	0.90	0.89	1.25	
AUS	0.77	0.80	0.61	6.54

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GUE	bde			
	CAN	GBR	USA	AUS
CAN	6.15			
GBR	0.91	1.36		
USA	0.81	0.90	1.41	
AUS	0.79	0.78	0.78	5.61

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GUE	ang			
	CAN	GBR	USA	AUS
CAN	7.67			
GBR	0.80	1.47		
USA	0.76	0.91	1.64	
AUS	0.40	0.75	0.68	7.06

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GUE	ran			
	CAN	GBR	USA	AUS
CAN	6.39			
GBR	0.97	1.65		
USA	0.97	0.97	1.59	
AUS	0.93	0.96	0.91	8.17

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GUE	rwi			
	CAN	GBR	USA	AUS
CAN	6.74			
GBR	0.94	1.42		
USA	0.94	0.90	1.33	
AUS	0.89	0.90	0.79	5.05

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GUE	rls			
	CAN	GBR	USA	AUS
CAN	7.35			
GBR	0.73	1.78		
USA	0.88	0.69	0.92	
AUS	0.72	0.84	0.65	7.12

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GUE	rlr		
	CAN	USA	AUS
CAN	7.25		
USA	0.85	0.98	
AUS	0.55	0.68	6.62

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GUE	fan			
	CAN	GBR	USA	AUS
CAN	8.52			
GBR	0.58	1.64		
USA	0.79	0.69	0.77	
AUS	0.48	0.83	0.65	8.78

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GUE	fua			
	CAN	GBR	USA	AUS
CAN	7.11			
GBR	0.94	1.55		
USA	0.90	0.89	1.57	
AUS	0.83	0.83	0.69	6.45

GUE ruh		CAN	GBR	USA	AUS
CAN		6.68			
GBR		0.74	1.78		
USA		0.79	0.88	1.39	
AUS		0.78	0.61	0.67	5.76

GUE usu		CAN	GBR	USA	AUS
CAN		6.95			
GBR		0.70	1.56		
USA		0.73	0.78	1.09	
AUS		0.80	0.72	0.80	8.08

GUE ude		CAN	GBR	USA	AUS
CAN		5.99			
GBR		0.97	1.58		
USA		0.93	0.90	1.68	
AUS		0.82	0.86	0.66	4.61

GUE ftp		CAN	GBR	USA	AUS
CAN		5.85			
GBR		0.96	1.25		
USA		0.91	0.87	1.27	
AUS		0.81	0.81	0.82	6.55

GUE ftl		CAN	GBR	USA	AUS
CAN		4.75			
GBR		0.74	1.80		
USA		0.79	0.97	1.48	
AUS		0.56	0.92	0.89	6.41

GUE rtp		CAN	AUS
CAN		5.63	
AUS		0.71	6.72

GUE ocs		CAN	GBR	USA	AUS
CAN		8.00			
GBR		0.88	1.54		
USA		0.77	0.82	1.08	
AUS		0.49	0.48	0.60	7.20

GUE ous		CAN	GBR	USA	AUS
CAN		7.93			
GBR		0.89	1.44		
USA		0.84	0.77	0.76	
AUS		0.58	0.59	0.61	4.66







HOL ang

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD
USA	HUN	POL	ZAF	JPN	CZE	EST	FRR	IRL	KOR	PRT	SVN
AUS	6.30										
BEL	0.58	1.11									
CAN	0.66	0.77	6.40								
CHE	0.57	0.77	0.87	11.69							
DEU	0.60	0.75	0.86	0.78	12.60						
DFS	0.64	0.85	0.88	0.80	0.87	10.78					
ESP	0.68	0.77	0.88	0.77	0.74	0.84	0.74				
FRA	0.62	0.81	0.89	0.86	0.81	0.87	0.84	0.98			
GBR	0.79	0.77	0.90	0.79	0.81	0.88	0.83	0.81	1.24		
ITA	0.72	0.74	0.89	0.75	0.84	0.85	0.83	0.81	0.89	1.29	
NLD	0.71	0.61	0.71	0.67	0.52	0.64	0.76	0.65	0.77	0.68	4.53
USA	0.70	0.77	0.94	0.80	0.85	0.89	0.85	0.85	0.91	0.89	0.66
1.38											
HUN	0.60	0.72	0.77	0.72	0.87	0.80	0.70	0.79	0.73	0.78	0.50
0.79	1.00										
POL	0.52	0.67	0.72	0.72	0.65	0.72	0.78	0.76	0.69	0.74	0.68
0.70	0.59	6.86									
ZAF	0.66	0.80	0.73	0.65	0.78	0.80	0.72	0.73	0.85	0.79	0.55
0.77	0.78	0.62	9.12								
JPN	0.66	0.80	0.89	0.76	0.81	0.90	0.87	0.86	0.85	0.89	0.73
0.86	0.73	0.75	0.77	1.46							
CZE	0.59	0.77	0.81	0.73	0.80	0.84	0.73	0.77	0.74	0.81	0.57
0.78	0.81	0.62	0.68	0.74	14.34						
EST	0.44	0.66	0.60	0.57	0.64	0.68	0.61	0.57	0.57	0.59	0.50
0.57	0.71	0.52	0.67	0.62	0.67	14.97					
FRR	0.48	0.62	0.58	0.53	0.74	0.62	0.61	0.64	0.59	0.61	0.46
0.60	0.67	0.43	0.62	0.62	0.54	0.58	0.08				
IRL	0.75	0.79	0.92	0.81	0.85	0.89	0.82	0.86	0.96	0.88	0.69
0.93	0.79	0.70	0.84	0.85	0.76	0.56	0.57	0.79			
KOR	0.67	0.79	0.79	0.74	0.73	0.75	0.77	0.73	0.80	0.76	0.59
0.75	0.70	0.58	0.82	0.80	0.62	0.62	0.61	0.79	2.43		
PRT	0.60	0.71	0.77	0.61	0.76	0.78	0.73	0.72	0.79	0.80	0.54
0.79	0.71	0.61	0.71	0.77	0.70	0.61	0.64	0.74	0.80	0.25	
SVN	0.56	0.66	0.69	0.76	0.57	0.61	0.76	0.69	0.69	0.64	0.76
0.67	0.55	0.80	0.58	0.64	0.54	0.54	0.47	0.64	0.62	0.69	24.43









HOL rlr

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	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD
USA	HUN	POL	ZAF	JPN	CZE	EST	FRR	IRL	KOR	SVN	PRT
AUS	6.59										
BEL	0.71	1.89									
CAN	0.63	0.84	6.46								
CHE	0.80	0.85	0.76	11.97							
DEU	0.60	0.89	0.89	0.74	11.29						
DFS	0.65	0.85	0.91	0.77	0.92	12.97					
ESP	0.62	0.86	0.86	0.74	0.86	0.90	1.13				
FRA	0.74	0.90	0.84	0.87	0.85	0.83	0.86	1.07			
GBR	0.48	0.63	0.68	0.58	0.64	0.62	0.70	0.63	1.29		
ITA	0.56	0.76	0.80	0.66	0.79	0.74	0.79	0.81	0.75	1.83	
NLD	0.60	0.90	0.87	0.71	0.90	0.90	0.86	0.81	0.64	0.75	4.64
USA	0.58	0.78	0.87	0.66	0.78	0.83	0.78	0.76	0.70	0.87	0.81
1.84											
HUN	0.64	0.87	0.79	0.81	0.83	0.83	0.79	0.86	0.54	0.79	0.83
0.81	1.05										
POL	0.71	0.85	0.86	0.75	0.82	0.84	0.77	0.82	0.53	0.79	0.79
0.83	0.80	14.81									
ZAF	0.61	0.72	0.55	0.63	0.54	0.56	0.54	0.66	0.54	0.63	0.56
0.70	0.68	0.68	9.20								
JPN	0.69	0.79	0.90	0.80	0.82	0.91	0.81	0.82	0.51	0.70	0.82
0.79	0.79	0.80	0.57	1.78							
CZE	0.57	0.82	0.80	0.69	0.84	0.79	0.78	0.76	0.57	0.81	0.78
0.78	0.83	0.86	0.66	0.75	16.13						
EST	0.57	0.66	0.63	0.57	0.74	0.79	0.71	0.68	0.46	0.58	0.74
0.60	0.66	0.69	0.52	0.73	0.61	15.19					
FRR	0.55	0.77	0.62	0.64	0.79	0.71	0.71	0.77	0.52	0.69	0.73
0.64	0.67	0.75	0.58	0.56	0.65	0.62	0.10				
IRL	0.46	0.58	0.64	0.53	0.56	0.55	0.63	0.58	0.79	0.72	0.60
0.62	0.51	0.54	0.54	0.51	0.59	0.42	0.41	1.67			
KOR	0.55	0.72	0.84	0.70	0.76	0.85	0.82	0.80	0.51	0.72	0.74
0.78	0.74	0.78	0.55	0.88	0.73	0.64	0.59	0.48	2.24		
SVN	0.51	0.82	0.81	0.72	0.82	0.82	0.75	0.79	0.54	0.72	0.87
0.81	0.83	0.72	0.59	0.81	0.75	0.63	0.67	0.46	0.77	24.67	
PRT	0.58	0.84	0.74	0.72	0.87	0.77	0.77	0.80	0.60	0.69	0.76
0.70	0.78	0.75	0.55	0.68	0.79	0.61	0.72	0.54	0.72	0.81	0.23

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HOL fan

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	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD
USA	HUN	POL	ZAF	JPN	CZE	EST	FRR	IRL	KOR	SVN	PRT
AUS	5.81										
BEL	0.73	2.02									
CAN	0.67	0.84	6.56								
CHE	0.71	0.88	0.74	11.27							
DEU	0.72	0.86	0.85	0.72	12.84						
DFS	0.63	0.91	0.88	0.75	0.85	13.24					
ESP	0.71	0.77	0.87	0.66	0.84	0.83	1.05				
FRA	0.82	0.77	0.78	0.69	0.88	0.69	0.85	1.05			
GBR	0.82	0.77	0.83	0.66	0.89	0.72	0.86	0.92	1.36		
ITA	0.57	0.70	0.77	0.62	0.76	0.71	0.73	0.72	0.75	1.61	
NLD	0.75	0.80	0.77	0.66	0.90	0.76	0.80	0.85	0.88	0.71	5.28
USA	0.69	0.77	0.88	0.66	0.83	0.79	0.85	0.81	0.85	0.86	0.81
1.64											
HUN	0.82	0.78	0.81	0.77	0.86	0.71	0.85	0.91	0.88	0.67	0.83
0.81	1.11										
POL	0.66	0.76	0.82	0.74	0.71	0.74	0.75	0.75	0.76	0.73	0.65
0.80	0.80	13.32									
ZAF	0.87	0.77	0.77	0.74	0.84	0.72	0.80	0.87	0.89	0.74	0.79
0.81	0.87	0.71	11.22								
JPN	0.77	0.75	0.69	0.80	0.79	0.69	0.73	0.77	0.73	0.62	0.79
0.74	0.87	0.68	0.78	1.98							
CZE	0.74	0.83	0.84	0.71	0.91	0.81	0.84	0.86	0.84	0.70	0.83
0.82	0.92	0.75	0.79	0.85	17.45						
EST	0.68	0.68	0.67	0.59	0.74	0.67	0.80	0.77	0.71	0.60	0.79
0.72	0.78	0.63	0.65	0.74	0.79	15.63					
FRR	0.59	0.78	0.62	0.62	0.76	0.69	0.70	0.74	0.68	0.65	0.78
0.62	0.59	0.51	0.62	0.55	0.65	0.62	0.11				
IRL	0.77	0.74	0.82	0.63	0.84	0.72	0.79	0.82	0.95	0.74	0.79
0.78	0.77	0.73	0.82	0.61	0.77	0.61	0.60	1.65			
KOR	0.60	0.63	0.74	0.56	0.76	0.64	0.80	0.78	0.77	0.70	0.74
0.78	0.80	0.69	0.69	0.65	0.77	0.61	0.53	0.66	1.77		
SVN	0.41	0.56	0.63	0.50	0.72	0.71	0.71	0.60	0.63	0.67	0.62
0.65	0.60	0.55	0.63	0.52	0.67	0.55	0.52	0.63	0.61	22.85	
PRT	0.65	0.65	0.65	0.65	0.75	0.65	0.71	0.74	0.69	0.65	0.71
0.73	0.67	0.65	0.68	0.66	0.73	0.73	0.59	0.65	0.71	0.67	0.18

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HOL ude

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD
USA	HUN	POL	ZAF	JPN	CZE	EST	FRR	IRL	KOR	SVN	PRT
AUS	4.42										
BEL	0.94	1.46									
CAN	0.93	0.96	5.80								
CHE	0.96	0.95	0.95	11.46							
DEU	0.94	0.96	0.98	0.96	12.98						
DFS	0.93	0.95	0.97	0.96	0.97	11.49					
ESP	0.95	0.96	0.97	0.96	0.96	0.97	1.05				
FRA	0.96	0.96	0.97	0.97	0.98	0.97	0.97	1.10			
GBR	0.95	0.96	0.97	0.95	0.96	0.95	0.96	0.96	1.17		
ITA	0.93	0.94	0.97	0.95	0.96	0.95	0.98	0.97	0.94	1.37	
NLD	0.94	0.96	0.97	0.96	0.98	0.97	0.96	0.98	0.97	0.95	5.09
USA	0.94	0.95	0.97	0.96	0.96	0.97	0.97	0.98	0.97	0.97	0.97
1.49											
HUN	0.93	0.95	0.97	0.96	0.96	0.97	0.97	0.96	0.95	0.97	0.95
0.96	1.18										
POL	0.94	0.95	0.95	0.96	0.96	0.95	0.95	0.96	0.94	0.95	0.95
0.95	0.95	9.78									
ZAF	0.95	0.95	0.97	0.93	0.96	0.94	0.95	0.96	0.98	0.94	0.96
0.96	0.95	0.94	11.61								
JPN	0.94	0.94	0.97	0.95	0.95	0.97	0.97	0.97	0.95	0.96	0.95
0.97	0.96	0.94	0.95	1.35							
CZE	0.93	0.96	0.98	0.94	0.98	0.95	0.96	0.95	0.95	0.95	0.95
0.94	0.97	0.96	0.96	0.94	14.76						
EST	0.88	0.91	0.93	0.89	0.93	0.94	0.93	0.91	0.91	0.91	0.93
0.94	0.94	0.93	0.90	0.91	0.93	13.52					
FRR	0.87	0.93	0.90	0.91	0.94	0.91	0.92	0.94	0.90	0.91	0.95
0.90	0.87	0.91	0.86	0.89	0.89	0.87	0.09				
IRL	0.95	0.95	0.95	0.94	0.94	0.92	0.94	0.94	0.99	0.92	0.95
0.95	0.92	0.92	0.96	0.93	0.93	0.88	0.86	1.33			
KOR	0.88	0.85	0.89	0.89	0.87	0.88	0.91	0.90	0.88	0.90	0.89
0.91	0.89	0.87	0.90	0.93	0.86	0.81	0.84	0.86	4.97		
SVN	0.84	0.89	0.89	0.89	0.92	0.90	0.89	0.88	0.86	0.89	0.90
0.89	0.90	0.90	0.89	0.86	0.92	0.87	0.84	0.84	0.80	17.12	
PRT	0.90	0.93	0.92	0.90	0.93	0.92	0.92	0.90	0.90	0.92	0.91
0.91	0.92	0.90	0.92	0.91	0.94	0.88	0.87	0.90	0.90	0.89	0.43





HOL ftl

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	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD
USA	HUN	POL	ZAF	JPN	CZE	EST	FRR	IRL	KOR	SVN	PRT
AUS	5.91										
BEL	0.95	1.53									
CAN	0.95	0.92	5.73								
CHE	0.94	0.95	0.91	11.55							
DEU	0.96	0.98	0.94	0.95	13.53						
DFS	0.96	0.97	0.94	0.97	0.98	10.89					
ESP	0.95	0.98	0.94	0.95	0.98	0.97	1.12				
FRA	0.95	0.90	0.98	0.89	0.93	0.92	0.92	1.07			
GBR	0.96	0.97	0.95	0.94	0.98	0.96	0.97	0.94	1.33		
ITA	0.91	0.91	0.92	0.90	0.93	0.93	0.93	0.91	0.96	1.61	
NLD	0.95	0.98	0.93	0.96	0.98	0.98	0.98	0.91	0.97	0.92	5.00
USA	0.95	0.94	0.96	0.93	0.96	0.96	0.96	0.94	0.97	0.95	0.95
1.47											
HUN	0.93	0.96	0.89	0.96	0.95	0.96	0.96	0.87	0.93	0.88	0.96
0.91	1.19										
POL	0.96	0.96	0.92	0.96	0.97	0.97	0.96	0.90	0.96	0.91	0.96
0.95	0.96	11.96									
ZAF	0.94	0.94	0.90	0.92	0.93	0.94	0.95	0.90	0.93	0.91	0.94
0.92	0.94	0.95	10.78								
JPN	0.97	0.98	0.94	0.96	0.98	0.98	0.98	0.92	0.97	0.94	0.98
0.97	0.96	0.97	0.96	1.49							
CZE	0.95	0.96	0.92	0.96	0.97	0.98	0.97	0.90	0.97	0.91	0.97
0.95	0.96	0.97	0.94	0.97	14.22						
EST	0.91	0.91	0.89	0.91	0.94	0.95	0.93	0.88	0.92	0.88	0.94
0.90	0.94	0.95	0.88	0.94	0.94	13.85					
FRR	0.89	0.93	0.89	0.92	0.95	0.93	0.93	0.87	0.93	0.90	0.93
0.91	0.89	0.92	0.88	0.92	0.92	0.88	0.13				
IRL	0.96	0.96	0.95	0.92	0.98	0.95	0.96	0.94	0.99	0.94	0.96
0.96	0.91	0.95	0.92	0.96	0.96	0.92	0.91	1.75			
KOR	0.92	0.94	0.88	0.93	0.94	0.94	0.94	0.86	0.93	0.87	0.94
0.92	0.93	0.93	0.91	0.95	0.94	0.88	0.87	0.90	5.01		
SVN	0.91	0.94	0.89	0.94	0.95	0.95	0.95	0.87	0.94	0.90	0.95
0.92	0.93	0.94	0.89	0.94	0.94	0.89	0.89	0.93	0.90	18.24	
PRT	0.90	0.94	0.91	0.92	0.96	0.95	0.94	0.90	0.94	0.90	0.95
0.94	0.93	0.96	0.90	0.94	0.96	0.91	0.91	0.94	0.93	0.90	0.36

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HOL rtp

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	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD
USA	POL	NZL	JPN	CZE	EST	FRR	IRL	KOR	SVN	PRT	ZAF
AUS	5.54										
BEL	0.96	1.41									
CAN	0.96	0.96	6.05								
CHE	0.96	0.96	0.98	11.92							
DEU	0.94	0.96	0.97	0.97	13.74						
DFS	0.92	0.94	0.96	0.95	0.97	10.97					
ESP	0.94	0.96	0.97	0.96	0.98	0.97	0.91				
FRA	0.96	0.96	0.98	0.97	0.97	0.96	0.98	1.06			
GBR	0.96	0.95	0.97	0.96	0.97	0.97	0.97	0.98	1.31		
ITA	0.86	0.89	0.89	0.88	0.94	0.93	0.93	0.92	0.91	1.27	
NLD	0.95	0.95	0.97	0.96	0.98	0.97	0.97	0.97	0.98	0.92	4.84
USA	0.92	0.92	0.95	0.92	0.95	0.96	0.95	0.94	0.97	0.90	0.95
1.63											
POL	0.89	0.93	0.93	0.92	0.97	0.94	0.96	0.95	0.94	0.92	0.95
0.92	10.59										
NZL	0.96	0.94	0.94	0.94	0.95	0.92	0.93	0.95	0.95	0.88	0.93
0.90	0.92	0.45									
JPN	0.96	0.97	0.98	0.97	0.97	0.97	0.97	0.98	0.97	0.91	0.97
0.95	0.95	0.94	1.55								
CZE	0.91	0.95	0.94	0.93	0.97	0.94	0.95	0.95	0.95	0.90	0.94
0.93	0.96	0.93	0.94	13.88							
EST	0.89	0.91	0.92	0.89	0.95	0.91	0.92	0.92	0.92	0.89	0.94
0.90	0.92	0.88	0.92	0.92	13.22						
FRR	0.81	0.84	0.82	0.83	0.82	0.81	0.85	0.84	0.82	0.78	0.82
0.80	0.77	0.78	0.79	0.79	0.78	0.10					
IRL	0.94	0.93	0.95	0.95	0.95	0.94	0.94	0.96	0.97	0.89	0.95
0.93	0.90	0.94	0.95	0.92	0.87	0.79	1.29				
KOR	0.88	0.89	0.92	0.91	0.93	0.93	0.95	0.93	0.91	0.93	0.92
0.93	0.92	0.87	0.94	0.89	0.83	0.74	0.90	2.52			
SVN	0.88	0.90	0.91	0.91	0.93	0.89	0.95	0.91	0.90	0.88	0.91
0.87	0.92	0.88	0.89	0.90	0.86	0.79	0.88	0.87	15.69		
PRT	0.89	0.92	0.93	0.92	0.94	0.93	0.94	0.93	0.94	0.89	0.91
0.93	0.94	0.88	0.92	0.92	0.87	0.79	0.90	0.90	0.90	0.46	
ZAF	0.91	0.89	0.90	0.88	0.89	0.89	0.89	0.89	0.89	0.88	0.88
0.89	0.88	0.88	0.89	0.88	0.83	0.78	0.88	0.88	0.86	0.89	7.53

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HOL	ocs										
	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD
USA	HUN	POL	NZL	JPN	CZE	EST	FRR	IRL	KOR	SVN	PRT
AUS	6.36										
BEL	0.58	1.22									
CAN	0.58	0.72	5.48								
CHE	0.54	0.78	0.92	11.77							
DEU	0.62	0.64	0.86	0.83	13.01						
DFS	0.64	0.67	0.80	0.79	0.87	10.32					
ESP	0.66	0.74	0.79	0.79	0.86	0.86	0.80				
FRA	0.57	0.74	0.80	0.86	0.84	0.86	0.88	1.12			
GBR	0.68	0.73	0.86	0.89	0.92	0.88	0.87	0.90	0.94		
ITA	0.58	0.66	0.82	0.81	0.82	0.81	0.86	0.87	0.85	0.81	
NLD	0.61	0.72	0.80	0.81	0.89	0.89	0.87	0.85	0.90	0.80	3.01
USA	0.63	0.68	0.86	0.84	0.89	0.88	0.86	0.86	0.91	0.84	0.87
0.91											
HUN	0.54	0.73	0.83	0.82	0.84	0.75	0.77	0.81	0.82	0.80	0.76
0.80	1.12										
POL	0.46	0.63	0.59	0.65	0.60	0.66	0.74	0.70	0.67	0.67	0.68
0.67	0.67	7.10									
NZL	0.79	0.54	0.64	0.61	0.64	0.58	0.63	0.57	0.70	0.55	0.66
0.68	0.57	0.46	0.32								
JPN	0.53	0.79	0.88	0.91	0.77	0.79	0.79	0.85	0.83	0.83	0.81
0.85	0.72	0.71	0.57	0.70							
CZE	0.64	0.66	0.84	0.78	0.88	0.79	0.78	0.75	0.83	0.76	0.78
0.80	0.85	0.59	0.71	0.68	15.44						
EST	0.48	0.62	0.73	0.59	0.76	0.66	0.71	0.64	0.67	0.65	0.72
0.67	0.67	0.48	0.47	0.61	0.74	13.45					
FRR	0.54	0.72	0.61	0.69	0.77	0.73	0.77	0.74	0.76	0.74	0.81
0.67	0.64	0.73	0.50	0.67	0.68	0.58	0.10				
IRL	0.63	0.49	0.71	0.68	0.76	0.67	0.67	0.63	0.77	0.67	0.63
0.69	0.69	0.43	0.59	0.56	0.72	0.54	0.51	1.05			
KOR	0.51	0.55	0.57	0.62	0.59	0.57	0.73	0.61	0.59	0.66	0.62
0.61	0.60	0.62	0.44	0.63	0.49	0.54	0.52	0.46	7.24		
SVN	0.41	0.57	0.59	0.59	0.68	0.63	0.72	0.70	0.63	0.67	0.66
0.65	0.63	0.69	0.45	0.64	0.61	0.54	0.58	0.43	0.62	20.10	
PRT	0.56	0.74	0.75	0.75	0.77	0.79	0.77	0.76	0.79	0.75	0.77
0.75	0.76	0.74	0.49	0.72	0.74	0.70	0.74	0.59	0.73	0.71	0.59

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	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD
USA	HUN	POL	NZL	JPN	CZE	EST	FRR	IRL	SVN	PRT	
AUS	4.34										
BEL	0.56	1.33									
CAN	0.65	0.77	5.39								
CHE	0.67	0.85	0.94	11.74							
DEU	0.65	0.80	0.90	0.90	13.53						
DFS	0.45	0.81	0.86	0.90	0.88	12.78					
ESP	0.70	0.70	0.84	0.85	0.84	0.75	0.88				
FRA	0.54	0.81	0.85	0.92	0.89	0.94	0.80	1.03			
GBR	0.79	0.66	0.84	0.85	0.86	0.69	0.89	0.75	1.11		
ITA	0.64	0.72	0.89	0.89	0.86	0.83	0.92	0.88	0.85	1.02	
NLD	0.61	0.84	0.89	0.93	0.91	0.89	0.85	0.92	0.82	0.86	4.86
USA	0.68	0.77	0.93	0.93	0.89	0.85	0.90	0.89	0.89	0.94	0.90
1.15											
HUN	0.59	0.82	0.86	0.88	0.88	0.85	0.82	0.84	0.76	0.83	0.80
0.83	1.27										
POL	0.66	0.77	0.70	0.77	0.78	0.69	0.70	0.70	0.76	0.69	0.73
0.71	0.68	8.03									
NZL	0.78	0.75	0.83	0.88	0.81	0.76	0.74	0.82	0.81	0.76	0.83
0.85	0.77	0.73	0.43								
JPN	0.71	0.82	0.93	0.90	0.88	0.79	0.81	0.83	0.87	0.87	0.87
0.92	0.77	0.78	0.81	0.76							
CZE	0.58	0.83	0.89	0.90	0.93	0.91	0.80	0.91	0.76	0.86	0.89
0.85	0.91	0.76	0.78	0.82	17.32						
EST	0.49	0.73	0.78	0.76	0.81	0.85	0.72	0.84	0.65	0.78	0.83
0.80	0.77	0.65	0.66	0.73	0.83	13.57					
FRR	0.54	0.80	0.69	0.76	0.84	0.74	0.77	0.76	0.72	0.72	0.82
0.72	0.68	0.69	0.61	0.72	0.76	0.64	0.10				
IRL	0.83	0.62	0.77	0.79	0.79	0.60	0.84	0.68	0.96	0.78	0.72
0.83	0.72	0.75	0.82	0.81	0.70	0.55	0.62	1.01			
SVN	0.46	0.57	0.54	0.57	0.55	0.48	0.67	0.50	0.51	0.51	0.60
0.54	0.52	0.62	0.49	0.55	0.53	0.53	0.55	0.46	20.58		
PRT	0.72	0.70	0.79	0.80	0.82	0.72	0.80	0.76	0.81	0.79	0.80
0.81	0.76	0.73	0.73	0.80	0.80	0.70	0.72	0.74	0.69	0.97	

HOL ofl

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD
USA	HUN	POL	JPN	CZE	EST	IRL	SVN	PRT			
AUS	5.81										
BEL	0.47	1.77									
CAN	0.32	0.75	6.26								
CHE	0.38	0.81	0.90	11.48							
DEU	0.33	0.74	0.85	0.76	11.90						
DFS	0.33	0.67	0.87	0.78	0.79	13.07					
ESP	0.40	0.73	0.82	0.75	0.72	0.82	0.94				
FRA	0.34	0.78	0.67	0.68	0.74	0.61	0.75	1.08			
GBR	0.34	0.74	0.79	0.78	0.77	0.71	0.81	0.83	1.24		
ITA	0.35	0.70	0.70	0.67	0.72	0.56	0.68	0.78	0.72	1.66	
NLD	0.35	0.82	0.67	0.64	0.73	0.62	0.66	0.81	0.75	0.67	5.13
USA	0.41	0.75	0.83	0.76	0.75	0.67	0.73	0.73	0.75	0.76	0.67
1.57											
HUN	0.46	0.71	0.62	0.62	0.67	0.53	0.65	0.76	0.65	0.75	0.69
0.72	1.14										
POL	0.46	0.76	0.74	0.72	0.74	0.56	0.65	0.69	0.66	0.75	0.60
0.81	0.71	11.35									
JPN	0.36	0.65	0.87	0.81	0.77	0.72	0.68	0.59	0.64	0.70	0.56
0.86	0.56	0.74	0.64								
CZE	0.43	0.78	0.81	0.72	0.79	0.60	0.65	0.66	0.67	0.75	0.63
0.84	0.80	0.86	0.76	15.83							
EST	0.38	0.66	0.58	0.53	0.63	0.58	0.67	0.72	0.60	0.66	0.73
0.66	0.66	0.65	0.57	0.67	15.30						
IRL	0.46	0.77	0.78	0.82	0.71	0.69	0.73	0.68	0.84	0.69	0.67
0.72	0.69	0.67	0.71	0.71	0.50	1.47					
SVN	0.49	0.62	0.64	0.57	0.58	0.53	0.65	0.64	0.55	0.68	0.70
0.77	0.75	0.56	0.68	0.70	0.65	0.52	25.90				
PRT	0.40	0.67	0.65	0.65	0.69	0.65	0.67	0.79	0.71	0.72	0.72
0.72	0.74	0.65	0.58	0.68	0.83	0.55	0.73	0.43			

HOL loc

	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA
CZE	IRL	KOR	SVN	PRT							
BEL	1.89										
CAN	0.84	6.46									
CHE	0.57	0.63	11.95								
DEU	0.62	0.73	0.66	11.92							
DFS	0.85	0.91	0.54	0.67	12.96						
ESP	0.55	0.71	0.72	0.75	0.72	0.98					
FRA	0.76	0.75	0.69	0.81	0.69	0.74	1.08				
GBR	0.61	0.66	0.86	0.79	0.61	0.79	0.84	1.30			
ITA	0.57	0.66	0.65	0.71	0.55	0.71	0.76	0.74	1.93		
NLD	0.83	0.77	0.64	0.83	0.76	0.67	0.80	0.72	0.60	4.73	
USA	0.54	0.71	0.52	0.78	0.64	0.70	0.74	0.70	0.79	0.58	1.57
CZE	0.37	0.52	0.52	0.66	0.49	0.57	0.61	0.61	0.64	0.47	0.68
22.36											
IRL	0.62	0.64	0.64	0.70	0.58	0.72	0.73	0.78	0.63	0.66	0.66
0.44	1.68										
KOR	0.56	0.75	0.54	0.51	0.72	0.73	0.62	0.63	0.58	0.52	0.54
0.58	0.58	11.04									
SVN	0.66	0.72	0.63	0.65	0.73	0.66	0.71	0.68	0.72	0.73	0.65
0.68	0.50	0.67	28.98								
PRT	0.50	0.50	0.51	0.65	0.50	0.59	0.55	0.62	0.53	0.51	0.50
0.69	0.51	0.63	0.61	0.21							

HOL bcs

	BEL	CHE	DEU	DFS	FRA	GBR	ITA	NLD	USA	CZE	FRR
JPN	IRL	KOR	CAN	PRT	ESP						
BEL	1.10										
CHE	0.73	11.80									
DEU	0.75	0.90	13.07								
DFS	0.76	0.88	0.95	12.18							
FRA	0.74	0.93	0.93	0.94	1.01						
GBR	0.75	0.92	0.90	0.87	0.94	1.25					
ITA	0.74	0.90	0.95	0.94	0.96	0.90	6.66				
NLD	0.75	0.93	0.95	0.95	0.94	0.91	0.93	4.92			
USA	0.79	0.70	0.74	0.76	0.76	0.75	0.75	0.73	1.38		
CZE	0.76	0.86	0.95	0.93	0.91	0.87	0.94	0.93	0.71	12.60	
FRR	0.72	0.86	0.82	0.76	0.82	0.84	0.78	0.85	0.63	0.77	0.08
JPN	0.75	0.92	0.94	0.95	0.96	0.92	0.95	0.94	0.77	0.92	0.77
1.60											
IRL	0.68	0.88	0.83	0.82	0.89	0.95	0.82	0.87	0.67	0.81	0.79
0.87	1.08										
KOR	0.64	0.77	0.79	0.80	0.82	0.77	0.82	0.75	0.67	0.76	0.67
0.82	0.71	2.62									
CAN	0.76	0.92	0.93	0.93	0.94	0.96	0.93	0.95	0.76	0.92	0.81
0.97	0.91	0.79	6.14								
PRT	0.76	0.82	0.87	0.85	0.87	0.84	0.86	0.88	0.75	0.87	0.84
0.86	0.78	0.81	0.87	0.34							
ESP	0.78	0.89	0.94	0.94	0.95	0.94	0.93	0.93	0.75	0.93	0.86
0.94	0.88	0.86	0.95	0.88	1.12						

JER sta

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD
AUS	6.14								
CAN	0.85	6.18							
DFS	0.86	0.95	11.92						
GBR	0.88	0.95	0.94	1.03					
ITA	0.88	0.94	0.91	0.96	1.22				
NZL	0.89	0.86	0.86	0.93	0.90	0.36			
USA	0.89	0.97	0.95	0.97	0.93	0.90	1.27		
ZAF	0.86	0.87	0.86	0.93	0.89	0.94	0.90	9.35	
NLD	0.88	0.96	0.97	0.94	0.92	0.85	0.94	0.87	4.92

JER cwi

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD
AUS	5.46								
CAN	0.68	6.53							
DFS	0.81	0.83	15.40						
GBR	0.77	0.88	0.82	1.61					
ITA	0.62	0.88	0.74	0.76	1.34				
NZL	0.81	0.63	0.68	0.80	0.60	0.36			
USA	0.74	0.92	0.79	0.83	0.88	0.62	0.87		
ZAF	0.75	0.83	0.74	0.85	0.74	0.76	0.81	9.00	
NLD	0.71	0.85	0.90	0.83	0.74	0.64	0.84	0.77	4.47

JER bde

	AUS	CAN	DFS	GBR	ITA	NZL	ZAF	NLD
AUS	5.37							
CAN	0.75	5.88						
DFS	0.84	0.86	13.51					
GBR	0.69	0.80	0.80	1.60				
ITA	0.56	0.71	0.73	0.83	1.38			
NZL	0.75	0.65	0.68	0.69	0.68	0.36		
ZAF	0.86	0.75	0.83	0.78	0.75	0.76	9.58	
NLD	0.68	0.83	0.84	0.83	0.85	0.52	0.71	3.26

JER ang

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	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD
AUS	6.47							
CAN	0.59	7.13						
DFS	0.69	0.76	13.22					
GBR	0.84	0.70	0.87	1.15				
ITA	0.71	0.75	0.84	0.88	1.26			
USA	0.79	0.82	0.87	0.87	0.82	0.93		
ZAF	0.67	0.63	0.76	0.84	0.76	0.77	9.27	
NLD	0.75	0.70	0.65	0.76	0.67	0.70	0.62	3.57

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JER ran

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	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD
AUS	5.81								
CAN	0.89	5.73							
DFS	0.90	0.95	11.47						
GBR	0.96	0.94	0.95	1.22					
ITA	0.86	0.95	0.93	0.91	1.44				
NZL	0.96	0.87	0.88	0.93	0.86	0.29			
USA	0.92	0.94	0.95	0.97	0.93	0.91	1.06		
ZAF	0.96	0.91	0.91	0.97	0.91	0.92	0.93	9.85	
NLD	0.90	0.93	0.95	0.95	0.90	0.85	0.95	0.92	4.72

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JER rwi

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	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD
AUS	6.07								
CAN	0.87	6.64							
DFS	0.79	0.88	11.93						
GBR	0.81	0.94	0.86	1.38					
ITA	0.69	0.81	0.80	0.79	1.47				
NZL	0.89	0.86	0.80	0.80	0.73	0.28			
USA	0.80	0.84	0.83	0.86	0.86	0.67	0.75		
ZAF	0.80	0.81	0.82	0.83	0.81	0.75	0.82	9.87	
NLD	0.83	0.85	0.89	0.77	0.73	0.80	0.67	0.73	4.10

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JER rls

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	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD
AUS	7.35								
CAN	0.54	5.72							
DFS	0.59	0.92	12.90						
GBR	0.72	0.82	0.78	1.76					
ITA	0.52	0.78	0.79	0.78	1.54				
NZL	0.71	0.65	0.64	0.75	0.72	0.12			
USA	0.72	0.91	0.91	0.88	0.80	0.73	0.62		
ZAF	0.87	0.73	0.72	0.83	0.73	0.86	0.77	12.66	
NLD	0.66	0.85	0.89	0.81	0.87	0.64	0.86	0.74	3.54

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JER rlr

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	AUS	CAN	DFS	ITA	ZAF	NLD
AUS	7.85					
CAN	0.40	6.94				
DFS	0.55	0.77	12.91			
ITA	0.46	0.59	0.59	1.12		
ZAF	0.57	0.61	0.57	0.59	13.60	
NLD	0.61	0.80	0.87	0.76	0.67	5.06

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JER fan

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	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD
AUS	6.94							
CAN	0.66	5.55						
DFS	0.68	0.87	12.81					
GBR	0.78	0.79	0.72	1.37				
ITA	0.57	0.77	0.64	0.78	1.79			
USA	0.69	0.87	0.80	0.85	0.80	0.70		
ZAF	0.79	0.68	0.72	0.91	0.69	0.81	10.49	
NLD	0.71	0.79	0.77	0.88	0.75	0.81	0.78	4.80

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JER fua

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	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD
AUS	5.87								
CAN	0.68	5.16							
DFS	0.81	0.83	12.74						
GBR	0.78	0.92	0.82	1.59					
ITA	0.64	0.84	0.79	0.85	1.48				
NZL	0.84	0.67	0.71	0.78	0.66	0.40			
USA	0.79	0.93	0.86	0.92	0.89	0.70	1.09		
ZAF	0.76	0.90	0.82	0.92	0.82	0.72	0.90	11.85	
NLD	0.79	0.87	0.91	0.90	0.82	0.79	0.85	0.86	5.12

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JER ruh

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	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD
AUS	5.42								
CAN	0.70	7.04							
DFS	0.74	0.88	11.17						
GBR	0.84	0.83	0.84	1.18					
ITA	0.77	0.84	0.82	0.89	1.36				
NZL	0.74	0.74	0.79	0.75	0.81	0.40			
USA	0.80	0.84	0.90	0.91	0.83	0.75	1.05		
ZAF	0.86	0.76	0.85	0.91	0.81	0.76	0.90	9.57	
NLD	0.77	0.82	0.93	0.88	0.87	0.76	0.85	0.79	4.78

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JER usu

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	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD
AUS	5.38								
CAN	0.83	6.45							
DFS	0.74	0.86	12.81						
GBR	0.85	0.90	0.84	1.69					
ITA	0.54	0.72	0.67	0.63	1.55				
NZL	0.57	0.57	0.52	0.62	0.62	0.38			
USA	0.75	0.86	0.88	0.83	0.79	0.48	0.77		
ZAF	0.80	0.82	0.80	0.82	0.69	0.52	0.83	10.85	
NLD	0.80	0.83	0.89	0.83	0.78	0.53	0.86	0.79	5.36

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JER ude

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	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD
AUS	5.43							
CAN	0.94	4.88						
DFS	0.94	0.93	12.23					
GBR	0.94	0.95	0.92	1.57				
ITA	0.95	0.93	0.93	0.89	1.40			
USA	0.94	0.97	0.96	0.93	0.95	1.42		
ZAF	0.94	0.92	0.94	0.94	0.93	0.94	11.23	
NLD	0.94	0.95	0.96	0.94	0.95	0.94	0.93	4.59

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JER ftp

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD
AUS	6.07								
CAN	0.88	5.89							
DFS	0.86	0.94	13.01						
GBR	0.89	0.89	0.88	1.39					
ITA	0.68	0.80	0.81	0.69	1.61				
NZL	0.90	0.91	0.85	0.85	0.77	0.30			
USA	0.87	0.94	0.94	0.91	0.86	0.88	1.04		
ZAF	0.87	0.92	0.91	0.92	0.84	0.90	0.92	10.88	
NLD	0.91	0.95	0.94	0.90	0.79	0.87	0.91	0.92	5.28

JER ftl

	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD
AUS	6.45							
CAN	0.81	5.44						
DFS	0.91	0.88	13.85					
GBR	0.95	0.87	0.93	1.40				
ITA	0.89	0.74	0.88	0.92	1.62			
USA	0.93	0.92	0.95	0.96	0.92	0.93		
ZAF	0.95	0.90	0.92	0.94	0.90	0.96	11.11	
NLD	0.93	0.90	0.96	0.96	0.89	0.95	0.94	5.01

JER rtp

	AUS	CAN	DFS	NZL	ZAF	NLD
AUS	5.84					
CAN	0.95	6.13				
DFS	0.90	0.94	12.99			
NZL	0.95	0.95	0.90	0.39		
ZAF	0.96	0.95	0.92	0.92	10.22	
NLD	0.88	0.91	0.96	0.85	0.85	4.57

JER ocs

	AUS	CAN	DFS	GBR	ITA	NZL	USA	NLD
AUS	6.06							
CAN	0.48	5.95						
DFS	0.52	0.70	12.96					
GBR	0.66	0.84	0.77	1.91				
ITA	0.43	0.80	0.64	0.75	0.76			
NZL	0.62	0.60	0.51	0.61	0.60	0.33		
USA	0.67	0.79	0.81	0.86	0.81	0.63	0.91	
NLD	0.60	0.79	0.86	0.85	0.83	0.60	0.82	2.74

JER ous

	AUS	CAN	DFS	GBR	NZL	USA	NLD
AUS	5.10						
CAN	0.66	6.19					
DFS	0.48	0.86	13.06				
GBR	0.73	0.86	0.73	1.34			
NZL	0.73	0.74	0.69	0.75	0.46		
USA	0.64	0.91	0.81	0.86	0.68	0.66	
NLD	0.61	0.89	0.89	0.79	0.80	0.90	4.71

JER ofl

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	AUS	CAN	DFS	GBR	ITA	USA	NLD
AUS	6.94						
CAN	0.57	5.90					
DFS	0.38	0.80	13.74				
GBR	0.57	0.75	0.56	1.33			
ITA	0.57	0.76	0.61	0.70	1.16		
USA	0.64	0.84	0.67	0.74	0.76	0.89	
NLD	0.44	0.69	0.63	0.73	0.69	0.67	5.73

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RDC sta

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	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD
AUS	5.53								
CAN	0.88	5.90							
DEU	0.88	0.95	12.28						
DFS	0.86	0.96	0.96	8.77					
GBR	0.91	0.92	0.94	0.89	1.21				
NOR	0.88	0.91	0.93	0.96	0.89	11.69			
NZL	0.89	0.90	0.86	0.89	0.90	0.90	0.47		
USA	0.89	0.97	0.95	0.93	0.94	0.88	0.88	2.02	
NLD	0.86	0.95	0.97	0.96	0.93	0.93	0.83	0.93	4.34

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RDC cwi

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	AUS	CAN	DEU	DFS	GBR	NZL	USA	NLD
AUS	6.56							
CAN	0.69	7.13						
DEU	0.71	0.85	11.21					
DFS	0.76	0.84	0.87	12.82				
GBR	0.79	0.83	0.90	0.83	1.52			
NZL	0.79	0.64	0.73	0.71	0.80	0.35		
USA	0.67	0.86	0.82	0.77	0.82	0.70	1.06	
NLD	0.67	0.90	0.93	0.90	0.91	0.66	0.83	4.80

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RDC bde

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	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD
AUS	5.82								
CAN	0.83	5.97							
DEU	0.80	0.88	9.36						
DFS	0.86	0.84	0.92	11.75					
GBR	0.80	0.81	0.90	0.84	1.43				
NOR	0.86	0.70	0.79	0.83	0.68	12.29			
NZL	0.80	0.64	0.72	0.79	0.73	0.78	0.35		
USA	0.72	0.77	0.86	0.79	0.88	0.69	0.70	1.00	
NLD	0.71	0.83	0.90	0.84	0.91	0.72	0.62	0.89	4.35

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RDC ang

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	AUS	CAN	DEU	DFS	GBR	USA	NLD
AUS	7.09						
CAN	0.66	6.69					
DEU	0.62	0.85	12.12				
DFS	0.65	0.81	0.86	9.26			
GBR	0.78	0.79	0.81	0.80	1.32		
USA	0.72	0.86	0.85	0.79	0.84	0.87	
NLD	0.76	0.72	0.55	0.64	0.77	0.66	5.71

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## RDC ran

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD
AUS	6.92								
CAN	0.92	5.99							
DEU	0.93	0.97	8.27						
DFS	0.92	0.95	0.95	10.08					
GBR	0.95	0.96	0.96	0.94	1.38				
NOR	0.91	0.86	0.89	0.90	0.85	10.83			
NZL	0.94	0.92	0.90	0.89	0.93	0.86	0.29		
USA	0.92	0.98	0.96	0.95	0.96	0.87	0.91	1.05	
NLD	0.93	0.96	0.98	0.96	0.97	0.91	0.90	0.96	5.85

## RDC rwi

	AUS	CAN	DEU	DFS	GBR	NZL	USA	NLD
AUS	6.16							
CAN	0.88	5.92						
DEU	0.84	0.92	8.57					
DFS	0.85	0.93	0.91	10.61				
GBR	0.86	0.84	0.89	0.81	1.38			
NZL	0.87	0.87	0.81	0.89	0.85	0.30		
USA	0.81	0.89	0.84	0.86	0.88	0.84	1.17	
NLD	0.88	0.94	0.94	0.92	0.88	0.83	0.82	5.77

## RDC rls

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD
AUS	7.56								
CAN	0.76	6.38							
DEU	0.78	0.93	8.57						
DFS	0.75	0.97	0.93	9.11					
GBR	0.86	0.77	0.87	0.75	1.67				
NOR	0.78	0.87	0.88	0.94	0.72	13.46			
NZL	0.71	0.65	0.71	0.65	0.71	0.68	0.12		
USA	0.75	0.95	0.92	0.94	0.81	0.84	0.63	0.69	
NLD	0.78	0.91	0.92	0.88	0.88	0.75	0.67	0.90	5.41

## RDC rlr

	AUS	CAN	DEU	DFS	NOR	NLD
AUS	7.31					
CAN	0.63	6.74				
DEU	0.61	0.88	9.53			
DFS	0.63	0.86	0.91	10.72		
NOR	0.65	0.76	0.82	0.87	12.44	
NLD	0.62	0.86	0.90	0.88	0.87	4.80

## RDC fan

	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD
AUS	6.78							
CAN	0.66	6.64						
DEU	0.73	0.83	14.06					
DFS	0.67	0.65	0.78	9.44				
GBR	0.81	0.76	0.90	0.68	1.72			
NOR	0.71	0.61	0.75	0.57	0.68	13.99		
USA	0.71	0.84	0.83	0.73	0.83	0.65	0.81	
NLD	0.74	0.77	0.88	0.73	0.88	0.74	0.81	4.44

RDC fua

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	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD
AUS	6.81								
CAN	0.75	6.00							
DEU	0.77	0.89	10.90						
DFS	0.77	0.82	0.82	11.79					
GBR	0.78	0.83	0.94	0.83	1.68				
NOR	0.76	0.81	0.74	0.86	0.77	10.98			
NZL	0.78	0.80	0.81	0.71	0.78	0.77	0.33		
USA	0.74	0.93	0.89	0.83	0.90	0.81	0.84	1.13	
NLD	0.76	0.91	0.94	0.91	0.92	0.87	0.83	0.88	4.38

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RDC ruh

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	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD
AUS	5.88								
CAN	0.78	5.85							
DEU	0.82	0.87	13.26						
DFS	0.78	0.91	0.91	10.67					
GBR	0.84	0.76	0.87	0.82	1.44				
NOR	0.79	0.84	0.84	0.88	0.76	11.62			
NZL	0.83	0.76	0.81	0.77	0.89	0.73	0.32		
USA	0.78	0.87	0.90	0.92	0.88	0.82	0.84	1.04	
NLD	0.78	0.81	0.92	0.93	0.89	0.88	0.82	0.86	5.31

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RDC usu

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	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD
AUS	6.51								
CAN	0.78	5.94							
DEU	0.74	0.88	11.51						
DFS	0.69	0.79	0.79	12.46					
GBR	0.82	0.81	0.75	0.71	1.92				
NOR	0.77	0.70	0.69	0.77	0.73	13.95			
NZL	0.71	0.68	0.60	0.52	0.68	0.68	0.30		
USA	0.77	0.84	0.75	0.82	0.86	0.77	0.70	0.97	
NLD	0.79	0.84	0.78	0.89	0.91	0.86	0.60	0.90	4.68

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RDC ude

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	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD
AUS	6.81							
CAN	0.93	5.53						
DEU	0.94	0.96	11.01					
DFS	0.92	0.97	0.95	10.58				
GBR	0.95	0.93	0.96	0.91	1.83			
NOR	0.92	0.88	0.90	0.92	0.86	10.93		
USA	0.94	0.97	0.96	0.96	0.94	0.87	1.09	
NLD	0.94	0.97	0.98	0.96	0.97	0.92	0.97	4.67

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RDC ftp

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	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD
AUS	6.73								
CAN	0.94	5.18							
DEU	0.94	0.96	12.21						
DFS	0.90	0.95	0.90	11.81					
GBR	0.94	0.91	0.96	0.85	1.55				
NOR	0.90	0.85	0.79	0.91	0.78	11.65			
NZL	0.92	0.89	0.87	0.81	0.88	0.81	0.26		
USA	0.89	0.93	0.92	0.92	0.90	0.85	0.85	1.11	
NLD	0.95	0.97	0.97	0.94	0.94	0.86	0.89	0.91	3.70

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## RDC ftl

	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD
AUS	5.63							
CAN	0.94	5.18						
DEU	0.96	0.91	12.81					
DFS	0.95	0.84	0.96	10.49				
GBR	0.95	0.88	0.97	0.92	1.53			
NOR	0.91	0.83	0.90	0.91	0.89	11.01		
USA	0.94	0.90	0.95	0.92	0.95	0.87	1.14	
NLD	0.95	0.92	0.98	0.96	0.96	0.91	0.95	5.82

## RDC rtp

	AUS	CAN	DEU	DFS	NOR	NZL	NLD
AUS	6.73						
CAN	0.94	5.97					
DEU	0.92	0.96	13.52				
DFS	0.89	0.94	0.96	12.46			
NOR	0.83	0.74	0.71	0.56	12.26		
NZL	0.92	0.94	0.93	0.90	0.75	0.34	
NLD	0.94	0.97	0.97	0.95	0.73	0.93	4.70

## RDC ocs

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD
AUS	5.02								
CAN	0.61	5.73							
DEU	0.63	0.83	17.43						
DFS	0.62	0.73	0.73	9.36					
GBR	0.68	0.78	0.91	0.74	1.67				
NOR	0.65	0.58	0.77	0.67	0.61	15.84			
NZL	0.73	0.55	0.66	0.67	0.63	0.70	0.29		
USA	0.64	0.83	0.88	0.82	0.84	0.73	0.70	0.78	
NLD	0.64	0.80	0.88	0.86	0.90	0.72	0.65	0.87	3.12

## RDC ous

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD
AUS	5.58								
CAN	0.68	5.78							
DEU	0.67	0.88	14.41						
DFS	0.56	0.79	0.83	10.95					
GBR	0.79	0.82	0.86	0.65	1.55				
NOR	0.62	0.82	0.75	0.82	0.75	10.74			
NZL	0.78	0.75	0.81	0.75	0.74	0.73	0.36		
USA	0.69	0.93	0.89	0.86	0.87	0.82	0.82	0.90	
NLD	0.61	0.89	0.91	0.89	0.82	0.85	0.83	0.90	4.67

## RDC ofl

	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD
AUS	6.78							
CAN	0.42	6.16						
DEU	0.43	0.84	14.63					
DFS	0.43	0.80	0.78	13.12				
GBR	0.42	0.71	0.76	0.60	1.61			
NOR	0.50	0.73	0.74	0.66	0.74	13.22		
USA	0.45	0.72	0.75	0.56	0.71	0.74	1.00	
NLD	0.42	0.67	0.73	0.61	0.75	0.84	0.67	6.64

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 ^LAPPENDIX II. Number of common bulls  
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BSW  
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common bulls below diagonal  
 common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	97	63	91	35	113	85	17	14
CHE	82	0	136	376	55	241	437	37	13
FRA	56	101	0	144	49	85	147	32	11
ITA	74	325	114	0	71	160	446	54	13
NLD	27	50	39	51	0	51	68	23	7
USA	105	215	57	111	37	0	194	20	14
DEA	68	346	110	364	56	156	0	53	10
SVN	15	38	31	54	22	16	51	0	5
GBR	12	11	11	11	7	13	9	4	0

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BSW  
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common bulls below diagonal  
 common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	89	63	90	28	113	83	16	14
CHE	76	0	121	326	50	211	375	36	12
FRA	56	87	0	143	45	85	145	31	11
ITA	74	276	114	0	64	159	416	53	12
NLD	23	47	36	50	0	37	62	23	7
USA	105	186	57	111	28	0	176	19	14
DEA	67	289	109	332	54	131	0	51	9
SVN	14	36	30	53	22	15	50	0	5
GBR	12	11	11	11	7	13	9	4	0

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BSW  
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common bulls below diagonal  
 common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	DEA	SVN	GBR
CAN	0	90	61	86	28	83	10	14
CHE	78	0	135	374	54	436	24	13
FRA	55	101	0	143	45	147	20	11
ITA	71	322	114	0	65	444	36	13
NLD	23	50	36	50	0	63	15	7
DEA	68	346	110	363	55	0	34	10
SVN	9	24	21	35	15	34	0	4
GBR	12	11	11	11	7	9	3	0

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BSW  
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common bulls below diagonal  
 common three quarter sib group above diagonal

	CAN	CHE	FRA	NLD	USA	GBR
CAN	0	96	63	15	112	14
CHE	82	0	131	29	239	13
FRA	56	96	0	27	85	11
NLD	12	28	22	0	20	3
USA	104	215	57	15	0	14
GBR	12	11	11	3	13	0

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BSW

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common bulls below diagonal  
common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	97	63	91	35	113	85	17	14
CHE	82	0	136	376	55	241	437	37	13
FRA	56	101	0	144	49	85	147	32	11
ITA	74	325	114	0	71	160	446	54	13
NLD	27	50	39	51	0	51	68	23	7
USA	105	215	57	111	37	0	194	20	14
DEA	68	346	110	364	56	156	0	53	10
SVN	15	38	31	54	22	16	51	0	5
GBR	12	11	11	11	7	13	9	4	0

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BSW

-----  
common bulls below diagonal  
common three quarter sib group above diagonal

	CAN	CHE	FRA	NLD	USA	DEA	GBR	SVN
CAN	0	97	63	35	113	85	14	10
CHE	82	0	135	54	240	432	13	24
FRA	56	100	0	49	85	147	11	20
NLD	27	49	39	0	51	68	7	15
USA	105	215	57	37	0	194	14	12
DEA	68	345	109	56	156	0	10	34
GBR	12	11	11	7	13	9	0	4
SVN	9	24	21	15	10	34	3	0

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BSW

-----  
common bulls below diagonal  
common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	97	63	91	35	113	85	17	14
CHE	82	0	136	376	55	241	437	37	13
FRA	56	101	0	144	49	85	147	32	11
ITA	74	325	114	0	71	160	446	54	13
NLD	27	50	39	51	0	51	68	23	7
USA	105	215	57	111	37	0	194	20	14
DEA	68	346	110	364	56	156	0	53	10
SVN	15	38	31	54	22	16	51	0	5
GBR	12	11	11	11	7	13	9	4	0

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BSW

-----  
common bulls below diagonal  
common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	97	63	91	27	113	85	17	14
CHE	82	0	136	376	53	241	437	37	13
FRA	56	101	0	144	45	85	147	32	11
ITA	74	325	114	0	64	160	446	54	13
NLD	22	49	36	49	0	36	62	23	7
USA	105	215	57	111	26	0	194	20	14
DEA	68	346	110	364	54	156	0	53	10
SVN	15	38	31	54	22	16	51	0	5
GBR	12	11	11	11	7	13	9	4	0

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BSW

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common bulls below diagonal  
common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	DEA	SVN
CAN	0	88	60	83	27	82	17
CHE	76	0	134	366	53	435	37
FRA	54	100	0	140	45	146	32
ITA	70	316	114	0	63	439	54
NLD	22	49	36	49	0	62	23
DEA	67	345	109	360	54	0	53
SVN	15	38	31	54	22	51	0

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BSW

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common bulls below diagonal  
common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	97	63	90	27	113	51	10	14
CHE	82	0	136	371	54	241	239	24	13
FRA	56	101	0	143	45	85	94	20	11
ITA	74	322	114	0	62	156	206	36	12
NLD	22	50	36	50	0	36	49	15	7
USA	105	215	57	111	27	0	94	12	14
DEA	41	177	64	174	43	64	0	32	7
SVN	9	24	21	35	15	10	32	0	4
GBR	12	11	11	11	7	13	7	3	0

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BSW

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common bulls below diagonal  
common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	97	63	91	28	113	85	17	14
CHE	82	0	136	376	54	241	437	37	13
FRA	56	101	0	144	45	85	147	32	11
ITA	74	325	114	0	65	160	446	54	13
NLD	23	50	36	50	0	37	63	23	7
USA	105	215	57	111	28	0	194	20	14
DEA	68	346	110	364	55	156	0	53	10
SVN	15	38	31	54	22	16	51	0	5
GBR	12	11	11	11	7	13	9	4	0

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BSW

-----  
common bulls below diagonal  
common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN
CAN	0	97	63	91	28	113	85	17
CHE	82	0	136	376	54	241	437	37
FRA	56	101	0	144	45	85	147	32
ITA	74	325	114	0	65	160	446	54
NLD	23	50	36	50	0	37	63	23
USA	105	215	57	111	28	0	194	20
DEA	68	346	110	364	55	156	0	53
SVN	15	38	31	54	22	16	51	0

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BSW

-----  
common bulls below diagonal  
common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	97	63	91	35	113	85	10	14
CHE	82	0	136	376	55	241	437	24	13
FRA	56	101	0	144	49	85	147	20	11
ITA	74	325	114	0	71	160	446	36	13
NLD	27	50	39	51	0	51	68	15	7
USA	105	215	57	111	37	0	194	12	14
DEA	68	346	110	364	56	156	0	34	10
SVN	9	24	21	35	15	10	34	0	4
GBR	12	11	11	11	7	13	9	3	0

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BSW

-----  
common bulls below diagonal  
common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	97	63	91	35	111	85	17	14
CHE	82	0	136	376	55	241	437	37	13
FRA	56	101	0	144	49	85	147	32	11
ITA	74	325	114	0	71	160	446	54	13
NLD	27	50	39	51	0	51	68	23	7
USA	104	215	57	111	37	0	194	20	14
DEA	68	346	110	364	56	156	0	53	10
SVN	15	38	31	54	22	16	51	0	5
GBR	12	11	11	11	7	13	9	4	0

-----

BSW

-----  
common bulls below diagonal  
common three quarter sib group above diagonal

	CAN	CHE	FRA	NLD	USA	DEA	SVN	GBR
CAN	0	97	63	35	113	74	16	14
CHE	82	0	135	54	240	401	36	13
FRA	56	100	0	49	85	137	31	11
NLD	27	49	39	0	51	62	23	7
USA	105	215	57	37	0	169	18	14
DEA	60	314	101	54	128	0	51	9
SVN	14	37	30	22	15	50	0	5
GBR	12	11	11	7	13	9	4	0

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BSW

-----  
common bulls below diagonal  
common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	97	63	91	35	113	85	16	14
CHE	82	0	136	376	55	241	437	36	13
FRA	56	101	0	144	49	85	147	31	11
ITA	74	325	114	0	71	160	446	53	13
NLD	27	50	39	51	0	51	68	23	7
USA	105	215	57	111	37	0	194	19	14
DEA	68	346	110	364	56	156	0	52	10
SVN	14	37	30	53	22	15	50	0	5
GBR	12	11	11	11	7	13	9	4	0

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BSW

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

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CAN	0	88	60	83	23	49	16
CHE	76	0	134	360	50	237	36
FRA	54	100	0	140	42	93	31
ITA	70	312	114	0	58	205	53
NLD	19	48	34	48	0	49	22
DEA	40	176	63	174	43	0	43
SVN	14	37	30	53	22	41	0

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BSW

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

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CAN	0	89	53	90	35	113	51	10	14
CHE	76	0	98	324	49	211	235	24	12
FRA	50	74	0	110	39	69	84	20	11
ITA	74	274	92	0	68	156	206	36	12
NLD	27	47	34	51	0	51	49	15	7
USA	105	186	49	111	37	0	94	12	14
DEA	41	173	62	174	43	64	0	32	7
SVN	9	24	21	35	15	10	32	0	4
GBR	12	11	11	11	7	13	7	3	0

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BSW

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

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CAN	0	89	53	91	35	112	85	10	14
CHE	76	0	99	326	50	211	386	24	12
FRA	50	74	0	110	39	69	116	20	11
ITA	74	276	92	0	71	160	440	36	13
NLD	27	47	34	51	0	51	68	15	7
USA	104	186	49	111	37	0	192	12	14
DEA	67	300	88	361	56	152	0	34	10
SVN	9	24	21	35	15	10	34	0	4
GBR	12	11	11	11	7	13	9	3	0

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BSW

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

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CAN	0	89	53	89	35	113	85	10	14
CHE	76	0	99	323	50	211	386	24	12
FRA	50	74	0	108	39	69	116	20	11
ITA	74	275	92	0	68	156	436	36	12
NLD	27	47	34	51	0	51	68	15	7
USA	105	186	49	108	37	0	192	12	14
DEA	67	300	88	358	56	152	0	34	10
SVN	9	24	21	35	15	10	34	0	4
GBR	12	11	11	11	7	13	9	3	0

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GUE

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

-----  
CAN 0 20 55 21  
GBR 17 0 62 12  
USA 44 62 0 26  
AUS 20 9 21 0  
-----

GUE

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

-----  
CAN 0 20 55 21  
GBR 17 0 62 12  
USA 44 62 0 26  
AUS 20 9 21 0  
-----

GUE

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

-----  
CAN 0 20 55 21  
GBR 17 0 62 12  
USA 44 62 0 26  
AUS 20 9 21 0  
-----

GUE

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

-----  
CAN 0 20 55 21  
GBR 17 0 62 12  
USA 44 62 0 26  
AUS 20 9 21 0  
-----

GUE

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

-----  
CAN 0 20 55 21  
GBR 17 0 62 12  
USA 44 62 0 26  
AUS 20 9 21 0  
-----

GUE

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

-----  
CAN 0 20 55 21  
GBR 17 0 62 12  
USA 44 62 0 26  
AUS 20 9 21 0  
-----

GUE

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

-----  
CAN 0 20 55 21  
GBR 17 0 62 12  
USA 44 62 0 26  
AUS 20 9 21 0  
-----

GUE

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

-----  
CAN 0 27 7  
USA 25 0 8  
AUS 6 7 0  
-----

GUE

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

-----  
CAN 0 20 55 21  
GBR 17 0 62 12  
USA 44 62 0 26  
AUS 20 9 21 0  
-----

GUE

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

-----  
CAN 0 20 55 21  
GBR 17 0 62 12  
USA 44 62 0 26  
AUS 20 9 21 0  
-----

GUE

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

-----  
CAN 0 20 55 21  
GBR 17 0 62 12  
USA 44 62 0 26  
AUS 20 9 21 0  
-----

GUE

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

-----  
CAN 0 20 55 21  
GBR 17 0 62 12  
USA 44 62 0 26  
AUS 20 9 21 0  
-----

GUE

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

-----  
CAN 0 20 53 20  
GBR 17 0 62 12  
USA 43 62 0 26  
AUS 19 9 21 0  
-----

GUE

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

-----  
CAN 0 20 55 21  
GBR 17 0 62 12  
USA 44 62 0 26  
AUS 20 9 21 0  
-----

GUE

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

-----  
CAN 0 20 55 21  
GBR 17 0 62 12  
USA 44 62 0 26  
AUS 20 9 21 0  
-----

GUE

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

-----  
CAN 0 7  
AUS 6 0  
-----

GUE

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

-----  
CAN 0 12 55 21  
GBR 9 0 33 10  
USA 44 31 0 26  
AUS 20 7 21 0  
-----

GUE

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

-----  
CAN 0 18 53 20  
GBR 15 0 60 12  
USA 43 60 0 26  
AUS 19 9 21 0  
-----



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	FRR	IRL	KOR	SVN	PRT														
	AUS	0	311	650	336	664	598	467	504	668	628	643	821	354	394	430	205	425	420
51	8	324	211	78	380														
	BEL	230	0	379	344	542	433	377	442	461	481	624	463	264	336	202	157	262	343
39	33	272	149	91	344														
	CAN	509	345	0	615	1500	884	962	817	1111	1269	852	2192	626	726	306	270	917	796
85	11	339	448	108	691														
	CHE	244	321	456	0	735	457	426	391	523	568	611	684	305	376	206	161	304	399
40	30	282	172	83	362														
	DEU	255	395	412	436	0	1687	1090	1549	1367	2004	1860	2250	782	1160	387	282	975	1320
124	94	475	365	162	733														
	DFS	310	358	525	382	605	0	763	1032	1101	1233	1254	1385	582	840	400	282	653	895
91	23	452	315	139	629														
	ESP	300	345	502	328	479	483	0	755	845	1046	789	1175	534	646	272	270	654	676
78	11	349	319	112	615														
	FRA	264	404	416	320	404	398	489	0	1013	1302	1153	1491	570	893	338	225	744	890
82	13	386	297	106	552														
	GBR	469	429	1028	502	583	671	661	520	0	1291	1233	1552	606	791	411	289	708	817
89	18	588	353	134	687														
	ITA	360	408	780	493	867	760	726	495	922	0	1313	2075	741	987	403	308	899	1049
105	29	448	437	154	782														
	NLD	450	646	644	568	861	847	627	523	923	916	0	1521	608	923	495	271	652	1046
119	70	534	299	148	711														
	USA	562	371	1884	583	644	718	672	566	1231	1153	1001	0	859	1100	476	341	1411	1210
125	20	445	584	134	888														
	HUN	212	216	512	242	431	389	401	324	471	559	429	724	0	525	230	229	457	661
64	4	272	294	87	459														
	POL	191	253	432	262	524	480	384	370	509	623	609	743	370	0	255	214	533	795
101	64	315	321	129	577														
	NZL	305	147	246	163	197	233	213	160	303	277	426	384	175	140	0	151	265	278
28	3	284	131	41	242														
	ZAF	180	140	256	145	202	233	251	174	267	270	239	344	206	161	131	0	217	237
31	5	167	168	54	251														
	JPN	169	141	246	139	174	209	206	168	228	237	209	294	173	149	105	151	0	593
62	3	260	342	82	439														
	CZE	207	239	478	271	723	465	438	459	529	661	806	796	549	489	169	180	147	0
81	25	323	340	132	564														
	EST	17	28	31	17	52	42	31	25	36	48	69	70	34	51	12	15	13	39
0	2	43	35	23	67														
	FRR	6	30	9	26	73	23	8	12	15	27	48	13	4	64	3	4	3	21
1	0	9	1	12	12														
	IRL	272	262	314	278	315	351	336	306	643	398	481	407	230	223	230	164	138	242
23	9	0	148	66	304														
	KOR	128	84	390	111	157	189	217	138	257	350	178	636	234	215	83	132	136	233
13	0	100	0	59	313														
	SVN	46	73	78	58	131	111	82	69	103	130	119	105	64	100	31	39	39	96
17	11	51	35	0	104														
	PRT	242	316	677	307	452	514	566	436	605	713	682	858	421	516	176	242	190	452
41	12	266	255	82	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	FRR	IRL	KOR	PRT	SVN														
	AUS	0	316	642	335	662	594	453	626	662	627	671	813	354	394	423	253	424	419
51	8	322	211	378	53														
	BEL	230	0	384	346	547	437	375	488	467	485	650	477	266	339	205	177	268	344
39	36	273	149	345	62														
	CAN	508	345	0	615	1501	884	958	989	1111	1269	896	2192	626	727	306	323	917	796
85	13	339	448	691	83														
	CHE	244	322	456	0	735	457	421	429	523	568	626	684	305	377	206	184	304	399
40	35	282	172	362	58														
	DEU	255	395	412	436	0	1687	1074	1694	1368	2004	1910	2250	782	1163	387	328	975	1320
124	110	475	365	734	128														
	DFS	310	358	525	382	605	0	748	1207	1102	1233	1291	1385	582	843	400	336	653	895
91	26	453	315	630	107														
	ESP	293	333	497	320	452	466	0	835	831	1028	793	1160	527	634	263	315	650	665
76	13	341	316	603	81														
	FRA	302	428	474	348	488	423	500	0	1168	1436	1351	1930	622	959	429	310	909	939
87	16	442	333	594	83														
	GBR	468	429	1028	502	583	671	637	570	0	1291	1271	1553	606	793	411	346	708	817
89	21	589	353	689	101														
	ITA	360	408	780	493	867	760	694	549	922	0	1346	2075	741	987	403	354	899	1049
105	31	448	438	782	120														
	NLD	475	671	694	591	892	870	632	613	965	955	0	1632	620	937	509	324	688	1059
121	84	541	311	724	109														
	USA	560	371	1884	583	644	718	656	766	1231	1153	1205	0	859	1102	476	410	1411	1210
125	22	446	585	888	102														
	HUN	212	216	512	242	431	389	394	339	471	559	446	724	0	526	230	257	457	661
64	4	272	295	459	70														
	POL	191	253	432	262	524	480	367	385	510	623	619	743	370	0	255	240	534	795
101	71	315	321	577	104														
	NZL	304	147	246	163	197	233	207	189	303	277	445	384	175	140	0	187	265	278
28	5	284	131	242	31														
	ZAF	214	153	300	161	227	257	291	214	318	301	296	429	223	169	167	0	261	258
32	5	204	187	267	36														
	JPN	169	141	246	139	174	209	204	173	228	237	211	294	173	149	105	159	0	593
62	3	260	342	439	59														
	CZE	207	239	478	271	723	465	424	490	529	661	822	796	549	489	169	192	147	0
81	26	323	340	565	104														
	EST	17	28	31	17	52	42	28	25	36	48	70	70	34	51	12	15	13	39
0	2	43	35	67	19														
	FRR	6	32	9	27	84	26	8	12	17	29	53	13	4	76	5	4	3	22
1	0	9	1	12	8														
	IRL	272	262	314	278	315	351	322	333	643	398	492	407	230	223	230	195	138	242
23	9	0	149	304	45														
	KOR	128	84	390	111	157	189	216	145	257	350	185	637	235	215	83	147	136	233
13	0	100	0	314	46														
	PRT	242	316	677	307	452	514	553	447	605	713	695	858	421	516	176	252	190	452
41	12	266	256	0	78														
	SVN	31	50	61	43	105	85	55	53	77	99	88	82	50	80	24	26	24	76
13	8	38	28	62	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	ZAF	JPN	CZE	EST	
FRR	IRL	KOR	PRT	SVN															
8	AUS	0	305	650	323	663	597	470	504	664	627	297	819	353	390	252	425	417	49
34	BEL	230	0	373	324	532	425	374	438	452	472	343	451	257	328	171	256	332	39
13	CAN	509	343	0	578	1499	880	966	817	1108	1268	470	2192	626	725	322	917	795	84
22	CHE	243	306	426	0	637	449	421	387	511	541	345	629	298	355	183	303	378	37
110	DEU	255	393	412	374	0	1672	1100	1548	1365	2002	939	2245	778	1156	327	974	1313	123
26	DFS	310	357	525	374	602	0	766	1027	1089	1226	633	1372	577	828	335	650	885	89
13	ESP	302	350	504	326	496	493	0	760	849	1056	441	1180	536	649	320	658	676	78
14	FRA	264	404	416	315	404	398	499	0	1012	1302	569	1489	569	891	258	744	890	80
21	GBR	469	426	1028	492	582	671	668	520	0	1286	593	1544	602	781	344	707	810	86
31	ITA	360	407	780	471	866	760	742	495	919	0	689	2072	739	981	352	899	1046	103
41	NLD	235	343	404	313	483	538	351	337	501	547	0	664	325	574	163	281	639	81
22	USA	562	367	1884	529	644	718	676	566	1230	1152	489	0	857	1095	408	1411	1201	124
4	HUN	212	215	512	238	431	389	406	324	470	558	235	723	0	523	257	457	659	64
71	POL	191	251	432	242	524	477	393	370	506	621	440	742	370	0	238	532	787	100
5	ZAF	214	153	300	160	227	257	294	184	318	301	143	428	223	169	0	261	255	31
3	JPN	169	141	246	139	174	209	207	168	228	237	138	294	173	149	159	0	593	62
26	CZE	207	237	478	259	721	460	444	459	527	661	575	793	549	485	192	147	0	77
2	EST	17	28	31	17	52	42	33	25	36	48	51	70	34	51	15	13	38	0
0	FRR	6	31	9	18	84	26	8	12	17	29	30	13	4	76	4	3	22	1
9	IRL	272	261	314	276	314	351	341	306	636	397	263	407	230	222	195	138	242	23
0	KOR	128	84	390	110	157	189	217	138	257	350	105	635	234	215	147	136	233	13
12	PRT	242	314	677	298	449	506	568	436	604	711	395	856	421	508	252	190	444	40
8	SVN	31	50	61	42	105	85	60	53	77	99	87	82	50	80	26	24	75	13

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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	FRR	IRL	KOR	SVN	PRT														
	AUS	0	317	650	336	664	599	455	634	668	628	696	821	354	396	430	253	425	420
51	8	324	214	78	379														
	BEL	230	0	384	346	547	438	372	488	467	485	672	477	266	339	205	177	268	344
39	36	273	151	91	345														
	CAN	509	345	0	615	1501	884	953	989	1111	1269	927	2192	626	727	306	323	917	796
85	13	339	453	108	691														
	CHE	244	322	456	0	735	457	419	429	523	568	634	684	305	377	206	184	304	399
40	35	282	174	83	362														
	DEU	255	395	412	436	0	1687	1066	1694	1368	2004	1951	2250	782	1163	387	328	975	1320
124	110	475	369	162	734														
	DFS	309	357	525	382	605	0	742	1208	1103	1234	1332	1386	583	844	401	336	653	895
91	26	454	318	139	629														
	ESP	290	331	495	316	441	458	0	828	824	1019	801	1152	525	631	262	315	645	663
75	13	338	319	109	598														
	FRA	302	428	474	348	488	420	491	0	1168	1436	1464	1930	622	959	429	310	909	939
87	16	442	336	107	592														
	GBR	469	429	1028	502	583	669	629	570	0	1291	1299	1554	606	793	411	346	708	817
89	21	591	355	134	687														
	ITA	360	408	780	493	867	759	681	549	922	0	1368	2075	741	987	403	354	899	1049
105	31	448	441	154	782														
	NLD	478	695	701	592	900	871	627	636	977	956	0	1759	629	946	522	334	721	1063
122	87	548	319	148	729														
	USA	562	371	1884	583	644	718	650	766	1231	1153	1242	0	859	1102	476	410	1411	1210
125	22	447	592	134	887														
	HUN	212	216	512	242	431	387	393	339	471	559	446	724	0	526	230	257	457	661
64	4	272	297	87	458														
	POL	191	253	432	262	524	480	365	385	510	623	620	743	370	0	255	240	534	795
101	71	315	323	129	577														
	NZL	305	147	246	163	197	233	206	189	303	277	447	384	175	140	0	187	265	278
28	5	284	133	41	242														
	ZAF	214	153	300	161	227	257	290	214	318	301	298	429	223	169	167	0	261	258
32	5	204	189	54	267														
	JPN	169	141	246	139	174	209	202	173	228	237	211	294	173	149	105	159	0	593
62	3	260	344	82	438														
	CZE	207	239	478	271	723	463	421	490	529	661	822	796	549	489	169	192	147	0
81	26	323	340	132	564														
	EST	17	28	31	17	52	42	28	25	36	48	70	70	34	51	12	15	13	39
0	2	43	35	23	67														
	FRR	6	32	9	27	84	26	8	12	17	29	53	13	4	76	5	4	3	22
1	0	9	1	13	12														
	IRL	272	262	314	278	315	350	319	333	645	398	495	407	230	223	230	195	138	242
23	9	0	150	66	304														
	KOR	129	85	394	112	159	190	216	147	259	352	189	645	236	217	84	149	137	233
13	0	100	0	60	314														
	SVN	46	73	78	58	131	111	75	69	103	130	121	105	64	100	31	39	39	96
17	12	51	36	0	104														
	PRT	241	316	677	307	452	512	548	444	603	713	697	858	420	515	176	252	190	451
41	12	265	257	82	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	FRR	IRL	KOR	PRT	SVN														
	AUS	0	292	650	336	664	599	456	634	668	628	694	821	354	396	430	252	235	420
51	8	324	211	380	53														
	BEL	229	0	367	338	524	417	357	450	445	466	592	436	251	326	190	166	176	329
39	34	264	141	332	62														
	CAN	509	340	0	615	1501	884	954	989	1111	1269	924	2192	626	727	306	322	615	796
85	13	339	449	691	83														
	CHE	244	320	456	0	735	457	419	429	523	568	632	684	305	377	206	183	224	399
40	35	282	172	362	58														
	DEU	255	392	412	436	0	1687	1066	1694	1368	2004	1946	2250	782	1163	387	327	697	1320
124	110	475	365	734	128														
	DFS	310	356	525	382	605	0	743	1208	1103	1234	1324	1386	583	844	401	335	425	895
91	26	454	315	630	107														
	ESP	291	330	496	316	441	461	0	830	826	1021	798	1154	527	631	262	314	468	664
75	13	339	316	600	81														
	FRA	302	423	474	348	488	423	494	0	1168	1436	1452	1930	622	959	429	309	576	939
87	16	442	333	594	83														
	GBR	469	424	1028	502	583	671	631	570	0	1291	1297	1554	606	793	411	345	467	817
89	21	591	353	689	101														
	ITA	360	406	780	493	867	760	683	549	922	0	1367	2075	741	987	403	353	660	1049
105	31	448	438	782	120														
	NLD	478	615	701	592	899	871	626	636	976	956	0	1752	629	945	521	333	476	1063
121	87	547	314	729	109														
	USA	562	362	1884	583	644	718	652	766	1231	1153	1239	0	859	1102	476	409	892	1210
125	22	447	586	888	102														
	HUN	212	214	512	242	431	389	394	339	471	559	446	724	0	526	230	256	339	661
64	4	272	295	459	70														
	POL	191	252	432	262	524	480	366	385	510	623	620	743	370	0	255	239	432	795
101	71	315	321	577	104														
	NZL	305	144	246	163	197	233	207	189	303	277	447	384	175	140	0	187	151	278
28	5	284	131	242	31														
	ZAF	213	151	299	160	226	256	289	213	317	300	297	428	222	168	167	0	164	257
32	5	203	186	267	36														
	JPN	133	113	203	120	145	177	160	144	182	202	169	237	142	138	80	113	0	452
50	2	176	257	328	56														
	CZE	207	238	478	271	723	465	422	490	529	661	822	796	549	489	169	192	129	0
81	26	323	339	565	104														
	EST	17	28	31	17	52	42	28	25	36	48	70	70	34	51	12	15	13	39
0	2	43	35	67	19														
	FRR	6	32	9	27	84	26	8	12	17	29	53	13	4	76	5	4	2	22
1	0	9	1	12	8														
	IRL	272	260	314	278	315	351	320	333	645	398	495	407	230	223	230	194	114	242
23	9	0	148	304	45														
	KOR	129	85	394	112	159	190	217	147	259	352	189	640	236	217	84	149	120	233
13	0	100	0	313	47														
	PRT	241	313	677	307	452	513	549	446	604	713	697	858	421	515	176	252	159	452
41	12	265	257	0	78														
	SVN	31	50	61	43	105	85	54	53	77	99	88	82	50	80	24	26	24	76
13	8	38	29	62	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	FRR	IRL	KOR	SVN	PRT														
	AUS	0	317	650	336	664	599	461	634	668	628	696	821	354	396	430	253	425	420
51	8	324	211	77	380														
	BEL	230	0	384	346	547	438	375	488	467	485	672	477	266	339	205	177	268	344
39	36	273	149	90	346														
	CAN	509	345	0	615	1501	884	959	989	1111	1269	927	2192	626	727	306	323	917	796
85	13	339	448	107	691														
	CHE	244	322	456	0	735	457	422	429	523	568	634	684	305	377	206	184	304	399
40	35	282	172	82	362														
	DEU	255	395	412	436	0	1687	1078	1694	1368	2004	1951	2250	782	1163	387	328	975	1320
124	110	475	365	161	734														
	DFS	310	358	525	382	605	0	753	1208	1103	1234	1332	1386	583	844	401	336	653	895
91	26	454	315	139	631														
	ESP	295	333	498	321	456	469	0	837	834	1031	811	1162	527	637	265	316	650	668
76	13	342	316	109	605														
	FRA	302	428	474	348	488	423	503	0	1168	1436	1464	1930	622	959	429	310	909	939
87	16	442	332	106	595														
	GBR	469	429	1028	502	583	671	639	570	0	1291	1299	1554	606	793	411	346	708	817
89	21	591	353	133	689														
	ITA	360	408	780	493	867	760	698	549	922	0	1368	2075	741	987	403	354	899	1049
105	31	448	437	153	783														
	NLD	478	695	701	592	900	871	637	636	977	956	0	1759	629	946	522	334	721	1063
122	87	548	314	147	730														
	USA	562	371	1884	583	644	719	658	766	1231	1153	1242	0	859	1102	476	410	1411	1210
125	22	447	583	133	889														
	HUN	212	216	512	242	431	389	394	339	471	559	446	724	0	526	230	257	457	661
64	4	272	294	86	460														
	POL	191	253	432	262	524	480	370	385	510	623	620	743	370	0	255	240	534	795
101	71	315	321	128	578														
	NZL	305	147	246	163	197	233	208	189	303	277	447	384	175	140	0	187	265	278
28	5	284	131	41	242														
	ZAF	214	153	300	161	227	257	292	214	318	301	298	429	223	169	167	0	261	258
32	5	204	187	54	267														
	JPN	169	141	246	139	174	209	204	173	228	237	211	294	173	149	105	159	0	593
62	3	260	342	81	439														
	CZE	207	239	478	271	723	465	426	490	529	661	822	796	549	489	169	192	147	0
81	26	323	340	131	566														
	EST	17	28	31	17	52	42	28	25	36	48	70	70	34	51	12	15	13	39
0	2	43	35	23	67														
	FRR	6	32	9	27	84	26	8	12	17	29	53	13	4	76	5	4	3	22
1	0	9	1	13	12														
	IRL	272	262	314	278	315	351	324	333	645	398	495	407	230	223	230	195	138	242
23	9	0	148	66	304														
	KOR	128	84	390	111	157	189	215	144	257	349	186	635	234	215	83	147	136	233
13	0	100	0	59	312														
	SVN	46	73	78	58	130	111	77	69	103	130	121	105	64	100	31	39	39	96
17	12	51	35	0	103														
	PRT	242	318	677	307	452	515	556	448	606	713	700	858	423	517	176	252	190	453
41	12	266	255	82	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	ZAF	JPN	CZE	EST	
FRR	IRL	KOR	SVN	PRT															
8	AUS	0	255	467	294	518	456	369	339	524	482	492	547	285	304	185	302	274	44
32	BEL	274	124	74	324														
11	BEL	219	0	347	332	504	401	349	362	427	450	554	415	247	301	146	231	267	38
32	CAN	250	101	88	325														
11	CAN	398	335	0	580	1420	790	889	665	1016	1215	787	1998	604	675	261	793	662	80
32	CHE	311	346	105	674														
32	CHE	233	316	441	0	735	456	423	341	523	568	601	684	303	351	162	296	321	40
98	DEU	273	124	80	358														
98	DEU	239	379	408	436	0	1686	1078	1276	1366	2004	1816	2250	779	1110	284	939	1089	124
25	DFS	457	286	159	730														
25	DFS	296	350	522	382	605	0	746	811	1097	1229	1216	1384	578	790	284	609	709	91
12	ESP	428	230	138	625														
12	ESP	271	329	486	323	463	474	0	628	830	1036	758	1161	528	605	271	616	564	76
10	FRA	330	239	110	606														
10	FRA	204	330	344	277	330	335	406	0	797	1070	932	1144	487	791	183	591	706	70
19	GBR	303	218	97	469														
19	GBR	416	412	955	501	583	669	646	415	0	1290	1182	1545	603	747	291	660	663	88
31	ITA	546	266	131	683														
31	ITA	329	400	771	493	867	759	708	421	920	0	1288	2073	738	951	310	861	892	105
75	NLD	432	349	151	778														
75	NLD	388	574	624	563	847	842	602	449	898	907	0	1427	591	872	267	618	895	118
20	USA	486	229	145	702														
20	USA	444	357	1771	583	644	718	661	431	1230	1153	969	0	856	1050	344	1282	1002	125
4	HUN	419	452	131	882														
4	HUN	202	210	506	242	431	389	397	279	470	559	432	724	0	499	230	441	545	64
71	POL	259	240	85	459														
71	POL	176	240	411	249	503	456	346	332	487	609	585	713	352	0	201	499	693	99
5	ZAF	278	274	126	556														
5	ZAF	177	139	255	146	203	234	252	139	270	271	240	347	207	153	0	209	197	31
3	JPN	164	123	53	251														
3	JPN	163	140	242	139	173	207	200	147	225	234	206	289	171	143	150	0	483	60
25	CZE	233	256	82	432														
25	CZE	155	194	400	215	594	385	329	343	417	554	711	644	440	433	144	133	0	73
2	EST	246	270	123	494														
2	EST	17	28	31	17	52	42	28	21	36	48	69	70	34	50	15	13	34	0
0	FRR	41	30	23	67														
0	FRR	6	30	9	27	76	25	8	8	16	29	50	13	4	76	4	3	21	1
9	IRL	9	1	11	12														
9	IRL	253	253	311	275	313	349	325	246	611	395	465	401	228	209	165	137	187	23
0	KOR	0	94	65	291														
0	KOR	75	65	303	86	123	146	153	119	184	278	132	485	186	194	90	105	190	11
11	SVN	66	0	51	256														
11	SVN	46	71	77	57	129	111	78	63	102	128	118	104	63	99	39	39	92	17
12	PRT	51	33	0	103														
12	PRT	238	311	656	304	452	513	559	389	604	713	679	856	423	505	242	188	394	41
		263	211	82	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	ZAF	JPN	CZE	EST	
FRR	IRL	KOR	SVN	PRT															
8	AUS	0	289	642	335	362	593	460	625	662	625	661	813	352	392	253	424	417	49
34	BEL	229	0	364	336	373	414	362	447	444	461	585	434	250	324	166	246	327	38
13	CAN	508	340	0	614	1029	883	962	974	1111	1266	880	2192	623	722	323	917	790	82
35	CHE	244	320	456	0	497	456	426	425	522	564	622	683	304	375	184	303	396	40
47	DEU	181	293	316	309	0	989	778	1028	859	1402	1208	1408	528	856	187	615	912	94
26	DFS	310	355	525	382	438	0	763	1179	1100	1225	1276	1382	578	838	336	653	887	88
13	ESP	300	344	502	328	322	483	0	839	845	1043	802	1175	531	643	320	654	673	76
15	FRA	302	423	474	348	298	422	529	0	1153	1425	1308	1891	618	949	309	896	932	84
21	GBR	468	424	1028	502	400	671	661	570	0	1289	1253	1551	604	788	345	708	811	88
31	ITA	360	403	780	492	594	758	726	548	921	0	1329	2073	736	978	353	896	1042	102
80	NLD	471	613	688	589	586	867	653	599	956	948	0	1587	611	921	322	680	1048	119
21	USA	560	362	1884	583	423	718	672	731	1231	1153	1189	0	856	1095	410	1411	1205	124
4	HUN	212	213	512	242	298	386	401	339	471	557	443	724	0	523	256	456	657	62
70	POL	191	251	432	261	421	477	383	385	508	620	611	743	368	0	239	531	787	97
5	ZAF	214	151	300	161	137	257	294	214	318	301	292	429	223	169	0	261	257	32
3	JPN	169	141	246	139	136	209	206	173	228	237	210	294	173	149	159	0	590	61
26	CZE	207	236	478	270	524	464	438	490	528	658	819	796	547	486	192	147	0	77
2	EST	17	27	31	17	38	41	31	25	35	47	69	70	33	48	15	13	37	0
0	FRR	6	32	9	27	35	26	8	12	17	29	51	13	4	76	4	3	22	1
9	IRL	272	260	314	278	213	351	336	333	639	398	491	407	230	223	195	138	242	23
0	KOR	128	84	389	111	125	189	215	144	257	348	183	628	234	215	147	136	233	13
12	SVN	46	72	78	58	120	109	82	69	103	128	120	105	63	98	39	39	95	16
12	PRT	242	316	677	308	354	515	570	449	608	715	696	861	425	519	252	190	455	40

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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	FRR	IRL	KOR	SVN	PRT														
	AUS	0	311	650	336	664	598	467	588	668	628	643	821	354	395	430	253	425	420
51	8	324	212	78	380														
	BEL	230	0	380	345	542	434	378	469	462	482	625	464	264	337	202	176	262	343
39	36	272	150	91	345														
	CAN	509	345	0	615	1500	884	962	910	1111	1269	852	2192	626	727	306	323	917	796
85	13	339	451	108	691														
	CHE	244	321	456	0	735	457	426	418	523	568	611	684	305	377	206	184	304	399
40	35	282	173	83	362														
	DEU	255	395	412	436	0	1687	1090	1658	1368	2004	1861	2250	782	1162	387	328	975	1320
124	110	475	367	162	734														
	DFS	310	358	525	382	605	0	763	1130	1102	1233	1254	1385	582	843	400	336	653	895
91	26	453	317	139	630														
	ESP	300	345	502	328	479	483	0	812	846	1046	790	1175	534	647	272	320	654	676
78	13	349	321	112	615														
	FRA	301	426	471	348	485	420	529	0	1111	1394	1263	1729	608	947	396	295	831	929
84	15	424	317	107	586														
	GBR	469	429	1028	502	583	671	661	565	0	1291	1234	1553	606	793	411	346	708	817
89	21	589	354	134	689														
	ITA	360	408	780	493	867	760	726	545	922	0	1313	2075	741	987	403	354	899	1049
105	31	448	440	154	782														
	NLD	450	646	645	568	861	846	627	584	924	917	0	1523	608	924	495	315	652	1046
119	78	534	301	148	711														
	USA	562	371	1884	583	644	719	672	695	1231	1153	1001	0	859	1102	476	410	1411	1210
125	22	446	589	134	888														
	HUN	212	216	512	242	431	389	401	338	471	559	429	724	0	526	230	257	457	661
64	4	272	297	87	459														
	POL	191	253	432	262	524	480	384	385	510	623	611	743	370	0	255	240	534	795
101	71	315	323	129	577														
	NZL	305	147	246	163	197	233	213	187	303	277	426	384	175	140	0	187	265	278
28	5	284	132	41	242														
	ZAF	214	153	300	161	227	257	294	212	318	301	278	429	223	169	167	0	261	258
32	5	204	188	54	267														
	JPN	169	141	246	139	174	209	206	173	228	237	209	294	173	149	105	159	0	593
62	3	260	343	82	439														
	CZE	207	239	478	271	723	465	438	488	529	661	806	796	549	489	169	192	147	0
81	26	323	340	132	565														
	EST	17	28	31	17	52	42	31	25	36	48	69	70	34	51	12	15	13	39
0	2	43	35	23	67														
	FRR	6	32	9	27	84	26	8	12	17	29	51	13	4	76	5	4	3	22
1	0	9	1	13	12														
	IRL	272	262	314	278	315	351	336	331	643	398	480	407	230	223	230	195	138	242
23	9	0	149	66	304														
	KOR	129	85	393	112	159	190	218	146	259	352	180	640	236	217	84	148	137	233
13	0	100	0	60	314														
	SVN	46	73	78	58	131	111	82	69	103	130	119	105	64	100	31	39	39	96
17	12	51	36	0	104														
	PRT	242	316	677	307	452	514	566	445	605	713	682	858	421	516	176	252	190	452
41	12	266	257	82	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	FRR	IRL	KOR	SVN	PRT														
	AUS	0	311	650	336	664	550	462	631	668	628	673	821	354	396	430	253	425	420
51	8	324	212	78	380														
	BEL	230	0	380	345	542	427	375	477	462	482	637	464	264	337	202	176	262	343
39	36	272	150	91	344														
	CAN	509	345	0	615	1501	804	960	974	1111	1269	896	2192	626	727	306	323	917	796
85	13	339	451	108	689														
	CHE	244	321	456	0	735	438	424	425	523	568	626	684	305	377	206	184	304	399
40	35	282	173	83	362														
	DEU	255	395	412	436	0	1597	1080	1682	1368	2004	1910	2250	782	1163	387	328	975	1320
124	110	475	367	162	732														
	DFS	310	357	525	382	603	0	711	1097	1042	1189	1255	1289	566	819	372	308	597	862
87	26	434	303	139	620														
	ESP	295	334	499	323	458	470	0	827	836	1033	798	1164	528	639	266	318	651	669
76	13	343	319	110	604														
	FRA	302	428	474	348	486	422	506	0	1155	1426	1345	1891	620	955	425	309	896	935
86	16	437	331	107	590														
	GBR	469	428	1027	502	582	669	639	569	0	1291	1271	1553	606	793	411	346	708	817
89	21	589	354	134	687														
	ITA	360	408	780	493	867	758	700	548	921	0	1346	2075	741	987	403	354	899	1049
105	31	448	440	154	781														
	NLD	475	667	694	591	892	869	637	612	964	955	0	1632	620	937	509	324	688	1059
121	84	541	313	148	723														
	USA	562	371	1884	583	644	718	660	731	1231	1153	1205	0	859	1102	476	410	1411	1210
125	22	446	590	134	886														
	HUN	212	216	512	242	431	389	396	339	471	559	446	724	0	526	230	257	457	661
64	4	272	297	87	459														
	POL	191	253	432	262	524	480	372	385	510	623	619	743	370	0	255	240	534	795
101	71	315	323	129	575														
	NZL	305	147	246	163	197	233	208	189	303	277	445	384	175	140	0	187	265	278
28	5	284	132	41	242														
	ZAF	214	153	300	161	227	257	293	214	318	301	296	429	223	169	167	0	261	258
32	5	204	188	54	266														
	JPN	169	141	246	139	174	209	205	173	228	237	211	294	173	149	105	159	0	593
62	3	260	343	82	439														
	CZE	207	239	478	271	723	465	428	490	529	661	822	796	549	489	169	192	147	0
81	26	323	340	132	564														
	EST	17	28	31	17	52	42	28	25	36	48	70	70	34	51	12	15	13	39
0	2	43	35	23	66														
	FRR	6	32	9	27	84	26	8	12	17	29	53	13	4	76	5	4	3	22
1	0	9	1	13	12														
	IRL	272	262	314	278	315	350	325	333	643	398	492	407	230	223	230	195	138	242
23	9	0	149	66	304														
	KOR	129	85	394	112	159	190	218	147	259	352	187	641	236	217	84	149	137	233
13	0	100	0	60	314														
	SVN	46	73	78	58	131	111	77	69	103	130	121	105	64	100	31	39	39	96
17	12	51	36	0	104														
	PRT	242	316	677	307	452	511	556	447	605	713	695	858	421	516	176	252	190	452
41	12	266	257	82	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	FRR	IRL	KOR	SVN	PRT														
	AUS	0	311	650	336	664	599	470	634	668	628	696	821	354	396	430	253	425	420
51	8	324	210	78	380														
	BEL	230	0	380	345	542	435	381	478	462	482	643	464	264	337	202	176	262	343
39	36	272	148	91	346														
	CAN	509	345	0	615	1501	884	966	989	1111	1269	927	2192	626	727	306	323	917	796
85	13	339	447	108	691														
	CHE	244	321	456	0	735	457	428	429	523	568	634	684	305	377	206	184	304	399
40	35	282	171	83	362														
	DEU	255	395	412	436	0	1687	1100	1694	1368	2004	1951	2250	782	1163	387	328	975	1320
124	110	475	364	162	734														
	DFS	310	358	526	382	605	0	770	1208	1103	1234	1332	1386	583	844	401	336	653	895
91	26	454	314	139	631														
	ESP	301	349	504	329	493	492	0	856	852	1057	835	1180	537	654	275	320	658	680
79	13	353	319	113	619														
	FRA	302	428	474	348	488	423	540	0	1168	1436	1464	1930	622	959	429	310	909	939
87	16	442	331	107	595														
	GBR	469	429	1028	502	583	671	668	570	0	1291	1299	1554	606	793	411	346	708	817
89	21	591	352	134	689														
	ITA	360	408	780	493	867	760	741	549	922	0	1368	2075	741	987	403	354	899	1049
105	31	448	436	154	783														
	NLD	478	674	701	592	900	871	670	636	977	956	0	1759	629	946	522	334	721	1063
122	87	548	313	148	730														
	USA	562	371	1884	583	644	720	676	766	1231	1153	1242	0	859	1102	476	410	1411	1210
125	22	447	581	134	889														
	HUN	212	216	512	242	431	390	405	339	471	559	446	724	0	526	230	257	457	661
64	4	272	293	87	460														
	POL	191	253	432	262	524	480	392	385	510	623	620	743	370	0	255	240	534	795
101	71	315	320	129	578														
	NZL	305	147	246	163	197	233	214	189	303	277	447	384	175	140	0	187	265	278
28	5	284	130	41	242														
	ZAF	214	153	300	161	227	258	294	214	318	301	298	429	223	169	167	0	261	258
32	5	204	186	54	267														
	JPN	169	141	246	139	174	209	207	173	228	237	211	294	173	149	105	159	0	593
62	3	260	341	82	439														
	CZE	207	239	478	271	723	465	442	490	529	661	822	796	549	489	169	192	147	0
81	26	323	340	132	566														
	EST	17	28	31	17	52	42	32	25	36	48	70	70	34	51	12	15	13	39
0	2	43	35	23	67														
	FRR	6	32	9	27	84	26	8	12	17	29	53	13	4	76	5	4	3	22
1	0	9	1	13	12														
	IRL	272	262	314	278	315	351	340	333	645	398	495	407	230	223	230	195	138	242
23	9	0	147	66	304														
	KOR	127	83	389	110	156	188	215	143	256	348	185	633	233	215	82	146	135	233
13	0	99	0	59	311														
	SVN	46	73	78	58	131	111	83	69	103	130	121	105	64	100	31	39	39	96
17	12	51	35	0	104														
	PRT	242	318	677	307	452	515	569	448	606	713	700	858	423	517	176	252	190	453
41	12	266	254	82	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	ZAF	JPN	CZE	EST	
FRR	IRL	KOR	SVN	PRT															
	AUS	0	314	642	335	662	595	452	626	662	627	692	813	354	394	253	424	419	51
8	321	212	78	378															
	BEL	230	0	382	345	543	436	374	484	465	482	668	474	264	337	176	266	342	39
36	271	148	91	343															
	CAN	508	344	0	615	1501	884	958	989	1111	1269	927	2192	626	727	323	917	796	85
13	339	450	108	691															
	CHE	244	322	456	0	735	457	421	429	523	568	634	684	305	377	184	304	399	40
35	282	173	83	362															
	DEU	255	395	412	436	0	1687	1072	1694	1368	2004	1951	2250	782	1163	328	975	1320	124
110	475	366	162	734															
	DFS	310	358	526	382	605	0	748	1208	1103	1234	1332	1386	583	844	336	653	895	91
26	454	316	139	630															
	ESP	293	333	497	319	448	465	0	834	831	1028	807	1159	527	634	315	650	665	76
13	341	317	109	603															
	FRA	302	428	474	348	488	423	498	0	1168	1436	1464	1930	622	959	310	909	939	87
16	442	334	107	594															
	GBR	468	429	1028	502	583	671	635	570	0	1291	1299	1554	606	793	346	708	817	89
21	588	354	134	689															
	ITA	360	408	780	493	867	760	691	549	922	0	1368	2075	741	987	354	899	1049	105
31	448	439	154	782															
	NLD	478	691	701	592	900	871	632	636	977	956	0	1759	629	946	334	721	1063	122
87	548	316	148	729															
	USA	560	370	1884	583	644	720	655	766	1231	1153	1242	0	859	1102	410	1411	1210	125
22	447	588	134	888															
	HUN	212	216	512	242	431	390	394	339	471	559	446	724	0	526	257	457	661	64
4	272	296	87	459															
	POL	191	253	432	262	524	480	367	385	510	623	620	743	370	0	240	534	795	101
71	315	322	129	577															
	ZAF	214	153	300	161	227	258	290	214	318	301	298	429	223	169	0	261	258	32
5	204	188	54	267															
	JPN	169	141	246	139	174	209	204	173	228	237	211	294	173	149	159	0	593	62
3	260	343	82	439															
	CZE	207	239	478	271	723	465	423	490	529	661	822	796	549	489	192	147	0	81
26	323	340	132	565															
	EST	17	28	31	17	52	42	28	25	36	48	70	70	34	51	15	13	39	0
2	43	35	23	67															
	FRR	6	32	9	27	84	26	8	12	17	29	53	13	4	76	4	3	22	1
0	9	1	13	12															
	IRL	272	262	314	278	315	351	321	333	642	398	495	407	230	223	195	138	242	23
9	0	149	66	304															
	KOR	129	85	394	112	159	190	217	147	259	352	189	641	236	217	149	137	233	13
0	100	0	60	314															
	SVN	46	73	78	58	131	111	75	69	103	130	121	105	64	100	39	39	96	17
12	51	36	0	104															
	PRT	241	315	677	307	452	513	551	446	604	713	697	858	421	515	252	190	452	41
12	265	257	82	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	FRR	IRL	KOR	SVN	PRT														
	AUS	0	311	650	336	664	599	462	634	668	628	696	821	354	396	430	253	425	420
51	8	324	212	76	380														
	BEL	230	0	380	345	542	435	375	478	462	482	643	464	264	337	202	176	262	343
39	36	272	150	89	345														
	CAN	509	345	0	615	1501	884	959	989	1111	1269	927	2192	626	727	306	323	917	796
85	13	339	451	106	691														
	CHE	244	321	456	0	735	457	423	429	523	568	634	684	305	377	206	184	304	399
40	35	282	173	81	362														
	DEU	255	395	412	436	0	1687	1079	1694	1368	2004	1951	2250	782	1163	387	328	975	1320
124	110	475	367	160	734														
	DFS	310	358	526	382	605	0	753	1208	1103	1234	1332	1386	583	844	401	336	653	895
91	26	454	317	138	630														
	ESP	295	334	498	321	456	469	0	838	835	1032	812	1163	527	638	266	317	650	668
76	13	342	318	109	605														
	FRA	302	428	474	348	488	423	504	0	1168	1436	1464	1930	622	959	429	310	909	939
87	16	442	335	105	594														
	GBR	469	429	1028	502	583	671	639	570	0	1291	1299	1554	606	793	411	346	708	817
89	21	591	354	132	689														
	ITA	360	408	780	493	867	760	698	549	922	0	1368	2075	741	987	403	354	899	1049
105	31	448	440	152	782														
	NLD	478	674	701	592	900	871	637	636	977	956	0	1759	629	946	522	334	721	1063
122	87	548	318	146	729														
	USA	562	371	1884	583	644	719	658	766	1231	1153	1242	0	859	1102	476	410	1411	1210
125	22	447	590	132	888														
	HUN	212	216	512	242	431	390	394	339	471	559	446	724	0	526	230	257	457	661
64	4	272	297	85	459														
	POL	191	253	432	262	524	480	371	385	510	623	620	743	370	0	255	240	534	795
101	71	315	323	127	577														
	NZL	305	147	246	163	197	233	208	189	303	277	447	384	175	140	0	187	265	278
28	5	284	132	41	242														
	ZAF	214	153	300	161	227	258	292	214	318	301	298	429	223	169	167	0	261	258
32	5	204	188	53	267														
	JPN	169	141	246	139	174	209	204	173	228	237	211	294	173	149	105	159	0	593
62	3	260	343	81	439														
	CZE	207	239	478	271	723	465	426	490	529	661	822	796	549	489	169	192	147	0
81	26	323	340	130	565														
	EST	17	28	31	17	52	42	28	25	36	48	70	70	34	51	12	15	13	39
0	2	43	35	22	67														
	FRR	6	32	9	27	84	26	8	12	17	29	53	13	4	76	5	4	3	22
1	0	9	1	13	12														
	IRL	272	262	314	278	315	351	324	333	645	398	495	407	230	223	230	195	138	242
23	9	0	149	65	304														
	KOR	129	85	394	112	159	190	217	147	259	352	189	641	236	217	84	149	137	233
13	0	100	0	59	314														
	SVN	46	73	78	58	130	111	77	69	103	129	120	104	63	99	31	39	39	96
17	12	51	36	0	103														
	PRT	242	316	677	307	452	514	555	447	605	713	698	858	421	516	176	252	190	452
41	12	266	257	82	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	ZAF	JPN	CZE	EST	
FRR	IRL	KOR	SVN	PRT															
	AUS	0	316	642	335	662	595	452	626	662	627	692	813	343	394	253	417	419	51
8	321	214	76	378															
	BEL	230	0	384	346	547	438	375	488	467	485	672	477	262	339	177	268	344	39
36	273	151	89	345															
	CAN	508	345	0	615	1501	884	958	989	1111	1269	927	2192	612	727	323	910	795	85
13	339	453	106	691															
	CHE	244	322	456	0	735	457	421	429	523	568	634	684	299	377	184	304	399	40
35	282	174	81	362															
	DEU	255	395	412	436	0	1687	1072	1694	1368	2004	1951	2250	764	1163	328	972	1320	124
110	475	369	160	734															
	DFS	310	358	526	382	605	0	748	1208	1103	1234	1332	1386	568	844	336	647	895	91
26	454	318	138	630															
	ESP	293	333	497	319	449	465	0	834	831	1028	807	1159	517	634	315	641	665	76
13	341	320	108	603															
	FRA	302	428	474	348	488	423	498	0	1168	1436	1464	1930	604	959	310	896	939	87
16	442	336	105	594															
	GBR	468	429	1028	502	583	671	636	570	0	1291	1299	1554	591	793	346	703	817	89
21	588	355	132	689															
	ITA	360	408	780	493	867	760	692	549	922	0	1368	2075	728	987	354	893	1049	105
31	448	441	152	782															
	NLD	478	695	701	592	900	871	633	636	977	956	0	1759	611	946	334	714	1063	122
87	548	319	146	729															
	USA	560	371	1884	583	644	720	655	766	1231	1153	1242	0	829	1102	410	1392	1209	125
22	447	592	132	888															
	HUN	204	209	498	238	422	381	380	331	455	543	433	698	0	520	248	447	648	64
4	265	295	85	457															
	POL	191	253	432	262	524	480	367	385	510	623	620	743	366	0	240	532	795	101
71	315	323	127	577															
	ZAF	214	153	300	161	227	258	290	214	318	301	298	429	212	169	0	259	258	32
5	204	189	53	267															
	JPN	169	141	246	139	174	209	204	173	228	237	211	294	167	149	159	0	592	61
3	258	344	81	439															
	CZE	207	239	478	271	723	465	424	490	529	660	822	796	537	489	192	147	0	81
26	323	340	130	565															
	EST	17	28	31	17	52	42	28	25	36	48	70	70	34	51	15	13	39	0
2	43	35	22	67															
	FRR	6	32	9	27	84	26	8	12	17	29	53	13	4	76	4	3	22	1
0	9	1	13	12															
	IRL	272	262	314	278	315	351	322	333	642	398	495	407	222	223	195	138	242	23
9	0	150	65	304															
	KOR	129	85	394	112	159	190	217	147	259	352	189	645	234	217	149	137	233	13
0	100	0	59	314															
	SVN	46	73	78	58	130	111	75	69	103	129	120	104	63	99	39	39	96	17
12	51	36	0	103															
	PRT	241	316	677	307	452	513	552	446	604	713	697	858	418	515	252	190	452	41
12	265	257	82	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	POL	NZL	JPN	CZE	EST	FRR
IRL	KOR	SVN	PRT	ZAF														
AUS	0	244	409	265	436	367	327	374	444	412	420	425	253	261	202	251	40	6
231	96	71	251	118														
BEL	211	0	374	324	511	390	370	467	407	467	549	385	264	195	178	271	39	35
229	84	89	288	93														
CAN	361	343	0	578	1433	727	959	989	929	1251	771	1780	621	300	615	664	83	13
274	270	106	572	173														
CHE	218	306	426	0	624	401	417	424	471	536	506	573	290	200	223	308	38	22
237	97	79	296	97														
DEU	217	384	400	369	0	1439	1052	1620	1151	1940	1664	1794	999	360	694	1077	120	100
376	223	160	608	167														
DFS	260	330	495	344	549	0	648	979	859	1093	1108	989	684	315	412	679	82	26
340	170	134	503	166														
ESP	242	337	499	320	450	422	0	844	722	1030	712	993	538	267	470	561	75	13
274	187	109	506	168														
FRA	235	428	474	343	438	385	515	0	885	1404	1079	1241	806	420	576	758	84	16
331	188	105	471	146														
GBR	366	387	870	448	509	568	532	464	0	1107	999	1176	647	303	452	634	77	16
398	201	130	544	173														
ITA	293	406	778	470	844	696	705	541	806	0	1197	1681	863	388	660	887	104	31
368	266	152	656	192														
NLD	337	556	585	478	773	774	561	523	743	851	0	1146	784	396	467	873	114	70
410	171	143	578	165														
USA	361	342	1611	503	548	619	552	502	1011	1015	801	0	905	303	852	951	115	15
322	348	129	682	202														
POL	144	199	373	198	427	401	279	309	416	535	512	621	0	177	410	659	88	66
231	221	117	477	139														
NZL	215	146	245	160	191	201	209	189	236	268	348	255	97	0	149	188	26	5
222	64	40	174	86														
JPN	132	113	203	120	145	176	162	144	182	202	169	237	127	80	0	425	49	2
159	186	69	305	118														
CZE	147	194	400	207	592	380	329	361	410	551	704	628	412	120	125	0	71	25
229	211	123	457	158														
EST	17	28	31	17	51	39	28	25	33	48	66	67	42	12	13	33	0	2
34	26	22	59	24														
FRR	5	32	9	18	77	26	8	12	14	29	46	11	72	5	2	21	1	0
9	1	13	12	5														
IRL	222	232	270	244	272	290	272	268	417	340	399	331	170	189	114	183	21	9
0	67	63	231	97														
KOR	63	55	238	69	97	112	114	93	141	218	97	382	161	44	82	148	11	0
48	0	47	188	85														
SVN	45	73	78	57	130	109	78	69	101	129	119	104	89	31	34	92	17	12
51	31	0	96	44														
PRT	191	257	534	242	371	403	433	350	460	587	542	650	431	124	148	364	36	12
205	160	75	0	158														
ZAF	107	86	157	82	116	144	144	115	149	159	139	196	112	75	90	120	13	4
92	59	32	148	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	JPN	CZE	EST	
FRR	IRL	KOR	SVN	PRT															
8	AUS	0	317	650	336	664	599	464	518	668	628	696	819	354	395	430	425	420	51
36	BEL	324	214	53	381														
13	CAN	230	0	383	345	547	437	376	451	466	484	671	475	266	338	205	268	344	39
35	CHE	273	151	62	346														
110	DEU	509	345	0	615	1501	884	960	833	1111	1269	927	2183	626	726	306	917	796	85
26	DFS	339	455	83	695														
13	ESP	244	322	456	0	735	457	424	401	523	568	634	681	305	376	206	304	399	40
21	FRA	282	174	58	363														
31	GBR	255	395	412	436	0	1687	1083	1565	1368	2004	1951	2243	782	1162	387	975	1320	124
14	ITA	475	369	128	738														
21	NLD	310	358	526	382	605	0	757	1048	1103	1234	1332	1385	583	842	401	653	895	91
26	USA	453	319	107	633														
4	HUN	295	337	499	323	464	474	0	767	841	1040	820	1165	531	643	271	652	672	76
71	POL	347	322	81	613														
5	NZL	286	414	441	339	427	416	507	0	1033	1319	1214	1510	578	900	350	755	898	82
3	JPN	397	307	83	557														
26	CZE	469	429	1028	502	583	671	647	558	0	1291	1299	1551	606	792	411	708	817	89
5	EST	590	355	101	688														
12	AUS	360	408	780	493	867	760	710	529	922	0	1368	2071	741	987	403	899	1049	105
87	BEL	448	442	120	784														
20	CAN	478	695	701	592	900	871	647	576	977	956	0	1756	629	945	522	721	1063	122
4	CHE	548	319	109	734														
71	DEU	560	370	1866	579	638	717	662	608	1225	1147	1237	0	859	1098	476	1408	1207	124
5	DFS	446	594	102	890														
3	ESP	212	216	512	242	431	390	397	337	471	559	446	724	0	525	230	457	661	64
26	FRA	272	297	70	461														
5	GBR	191	253	432	262	524	480	374	377	510	623	620	741	370	0	255	533	795	101
12	ITA	315	323	104	580														
5	NLD	305	147	246	163	197	233	211	183	303	277	447	382	175	140	0	265	278	28
3	USA	284	134	31	242														
26	HUN	169	141	246	139	174	209	205	172	228	237	211	294	173	149	105	0	593	62
5	POL	260	345	59	441														
12	CZE	207	239	478	271	723	465	430	475	529	661	822	793	549	489	169	147	0	81
2	EST	323	340	104	565														
0	AUS	17	28	31	17	52	42	28	25	36	48	70	70	34	51	12	13	39	0
9	BEL	43	35	19	67														
0	CAN	6	32	9	27	84	26	8	12	17	29	53	12	4	76	5	3	22	1
9	CHE	9	1	8	12														
9	DEU	272	262	314	278	315	351	329	329	645	398	495	406	230	223	230	138	242	23
0	DFS	0	150	45	304														
8	ESP	129	85	394	112	159	190	218	144	259	352	189	645	236	217	84	137	233	13
12	FRA	100	0	47	315														
8	GBR	31	50	61	43	105	85	56	53	77	99	88	82	50	80	24	24	76	13
12	ITA	38	29	0	78														
12	NLD	242	320	678	309	456	517	563	441	608	714	705	856	424	520	176	190	454	41
12	USA	267	258	62	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	JPN	CZE	EST	
FRR	IRL	SVN	PRT																
8	AUS	0	317	650	336	664	599	464	634	668	628	696	821	354	396	430	425	420	51
36	312	53	380																
13	BEL	230	0	384	346	547	438	377	488	467	485	672	477	266	339	205	268	344	39
13	264	62	345																
110	CAN	509	345	0	615	1501	884	960	989	1111	1269	927	2192	626	727	306	917	796	85
110	326	83	691																
35	CHE	244	322	456	0	735	457	424	429	523	568	634	684	305	377	206	304	399	40
110	273	59	362																
26	DEU	255	395	412	436	0	1687	1083	1694	1368	2004	1951	2250	782	1163	387	975	1320	124
26	458	129	734																
13	DFS	310	358	526	382	605	0	757	1208	1103	1234	1332	1386	583	844	401	653	895	91
13	431	108	630																
21	ESP	295	337	499	323	464	474	0	845	841	1040	820	1169	531	643	271	652	672	76
21	333	81	610																
16	FRA	302	428	474	348	488	423	515	0	1168	1436	1464	1930	622	959	429	909	939	87
21	414	83	594																
31	GBR	469	428	1027	502	581	670	644	569	0	1291	1299	1554	606	793	411	708	817	89
31	553	102	689																
87	ITA	360	408	780	493	867	760	710	549	920	0	1368	2075	741	987	403	899	1049	105
87	433	121	782																
22	NLD	478	695	701	592	900	871	647	636	975	956	0	1759	629	946	522	721	1063	122
22	513	110	729																
4	USA	562	371	1884	583	644	720	664	766	1231	1153	1242	0	859	1102	476	1411	1210	125
4	421	103	888																
71	HUN	212	216	512	242	431	390	397	339	471	559	446	724	0	526	230	457	661	64
71	262	70	459																
5	POL	191	253	432	262	524	480	374	385	510	623	620	743	370	0	255	534	795	101
5	305	105	577																
3	NZL	305	147	246	163	197	233	211	189	303	277	447	384	175	140	0	265	278	28
3	270	31	242																
26	JPN	169	141	246	139	174	209	205	173	228	237	211	294	173	149	105	0	593	62
26	246	59	439																
2	CZE	207	239	478	271	723	465	430	490	528	661	822	796	549	489	169	147	0	81
2	309	105	565																
0	EST	17	28	31	17	52	42	28	25	36	48	70	70	34	51	12	13	39	0
0	42	19	67																
9	FRR	6	32	9	27	84	26	8	12	17	29	53	13	4	76	5	3	22	1
9	9	9	12																
8	IRL	271	261	313	276	313	350	326	328	621	395	487	401	228	223	226	138	241	23
8	0	45	294																
12	SVN	31	50	61	43	105	85	56	53	77	100	89	82	50	80	24	24	76	13
12	38	0	78																
12	PRT	242	316	677	307	452	514	560	447	604	713	698	858	421	516	176	190	452	41
12	266	62	0																

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HOL

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common bulls below diagonal

common three quarter sib group above diagonal

SVN	PRT	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	JPN	CZE	EST	IRL	
		AUS	0	309	642	335	662	595	458	502	662	627	672	811	343	392	417	419	51	309
53	380	BEL	230	0	378	343	541	433	374	442	460	480	631	459	259	335	258	343	39	262
62	345	CAN	508	345	0	615	1501	884	961	817	1111	1269	895	2184	612	726	901	795	85	326
83	695	CHE	244	321	456	0	735	457	425	391	523	568	622	682	299	375	303	399	40	273
58	363	DEU	255	395	412	436	0	1687	1086	1549	1368	2004	1911	2244	764	1156	968	1320	124	458
128	738	DFS	310	358	526	382	605	0	760	1033	1103	1233	1305	1372	568	842	642	895	91	431
107	634	ESP	296	340	499	325	469	478	0	751	842	1043	804	1167	521	644	641	673	77	334
81	615	FRA	264	404	416	320	404	398	479	0	1014	1302	1177	1484	564	894	737	890	82	376
83	554	GBR	468	428	1027	502	581	670	649	519	0	1291	1274	1547	591	792	696	817	89	550
101	689	ITA	360	408	780	493	867	760	715	495	920	0	1343	2066	728	987	890	1049	105	433
120	786	NLD	455	653	654	570	870	848	623	525	937	919	0	1647	604	932	682	1052	120	508
109	721	USA	560	369	1884	583	642	720	664	566	1230	1153	1034	0	829	1099	1359	1207	125	419
102	892	HUN	204	209	498	238	422	381	383	320	455	543	417	698	0	519	446	648	64	257
70	460	POL	191	253	432	262	524	480	376	370	510	623	612	743	366	0	531	795	101	305
104	581	JPN	169	141	246	139	174	209	205	168	228	237	209	294	167	149	0	590	61	242
59	441	CZE	207	239	478	271	723	465	431	459	528	660	806	795	537	489	147	0	81	309
104	566	EST	17	28	31	17	52	42	30	25	36	48	69	70	34	51	13	39	0	42
19	67	IRL	271	261	313	276	313	350	328	304	618	395	477	401	221	223	138	241	23	0
45	294	SVN	31	50	61	43	105	85	56	53	77	99	88	82	50	80	24	76	13	38
0	78	PRT	243	320	678	309	455	518	566	438	609	717	689	861	423	520	190	456	41	267
62	0																			

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HOL

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common bulls below diagonal  
common three quarter sib group above diagonal

	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	CZE	IRL	KOR	SVN	PRT
BEL	0	346	266	397	398	334	413	426	310	503	416	261	248	74	39	276
CAN	335	0	466	1092	789	848	787	1013	905	705	1995	645	311	218	50	557
CHE	255	346	0	472	343	323	317	403	380	420	504	273	208	79	35	265
DEU	308	331	279	0	1137	825	1135	955	1122	1299	1561	935	319	175	78	497
DFS	346	523	296	471	0	667	1029	1090	690	1071	1363	688	428	141	68	499
ESP	311	433	233	339	433	0	695	738	699	659	1039	545	296	157	56	490
FRA	397	414	255	310	398	455	0	1011	744	981	1483	734	375	155	53	452
GBR	411	954	372	427	668	548	520	0	781	1007	1534	645	545	164	66	549
ITA	293	589	328	459	512	437	361	586	0	739	1203	660	262	205	69	507
NLD	511	553	390	614	768	501	482	743	567	0	1172	842	426	144	71	553
USA	357	1769	421	461	719	535	566	1228	751	772	0	967	418	276	65	699
CZE	192	390	187	532	372	325	351	404	429	677	618	0	235	166	63	435
IRL	253	310	204	229	350	289	304	612	262	410	401	180	0	58	28	230
KOR	49	195	58	82	94	100	79	115	172	83	306	116	42	0	27	152
SVN	35	40	27	66	57	42	35	55	61	56	54	49	26	16	0	53
PRT	251	528	220	341	399	421	349	452	468	520	651	346	202	129	43	0

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HOL

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common bulls below diagonal  
common three quarter sib group above diagonal

	BEL	CHE	DEU	DFS	FRA	GBR	ITA	NLD	USA	CZE	FRR	JPN	IRL	KOR	CAN	PRT	ESP
BEL	0	329	405	257	301	444	339	575	436	240	33	134	234	82	287	191	349
CHE	312	0	553	255	279	483	442	570	634	281	35	166	229	96	434	192	386
DEU	312	340	0	763	927	960	1251	1349	1569	873	58	502	278	206	942	367	831
DFS	206	199	297	0	418	625	509	783	685	430	4	201	253	114	320	228	400
FRA	264	227	264	165	0	601	720	721	881	540	10	378	200	152	507	266	513
GBR	419	463	430	347	329	0	868	1156	1499	576	20	341	481	201	705	353	766
ITA	319	376	477	344	320	638	0	850	1365	686	22	453	261	256	845	389	769
NLD	587	538	642	497	370	866	622	0	1382	797	73	332	422	169	558	361	712
USA	363	552	463	343	338	1217	833	916	0	875	21	654	375	346	1361	462	1087
CZE	175	193	505	226	267	361	442	641	563	0	25	323	180	205	516	298	493
FRR	31	27	44	4	8	17	20	50	13	21	0	2	6	1	8	7	13
JPN	84	85	111	96	105	140	155	128	183	102	2	0	97	164	424	186	364
IRL	235	233	211	192	175	542	255	399	364	136	6	73	0	58	204	121	283
KOR	54	68	95	67	89	139	214	95	382	144	0	80	41	0	240	160	183
CAN	284	354	317	243	280	692	572	497	1331	343	7	157	220	223	0	348	650
PRT	171	155	242	170	222	278	350	313	439	234	7	104	106	132	335	0	320
ESP	324	292	329	256	325	592	469	554	602	278	8	125	283	113	364	252	0

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JER

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common bulls below diagonal  
common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD
AUS	0	109	61	76	38	124	197	102	14
CAN	113	0	58	95	45	61	290	110	11
DFS	38	41	0	74	49	69	114	90	13
GBR	75	97	65	0	47	63	124	82	10
ITA	36	42	45	45	0	33	60	55	13
NZL	121	65	48	64	29	0	130	88	14
USA	185	282	79	127	63	141	0	196	24
ZAF	105	109	68	78	54	85	202	0	21
NLD	11	7	8	8	10	12	25	17	0

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JER

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common bulls below diagonal  
common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD
AUS	0	109	61	76	38	124	197	95	14
CAN	113	0	58	95	45	61	290	99	11
DFS	38	41	0	74	49	69	114	81	13
GBR	75	97	65	0	47	63	124	77	10
ITA	36	42	45	45	0	33	60	55	13
NZL	121	65	48	64	29	0	130	79	14
USA	185	282	79	127	63	141	0	176	24
ZAF	100	100	63	74	54	77	184	0	21
NLD	11	7	8	8	10	12	25	17	0

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JER

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common bulls below diagonal  
common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	NZL	ZAF	NLD
AUS	0	101	55	70	35	119	93	13
CAN	108	0	54	89	42	57	93	9
DFS	37	40	0	69	47	68	78	10
GBR	73	94	64	0	45	61	70	9
ITA	34	40	45	45	0	32	54	11
NZL	115	61	48	62	29	0	79	13
ZAF	99	96	60	70	54	77	0	17
NLD	11	7	7	7	9	12	15	0

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JER

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common bulls below diagonal  
common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD
AUS	0	109	59	75	38	197	101	1
CAN	113	0	58	95	45	290	110	2
DFS	36	41	0	72	49	114	89	3
GBR	74	97	63	0	47	124	82	3
ITA	36	42	45	45	0	60	55	3
USA	185	282	79	127	63	0	196	6
ZAF	104	109	67	78	54	202	0	5
NLD	1	2	3	3	3	6	5	0

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JER

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common bulls below diagonal  
common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD
AUS	0	109	61	76	38	124	197	102	14
CAN	113	0	58	95	45	61	290	110	11
DFS	38	41	0	74	49	69	114	90	13
GBR	75	97	65	0	47	63	124	82	10
ITA	36	42	45	45	0	33	60	55	13
NZL	121	65	48	64	29	0	130	88	14
USA	185	282	79	127	63	141	0	196	24
ZAF	105	109	68	78	54	85	202	0	21
NLD	11	7	8	8	10	12	25	17	0

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JER

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common bulls below diagonal  
common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD
AUS	0	109	61	76	38	124	197	102	14
CAN	113	0	58	95	45	61	290	110	11
DFS	38	41	0	74	49	69	114	90	13
GBR	75	97	65	0	47	63	124	82	10
ITA	36	42	45	45	0	33	60	55	13
NZL	121	65	48	64	29	0	130	88	14
USA	185	282	79	127	63	141	0	196	24
ZAF	105	109	68	78	54	85	202	0	21
NLD	11	7	8	8	10	12	25	17	0

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JER

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common bulls below diagonal  
common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD
AUS	0	109	61	76	38	124	197	102	14
CAN	113	0	58	95	45	61	290	110	11
DFS	38	41	0	74	49	69	114	90	13
GBR	75	97	65	0	47	63	124	82	10
ITA	36	42	45	45	0	33	60	55	13
NZL	121	65	48	64	29	0	130	88	14
USA	185	282	79	127	63	141	0	196	24
ZAF	105	109	68	78	54	85	202	0	21
NLD	11	7	8	8	10	12	25	17	0

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JER

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common bulls below diagonal  
common three quarter sib group above diagonal

	AUS	CAN	DFS	ITA	ZAF	NLD
AUS	0	66	33	27	60	8
CAN	65	0	53	40	76	8
DFS	25	38	0	46	56	9
ITA	25	38	44	0	47	11
ZAF	63	73	41	46	0	12
NLD	7	6	6	8	10	0

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JER

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common bulls below diagonal  
common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD
AUS	0	107	59	74	38	196	101	14
CAN	111	0	58	95	45	290	110	11
DFS	36	41	0	72	49	114	89	13
GBR	73	97	63	0	47	124	82	10
ITA	36	42	45	45	0	60	55	13
USA	184	282	79	127	63	0	196	24
ZAF	104	109	67	78	54	202	0	21
NLD	11	7	8	8	10	25	17	0

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JER

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common bulls below diagonal  
common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD
AUS	0	109	61	76	38	124	197	102	14
CAN	113	0	58	95	45	61	290	110	11
DFS	38	41	0	74	49	69	114	90	13
GBR	75	97	65	0	47	63	124	82	10
ITA	36	42	45	45	0	33	60	55	13
NZL	121	65	48	64	29	0	130	88	14
USA	185	282	79	127	63	141	0	196	24
ZAF	105	109	68	78	54	85	202	0	21
NLD	11	7	8	8	10	12	25	17	0

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JER

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common bulls below diagonal  
common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD
AUS	0	109	59	76	38	124	197	102	14
CAN	113	0	52	95	45	61	290	110	11
DFS	37	39	0	64	49	62	107	82	13
GBR	75	97	59	0	47	62	124	81	10
ITA	36	42	45	45	0	33	60	55	13
NZL	121	65	43	63	29	0	130	87	14
USA	185	282	75	127	63	141	0	196	24
ZAF	105	109	65	77	54	84	202	0	21
NLD	11	7	8	8	10	12	25	17	0

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JER

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common bulls below diagonal  
common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD
AUS	0	109	61	76	38	124	197	102	14
CAN	113	0	58	95	45	61	290	110	11
DFS	38	41	0	74	49	69	114	90	13
GBR	75	97	65	0	47	63	124	82	10
ITA	36	42	45	45	0	33	60	55	13
NZL	121	65	48	64	29	0	130	88	14
USA	185	282	79	127	63	141	0	196	24
ZAF	105	109	68	78	54	85	202	0	21
NLD	11	7	8	8	10	12	25	17	0

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JER

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common bulls below diagonal  
common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD
AUS	0	107	59	74	38	196	101	14
CAN	111	0	58	95	45	287	110	11
DFS	36	41	0	72	49	114	89	13
GBR	73	96	63	0	47	124	82	10
ITA	36	42	45	45	0	60	55	13
USA	184	280	79	127	63	0	196	24
ZAF	104	109	67	78	54	202	0	21
NLD	11	7	8	8	10	25	17	0

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JER

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common bulls below diagonal  
common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD
AUS	0	109	61	76	38	124	197	102	14
CAN	113	0	58	95	45	61	290	110	11
DFS	38	41	0	74	49	69	114	90	13
GBR	75	97	65	0	47	63	124	82	10
ITA	36	42	45	45	0	33	60	55	13
NZL	121	65	48	64	29	0	130	88	14
USA	185	282	79	127	63	141	0	196	24
ZAF	105	109	68	78	54	85	202	0	21
NLD	11	7	8	8	10	12	25	17	0

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JER

-----  
common bulls below diagonal  
common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD
AUS	0	107	59	74	38	196	94	14
CAN	111	0	58	95	45	290	99	11
DFS	36	41	0	72	49	114	80	13
GBR	73	97	63	0	47	124	77	10
ITA	36	42	45	45	0	60	55	13
USA	184	282	79	127	63	0	176	24
ZAF	99	100	62	74	54	184	0	21
NLD	11	7	8	8	10	25	17	0

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JER

-----  
common bulls below diagonal  
common three quarter sib group above diagonal

	AUS	CAN	DFS	NZL	ZAF	NLD
AUS	0	62	29	68	59	8
CAN	60	0	44	57	88	9
DFS	20	35	0	55	68	10
NZL	61	60	39	0	74	13
ZAF	63	87	51	67	0	15
NLD	7	6	7	11	13	0

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JER

-----  
common bulls below diagonal  
common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	NZL	USA	NLD
AUS	0	109	61	33	38	124	197	14
CAN	113	0	58	37	45	61	290	11
DFS	38	41	0	29	49	69	114	13
GBR	37	43	27	0	14	33	37	4
ITA	36	42	45	15	0	33	60	13
NZL	121	65	48	37	29	0	130	14
USA	185	282	79	40	63	141	0	24
NLD	11	7	8	5	10	12	25	0

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JER

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

-----  
AUS 0 109 59 76 124 197 14  
CAN 113 0 52 95 61 287 11  
DFS 37 39 0 64 62 107 13  
GBR 75 96 59 0 61 124 10  
NZL 121 65 43 62 0 130 14  
USA 185 280 75 127 141 0 24  
NLD 11 7 8 8 12 25 0  
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JER

-----  
common bulls below diagonal  
common three quarter sib group above diagonal  
AUS CAN DFS GBR ITA USA NLD

-----  
AUS 0 107 59 74 38 195 14  
CAN 111 0 58 95 45 290 11  
DFS 36 41 0 72 49 114 13  
GBR 73 96 63 0 47 124 10  
ITA 36 42 45 45 0 60 13  
USA 183 282 79 127 63 0 24  
NLD 11 7 8 8 10 25 0  
-----

JER

JER

RDC

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

-----  
AUS 0 21 8 36 7 15 16 10 6  
CAN 20 0 6 82 47 3 29 115 2  
DEU 7 6 0 28 0 7 3 0 6  
DFS 27 77 18 0 29 72 50 51 17  
GBR 6 46 0 27 0 0 19 35 0  
NOR 12 3 6 55 0 0 8 0 14  
NZL 16 27 3 48 16 7 0 18 2  
USA 10 106 0 47 32 0 17 0 1  
NLD 6 2 5 17 0 13 2 1 0  
-----

RDC

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

-----  
AUS 0 21 8 36 7 16 10 6  
CAN 20 0 6 82 47 29 115 2  
DEU 7 6 0 28 0 3 0 4  
DFS 27 77 18 0 29 47 51 16  
GBR 6 46 0 27 0 19 35 0  
NZL 16 27 3 45 16 0 18 2  
USA 10 106 0 47 32 17 0 1  
NLD 6 2 3 16 0 2 1 0  
-----

RDC

-----  
common bulls below diagonal  
common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD
AUS	0	21	8	36	7	5	16	10	6
CAN	20	0	6	82	47	0	29	113	2
DEU	7	6	0	28	0	2	3	0	5
DFS	27	77	18	0	29	37	47	51	15
GBR	6	46	0	27	0	0	19	34	0
NOR	5	0	1	24	0	0	2	0	10
NZL	16	27	3	45	16	2	0	18	2
USA	10	105	0	47	31	0	17	0	1
NLD	6	2	4	15	0	9	2	1	0

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RDC

-----  
common bulls below diagonal  
common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	GBR	USA	NLD
AUS	0	21	8	36	7	10	6
CAN	20	0	6	82	47	115	2
DEU	7	6	0	28	0	0	4
DFS	27	77	18	0	29	51	14
GBR	6	46	0	27	0	35	0
USA	10	106	0	47	32	0	1
NLD	6	2	3	14	0	1	0

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RDC

-----  
common bulls below diagonal  
common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD
AUS	0	21	8	36	7	15	16	10	6
CAN	20	0	6	82	47	3	29	115	2
DEU	7	6	0	28	0	7	3	0	6
DFS	27	77	18	0	29	80	46	51	16
GBR	6	46	0	27	0	0	19	35	0
NOR	12	3	6	61	0	0	8	0	14
NZL	16	27	3	42	16	7	0	18	2
USA	10	106	0	47	32	0	17	0	1
NLD	6	2	5	16	0	13	2	1	0

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RDC

-----  
common bulls below diagonal  
common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	GBR	NZL	USA	NLD
AUS	0	21	8	36	7	16	10	6
CAN	20	0	6	82	47	29	115	2
DEU	7	6	0	28	0	3	0	6
DFS	27	77	18	0	29	47	51	16
GBR	6	46	0	27	0	19	35	0
NZL	16	27	3	45	16	0	18	2
USA	10	106	0	47	32	17	0	1
NLD	6	2	5	16	0	2	1	0

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RDC

-----  
common bulls below diagonal  
common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD
AUS	0	21	8	36	7	15	16	10	6
CAN	20	0	6	82	47	3	29	115	2
DEU	7	6	0	28	0	7	3	0	6
DFS	27	77	18	0	29	83	50	51	17
GBR	6	46	0	27	0	0	19	35	0
NOR	12	3	6	63	0	0	8	0	14
NZL	16	27	3	48	16	7	0	18	2
USA	10	106	0	47	32	0	17	0	1
NLD	6	2	5	17	0	13	2	1	0

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RDC

-----  
common bulls below diagonal  
common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	NOR	NLD
AUS	0	10	8	24	13	6
CAN	10	0	6	81	3	2
DEU	7	6	0	28	7	4
DFS	18	76	18	0	80	14
NOR	11	3	6	61	0	14
NLD	6	2	3	14	13	0

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RDC

-----  
common bulls below diagonal  
common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD
AUS	0	21	5	36	7	15	10	6
CAN	20	0	3	82	47	3	115	2
DEU	4	3	0	15	0	5	0	4
DFS	27	77	9	0	29	80	51	15
GBR	6	46	0	27	0	0	35	0
NOR	12	3	4	61	0	0	0	14
USA	10	106	0	47	32	0	0	1
NLD	6	2	3	15	0	13	1	0

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RDC

-----  
common bulls below diagonal  
common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD
AUS	0	21	8	36	7	15	16	10	6
CAN	20	0	6	82	47	3	29	115	2
DEU	7	6	0	28	0	7	3	0	4
DFS	27	77	18	0	29	83	50	51	15
GBR	6	46	0	27	0	0	19	35	0
NOR	12	3	6	63	0	0	8	0	14
NZL	16	27	3	48	16	7	0	18	2
USA	10	106	0	47	32	0	17	0	1
NLD	6	2	3	15	0	13	2	1	0

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RDC

-----  
common bulls below diagonal  
common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD
AUS	0	21	8	36	7	15	16	10	6
CAN	20	0	6	82	47	3	29	115	2
DEU	7	6	0	28	0	7	3	0	5
DFS	27	77	18	0	29	80	47	51	15
GBR	6	46	0	27	0	0	19	35	0
NOR	12	3	6	61	0	0	8	0	14
NZL	16	27	3	44	16	7	0	18	2
USA	10	106	0	47	32	0	17	0	1
NLD	6	2	4	15	0	13	2	1	0

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RDC

-----  
common bulls below diagonal  
common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD
AUS	0	21	8	36	7	15	16	10	6
CAN	20	0	6	82	47	3	29	115	2
DEU	7	6	0	28	0	7	3	0	6
DFS	27	77	18	0	29	73	50	51	17
GBR	6	46	0	27	0	0	19	35	0
NOR	12	3	6	56	0	0	8	0	14
NZL	16	27	3	48	16	7	0	18	2
USA	10	106	0	47	32	0	17	0	1
NLD	6	2	5	17	0	13	2	1	0

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RDC

-----  
common bulls below diagonal  
common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD
AUS	0	21	8	36	7	15	10	6
CAN	20	0	6	82	47	3	112	2
DEU	7	6	0	28	0	7	0	6
DFS	27	77	18	0	29	83	51	17
GBR	6	46	0	27	0	0	35	0
NOR	12	3	6	63	0	0	0	14
USA	10	105	0	47	32	0	0	1
NLD	6	2	5	17	0	13	1	0

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RDC

-----  
common bulls below diagonal  
common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD
AUS	0	21	8	36	7	14	16	10	6
CAN	20	0	6	82	47	3	29	115	2
DEU	7	6	0	28	0	7	3	0	6
DFS	27	77	18	0	29	74	47	51	16
GBR	6	46	0	27	0	0	19	35	0
NOR	11	3	6	59	0	0	8	0	14
NZL	16	27	3	45	16	7	0	18	2
USA	10	106	0	47	32	0	17	0	1
NLD	6	2	5	16	0	13	2	1	0

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RDC

-----  
common bulls below diagonal  
common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD
AUS	0	21	8	36	7	15	10	6
CAN	20	0	6	82	47	3	113	2
DEU	7	6	0	28	0	7	0	6
DFS	27	77	18	0	29	77	51	17
GBR	6	46	0	27	0	0	34	0
NOR	12	3	6	58	0	0	0	14
USA	10	105	0	47	31	0	0	1
NLD	6	2	5	17	0	13	1	0

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RDC

-----  
common bulls below diagonal  
common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	NOR	NZL	NLD
AUS	0	7	7	20	11	6	6
CAN	7	0	5	76	3	29	2
DEU	6	5	0	21	7	3	4
DFS	15	70	15	0	72	41	14
NOR	9	3	6	56	0	8	14
NZL	6	27	3	41	7	0	1
NLD	6	2	3	14	13	1	0

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RDC

-----  
common bulls below diagonal  
common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD
AUS	0	21	8	36	7	14	16	10	6
CAN	20	0	6	82	44	3	29	115	2
DEU	7	6	0	28	0	7	3	0	6
DFS	27	77	18	0	29	76	48	51	17
GBR	6	43	0	27	0	0	16	33	0
NOR	11	3	6	61	0	0	8	0	14
NZL	16	27	3	46	13	7	0	18	2
USA	10	106	0	47	30	0	17	0	1
NLD	6	2	5	17	0	13	2	1	0

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RDC

-----  
common bulls below diagonal  
common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD
AUS	0	21	8	36	7	15	16	10	6
CAN	20	0	6	82	44	3	29	112	2
DEU	7	6	0	28	0	7	3	0	6
DFS	27	77	18	0	29	83	50	51	17
GBR	6	43	0	27	0	0	16	33	0
NOR	12	3	6	63	0	0	8	0	14
NZL	16	27	3	48	13	7	0	18	2
USA	10	105	0	47	30	0	17	0	1
NLD	6	2	5	17	0	13	2	1	0

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RDC

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

-----  
AUS 0 21 8 36 7 15 10 6  
CAN 20 0 6 82 44 3 115 2  
DEU 7 6 0 28 0 7 0 6  
DFS 27 77 18 0 29 83 51 17  
GBR 6 43 0 27 0 0 33 0  
NOR 12 3 6 63 0 0 0 14  
USA 10 106 0 47 30 0 0 1  
NLD 6 2 5 17 0 13 1 0  
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