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[] P R O G R A M C O F E C H A Version 6.06P 30343

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QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

Title of run: QURU\_IBR\_EWLW\_ORIGINAL-50

File of DATED series: QURU\_IBR\_EWLW

CONTENTS:

Part 1: Title page, options selected, summary, absent rings by series

Part 2: Histogram of time spans

Part 3: Master series with sample depth and absent rings by year

Part 4: Bar plot of Master Dating Series

Part 5: Correlation by segment of each series with Master

Part 6: Potential problems: low correlation, divergent year-to-year changes, absent rings, outliers

Part 7: Descriptive statistics

RUN CONTROL OPTIONS SELECTED VALUE

1 Cubic smoothing spline 50% wavelength cutoff for filtering

32 years

2 Segments examined are 50 years lagged successively by 25 years

3 Autoregressive model applied A Residuals are used in master dating series and testing

4 Series transformed to logarithms Y Each series log-transformed for master dating series and testing

5 CORRELATION is Pearson (parametric, quantitative)

Critical correlation, 99% confidence level .3281

6 Master dating series saved N

7 Ring measurements listed Y

8 Parts printed 1234567

9 Absent rings are omitted from master series and segment correlations (Y)

Time span of Master dating series is 1903 to 2016 114 years

Continuous time span is 1903 to 2016 114 years

Portion with two or more series is 1904 to 2016 113 years

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

\*C\* Number of dated series 30 \*C\*

\*O\* Master series 1903 2016 114 yrs \*O\*

\*F\* Total rings in all series 2297 \*F\*

\*E\* Total dated rings checked 2296 \*E\*

\*C\* Series intercorrelation .618 \*C\*

\*H\* Average mean sensitivity .157 \*H\*

\*A\* Segments, possible problems 2 \*A\*

\*\*\* Mean length of series 76.6 \*\*\*

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

ABSENT RINGS listed by SERIES: (See Master Dating Series for absent rings listed by year)

No ring measurements of zero value

1950 -1.999 19 2000 .676 30

1951 .586 19 2001 -.565 30

1952 -.551 19 2002 .782 30

1903 2.140 1 1953 -.871 20 2003 -1.463 30

1904 1.662 2 1954 -.363 21 2004 1.432 30

1905 1.579 2 1955 .319 22 2005 .255 30

1906 .539 2 1956 .309 22 2006 .387 30

1907 -.313 2 1957 .087 23 2007 .233 30

1908 -1.180 2 1958 .755 23 2008 -.157 30

1909 -.698 2 1959 .577 23 2009 -1.354 30

1910 -1.510 2 1960 .485 23 2010 -1.008 30

1911 -.188 4 1961 .150 23 2011 -.041 30

1912 -.823 4 1962 -.505 23 2012 -.210 30

1913 .445 4 1963 -1.945 24 2013 -.257 30

1914 .556 4 1964 .694 24 2014 .620 30

1915 .659 4 1965 -.176 24 2015 1.544 30

1916 -.132 4 1966 -.947 24 2016 -.420 30

1917 .020 4 1967 .649 24

1918 -.819 4 1968 .753 24

1919 -1.022 4 1969 1.458 24

1920 .536 5 1970 1.086 25

1921 -.405 6 1971 .467 26

1922 -.453 7 1972 1.154 26

1923 -1.701 7 1973 1.182 28

1924 -1.236 7 1974 .135 28

1925 -.775 7 1975 -.051 28

1926 -1.028 7 1976 .442 28

1927 .662 7 1977 -.353 28

1928 .951 10 1978 -1.490 29

1929 1.145 12 1979 -2.899 29

1930 .544 13 1980 .721 29

1931 1.341 13 1981 .076 29

1932 1.580 14 1982 -.278 30

1933 -.967 16 1983 -1.040 30

1934 -.866 16 1984 -.798 30

1935 .612 16 1985 -.044 30

1936 -2.982 17 1986 -.340 30

1937 .081 17 1987 .449 30

1938 .093 17 1988 -.442 30

1939 1.376 17 1989 .924 30

1940 -.263 18 1990 .792 30

1941 -1.414 18 1991 -1.001 30

1942 .954 18 1992 .077 30

1943 1.746 18 1993 .205 30

1944 1.081 18 1994 .646 30

1945 .408 18 1995 -.962 30

1946 -.413 19 1996 .265 30

1947 1.088 19 1997 -1.396 30

1948 -.112 19 1998 1.686 30

1949 -2.464 19 1999 .831 30

PART 5: CORRELATION OF SERIES BY SEGMENTS: QURU\_IBR\_EWLW\_ORIGINAL-50 12:52 Fri 26 Jan 2018 Page 5

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Correlations of 50-year dated segments, lagged 25 years

Flags: A = correlation under .3281 but highest as dated; B = correlation higher at other than dated position

Seq Series Time\_span 1900 1925 1950 1975

1949 1974 1999 2024

--- -------- --------- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ----

1 1440A 1963 2016 .61 .60

2 1440B 1957 2016 .54 .57

3 1441A 1936 2016 .73 .72 .72

4 1441B 1940 2016 .77 .72 .57

5 1442A 1911 2016 .75 .83 .73 .71

6 1442B 1933 2016 .82 .75 .74

7 1443A 1904 2016 .64 .72 .72 .82

8 1443B 1929 2016 .79 .76 .82

9 1444A 1930 2016 .80 .68 .69

10 1444B 1933 2016 .77 .70 .64

11 1445A 1911 2016 .71 .76 .44 .45

12 1445B 1903 2016 .70 .76 .58 .50

13 1446A 1920 2016 .43 .47 .48 .49

14 1447A 1922 2016 .58 .58 .57 .61

15 1448A 1971 2016 .51

16 1448B 1973 2016 .56

17 1449A 1954 2016 .68 .71

18 1449B 1955 2016 .70 .55

19 1895A 1953 2016 .35 .32A

20 1895B 1946 2016 .42 .42 .47

21 1896A 1928 2016 .77 .43 .47

22 1896B 1928 2016 .73 .59 .61

23 1897A 1932 2016 .72 .46 .39

24 1897B 1929 2016 .82 .66 .68

25 1898A 1928 2016 .78 .54 .55

26 1898B 1921 2016 .78 .79 .62 .63

27 1899A 1982 2016 .18B

28 1899B 1970 2016 .41

29 1900A 1973 2016 .55

30 1900B 1978 2016 .64

Av segment correlation .66 .73 .59 .58

PART 6: POTENTIAL PROBLEMS: QURU\_IBR\_EWLW\_ORIGINAL-50 12:52 Fri 26 Jan 2018 Page 5

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For each series with potential problems the following diagnostics may appear:

[A] Correlations with master dating series of flagged 50-year segments of series filtered with 32-year spline,

at every point from ten years earlier (-10) to ten years later (+10) than dated

[B] Effect of those data values which most lower or raise correlation with master series

Symbol following year indicates value in series is greater (>) or lesser (<) than master series value

[C] Year-to-year changes very different from the mean change in other series

[D] Absent rings (zero values)

[E] Values which are statistical outliers from mean for the year

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1440A 1963 to 2016 54 years Series 1

[B] Entire series, effect on correlation ( .608) is:

Lower 1984< -.024 1995> -.017 1968< -.015 1983> -.014 2003> -.014 1979> -.014 Higher 1997 .029 1978 .014

1440A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1963 347 416 426 341 473 361 495

1970 436 446 430 455 388 420 437 412 285 325

1980 420 382 339 359 274 348 313 321 341 343

1990 379 273 326 371 377 320 297 242 376 308

2000 338 257 312 277 328 297 324 302 273 228

2010 263 279 378 330 315 375 332

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1440B 1957 to 2016 60 years Series 2

[B] Entire series, effect on correlation ( .531) is:

Lower 2016> -.028 1958< -.021 1983> -.019 1965> -.017 2003> -.016 1974< -.015 Higher 1997 .035 1963 .026

1440B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1957 218 233 273

1960 257 265 291 243 330 367 320 427 321 427

1970 395 315 323 341 251 272 313 284 228 232

1980 335 341 284 301 235 262 210 236 201 244

1990 281 239 266 250 264 240 259 192 284 237

2000 278 222 265 221 243 265 237 242 212 195

2010 178 184 195 182 201 260 274

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1441A 1936 to 2016 81 years Series 3

[B] Entire series, effect on correlation ( .692) is:

Lower 1936> -.046 1997> -.017 1954> -.012 1962< -.011 1984< -.010 2005< -.009 Higher 1979 .036 1949 .019

1441A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1936 281 350 362 428

1940 289 224 469 519 440 400 325 385 317 230

1950 212 360 326 303 440 400 379 366 339 306

1960 297 329 252 254 415 350 268 286 333 339

1970 301 257 317 336 278 263 276 246 191 167

1980 230 221 237 198 159 200 188 202 250 336

1990 259 182 231 230 217 161 259 221 288 212

2000 246 153 177 131 184 151 187 166 169 183

2010 171 217 238 202 221 238 218

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1441B 1940 to 2016 77 years Series 4

[B] Entire series, effect on correlation ( .627) is:

Lower 2016< -.106 2009> -.014 1997> -.011 2004< -.006 1980< -.006 2013> -.006 Higher 2003 .025 1949 .019

1441B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1940 333 287 464 552 440 392 413 474 430 275

1950 266 419 326 309 444 440 496 566 506 479

1960 540 537 380 329 482 491 325 372 415 462

1970 402 361 409 473 336 262 288 274 196 168

1980 210 225 214 149 142 164 205 227 202 216

1990 212 173 184 196 183 134 230 182 247 230

2000 210 141 155 102 157 181 200 166 165 170

2010 165 175 164 176 167 178 151

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1442A 1911 to 2016 106 years Series 5

[B] Entire series, effect on correlation ( .724) is:

Lower 2008< -.012 1997> -.012 1911> -.009 1920> -.008 1957> -.007 1964< -.007 Higher 1949 .025 1963 .009

[E] Outliers 1 3.0 SD above or -4.5 SD below mean for year

1920 +3.3 SD

1442A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1911 65 61 76 65 82 68 75 74 73

1920 208 122 136 103 95 103 95 134 164 207

1930 200 271 276 145 198 302 121 248 232 296

1940 230 164 259 284 218 155 169 220 182 85

1950 104 165 132 116 157 192 202 254 204 192

1960 210 193 184 133 173 192 178 280 271 263

1970 238 221 270 213 218 174 181 137 119 114

1980 208 157 159 112 127 147 151 183 170 163

1990 170 148 160 152 174 123 154 162 239 179

2000 187 160 212 121 215 189 219 203 146 157

2010 193 219 185 203 255 207 174

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1442B 1933 to 2016 84 years Series 6

[B] Entire series, effect on correlation ( .771) is:

Lower 1995< -.023 1991> -.017 1936> -.008 2010> -.007 1948> -.006 2001> -.005 Higher 1949 .023 2003 .010

1442B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1933 191 265 411 173 289 216 246

1940 194 132 232 304 230 222 220 271 248 122

1950 110 223 152 135 173 200 220 239 233 218

1960 224 233 243 190 254 261 219 329 373 345

1970 303 289 335 311 237 182 204 179 159 129

1980 186 157 170 127 128 140 153 166 146 181

1990 178 184 175 196 185 126 179 154 224 191

2000 189 185 186 144 211 173 206 172 163 155

2010 187 190 175 184 236 226 189

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1443A 1904 to 2016 113 years Series 7

[B] Entire series, effect on correlation ( .699) is:

Lower 1917< -.017 1936> -.016 1908> -.011 1909> -.008 1962> -.008 1940> -.007 Higher 1949 .021 1979 .016

1443A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1904 166 146 91 48 47 67

1910 34 33 31 39 48 45 32 25 24 59

1920 134 114 160 87 85 143 123 218 246 358

1930 377 432 447 208 239 232 142 223 178 286

1940 298 206 296 316 242 185 171 247 210 123

1950 144 199 181 177 159 169 207 205 233 190

1960 218 210 228 187 204 215 176 221 255 246

1970 212 208 225 230 191 161 167 164 147 125

1980 164 162 149 126 119 146 128 160 127 135

1990 133 121 123 157 148 131 128 129 211 179

2000 178 155 171 119 176 151 150 153 148 118

2010 115 148 145 151 196 244 184

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1443B 1929 to 2016 88 years Series 8

[B] Entire series, effect on correlation ( .785) is:

Lower 1936> -.019 1990< -.014 1929< -.008 1986> -.008 1975< -.007 1962> -.006 Higher 1979 .017 2003 .009

1443B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1929 329

1930 344 439 489 215 271 367 198 320 300 373

1940 250 171 310 392 325 221 204 285 240 166

1950 197 327 229 192 185 191 214 191 232 214

1960 245 239 247 203 245 224 202 255 268 269

1970 260 242 258 242 206 168 178 178 162 119

1980 168 172 170 142 155 165 177 190 170 166

1990 139 138 150 165 185 149 157 147 208 182

2000 200 164 177 136 215 177 202 196 182 164

2010 171 183 163 170 185 261 185

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1444A 1930 to 2016 87 years Series 9

[B] Entire series, effect on correlation ( .744) is:

Lower 1996< -.014 1969< -.012 2010> -.011 1991> -.011 1960< -.008 1989< -.006 Higher 1979 .033 1936 .016

1444A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1930 378 474 501 205 229 355 157 254 305 323

1940 263 197 277 323 307 304 252 324 254 192

1950 191 224 228 215 222 234 226 239 261 239

1960 195 189 213 174 226 187 175 193 212 171

1970 175 175 167 152 163 144 137 124 120 102

1980 130 136 128 103 115 109 114 131 124 113

1990 119 121 114 134 122 106 105 104 150 139

2000 133 124 133 112 162 141 165 132 131 130

2010 154 148 133 149 143 179 135

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1444B 1933 to 2016 84 years Series 10

[B] Entire series, effect on correlation ( .702) is:

Lower 2012< -.044 1985< -.020 1978> -.013 1996< -.011 1940> -.007 1997> -.007 Higher 1979 .033 1936 .026

1444B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1933 299 335 507 224 284 410 424

1940 383 224 339 424 417 346 295 361 333 253

1950 251 327 276 258 253 264 277 253 307 286

1960 247 213 187 162 244 190 187 195 235 201

1970 221 200 219 230 163 135 146 130 144 110

1980 133 149 124 112 117 103 102 134 121 128

1990 136 116 114 141 149 108 109 127 173 151

2000 161 146 151 126 202 161 183 157 152 144

2010 151 177 131 160 177 208 151

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1445A 1911 to 2016 106 years Series 11

[B] Entire series, effect on correlation ( .592) is:

Lower 1991> -.017 2016> -.013 1917> -.013 1988> -.012 1911< -.009 1957< -.009 Higher 1936 .040 1949 .023

1445A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1911 52 69 132 182 171 163 248 170 119

1920 168 126 160 140 212 288 219 355 471 518

1930 482 493 468 392 329 453 311 413 476 507

1940 419 315 395 478 462 494 430 521 456 283

1950 300 420 312 283 207 263 250 224 343 394

1960 361 322 274 233 330 288 328 365 333 365

1970 315 300 336 380 390 406 367 278 210 209

1980 265 284 275 313 304 297 299 278 361 399

1990 358 368 297 379 353 299 285 276 335 362

2000 392 333 313 218 328 316 389 386 313 309

2010 315 312 325 301 388 400 458

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1445B 1903 to 2016 114 years Series 12

[\*] Early part of series cannot be checked from 1903 to 1903 -- not matched by another series

[B] Entire series, effect on correlation ( .555) is:

Lower 2000< -.068 2011< -.018 1920< -.015 1926> -.011 1996< -.010 2001> -.009 Higher 1936 .043 1949 .021

1445B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1903 126 101 99 74 68 36 36

1910 39 78 52 101 132 170 190 192 181 160

1920 115 102 94 72 89 148 272 286 411 528

1930 521 595 585 417 375 458 298 421 444 500

1940 458 424 529 629 599 674 559 628 504 367

1950 369 486 384 368 310 329 327 298 325 347

1960 312 329 294 307 397 368 369 402 366 408

1970 402 387 380 383 403 376 341 296 269 249

1980 436 348 284 259 258 277 280 304 315 328

1990 289 277 258 279 298 278 250 232 278 319

2000 252 272 266 226 257 246 283 284 261 238

2010 239 212 239 267 287 363 306

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1446A 1920 to 2016 97 years Series 13

[B] Entire series, effect on correlation ( .448) is:

Lower 1932< -.050 1925< -.022 2010> -.016 1921> -.015 1924> -.011 1926> -.010 Higher 1936 .044 1949 .021

1446A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1920 472 569 418 361 486 283 389 525 407 410

1930 375 459 237 208 259 259 169 233 242 306

1940 202 197 282 259 260 213 186 219 212 168

1950 201 207 219 296 341 316 333 349 386 345

1960 283 270 251 222 239 220 241 381 308 333

1970 275 269 304 404 420 416 388 290 282 211

1980 262 234 232 181 181 225 243 201 200 272

1990 298 246 234 190 209 208 231 166 233 237

2000 214 206 279 218 233 228 247 295 301 245

2010 306 288 279 202 274 244 199

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1447A 1922 to 2016 95 years Series 14

[B] Entire series, effect on correlation ( .598) is:

Lower 2010> -.017 1951< -.017 1970< -.016 1997> -.014 1954> -.011 1925> -.010 Higher 1979 .051 2003 .013

1447A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1922 400 279 277 410 270 417 417 490

1930 446 399 469 255 241 297 229 302 322 431

1940 315 296 403 350 323 319 320 376 279 254

1950 249 251 239 312 410 363 366 399 421 430

1960 370 351 356 324 366 308 338 450 425 463

1970 357 331 401 452 390 381 397 347 300 231

1980 296 271 267 220 248 283 307 257 221 292

1990 281 234 237 210 263 261 216 235 327 350

2000 298 274 267 186 209 193 175 176 194 194

2010 280 268 227 220 266 305 264

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1448A 1971 to 2016 46 years Series 15

[B] Entire series, effect on correlation ( .509) is:

Lower 2003> -.043 1986> -.023 1997< -.021 1993< -.017 1998< -.013 1971< -.012 Higher 2004 .029 1980 .021

1448A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1971 735 844 796 705 747 752 668 688 696

1980 901 704 644 703 691 706 817 681 558 772

1990 729 496 681 515 510 540 526 302 594 605

2000 498 458 570 526 636 393 439 536 471 386

2010 462 526 375 378 486 449 295

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1448B 1973 to 2016 44 years Series 16

[B] Entire series, effect on correlation ( .565) is:

Lower 1981< -.138 2003> -.060 1983> -.020 1984> -.011 1977> -.008 1994< -.005 Higher 1979 .142 1997 .033

1448B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1973 702 729 721 726 654 549 473

1980 620 483 548 585 558 519 500 476 421 510

1990 498 353 504 451 405 407 471 328 495 506

2000 392 332 448 463 484 356 373 441 379 253

2010 323 441 340 293 373 355 247

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1449A 1954 to 2016 63 years Series 17

[B] Entire series, effect on correlation ( .638) is:

Lower 1962> -.026 2010> -.019 1995> -.018 1957< -.014 1961> -.013 1956< -.011 Higher 1979 .119 1998 .020

[E] Outliers 1 3.0 SD above or -4.5 SD below mean for year

1962 +3.2 SD

1449A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1954 594 606 567 540 610 702

1960 657 760 759 587 657 633 584 656 584 598

1970 586 539 576 616 569 613 589 535 402 287

1980 458 368 343 322 374 381 356 376 336 350

1990 324 300 324 324 396 370 416 296 520 393

2000 349 294 401 322 386 405 355 340 377 356

2010 386 378 365 329 338 398 316

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1449B 1955 to 2016 62 years Series 18

[B] Entire series, effect on correlation ( .536) is:

Lower 2013< -.095 2009> -.024 1993< -.017 1962> -.012 2010> -.012 1988> -.011 Higher 1979 .121 1963 .028

1449B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1955 654 553 525 571 589

1960 643 719 659 492 617 560 573 580 520 578

1970 522 466 501 526 476 504 463 389 362 264

1980 397 343 292 269 323 345 376 370 391 401

1990 411 297 353 287 392 357 360 307 436 402

2000 413 326 384 332 405 406 341 347 366 397

2010 401 394 444 298 377 419 373

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1895A 1953 to 2016 64 years Series 19

[A] Segment High -10 -9 -8 -7 -6 -5 -4 -3 -2 -1 +0 +1 +2 +3 +4 +5 +6 +7 +8 +9 +10

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1967 2016 0 -.02 -.07 .15 -.14 -.15 -.20 -.09 -.23 -.07 -.17 .32\* - - - - - - - - - -

[B] Entire series, effect on correlation ( .336) is:

Lower 1990< -.051 2003> -.040 1973< -.028 1983> -.026 1954< -.025 1976< -.023 Higher 1963 .043 1978 .040

1967 to 2016 segment:

Lower 1990< -.079 2003> -.048 1973< -.040 1976< -.035 1983> -.032 1997> -.022 Higher 1978 .056 1998 .035

1895A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1953 726 654 790 736 669 714 621

1960 609 539 556 486 537 497 472 524 509 550

1970 523 443 425 335 288 338 262 302 222 210

1980 331 370 320 348 325 306 310 279 241 289

1990 203 185 209 222 204 194 230 247 349 307

2000 310 271 281 297 356 326 313 255 215 174

2010 162 136 177 197 203 260 253

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1895B 1946 to 2016 71 years Series 20

[B] Entire series, effect on correlation ( .421) is:

Lower 1972< -.051 1973< -.044 2003> -.026 1997> -.021 1952> -.017 1990< -.016 Higher 1979 .138 2004 .019

1895B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1946 283 306 282 267

1950 246 347 493 607 621 688 703 653 598 492

1960 531 446 446 436 504 488 487 510 502 556

1970 506 460 377 320 306 383 361 410 347 257

1980 404 410 381 379 413 408 357 337 268 314

1990 259 208 227 225 258 232 290 300 356 354

2000 349 313 353 338 405 312 256 182 184 135

2010 143 143 207 190 197 329 309

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1896A 1928 to 2016 89 years Series 21

[B] Entire series, effect on correlation ( .610) is:

Lower 1986< -.083 1998< -.019 2010< -.016 1958< -.009 1991> -.008 1947< -.007 Higher 1936 .067 1949 .028

[E] Outliers 1 3.0 SD above or -4.5 SD below mean for year

1986 -4.8 SD

1896A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1928 467 636

1930 448 480 530 404 276 410 196 340 310 486

1940 341 298 366 444 369 327 281 266 259 186

1950 225 322 260 246 233 254 219 233 206 213

1960 265 216 206 190 271 190 213 243 213 245

1970 328 254 278 222 208 188 195 175 164 144

1980 188 160 154 137 140 128 98 133 143 144

1990 170 152 144 148 168 132 152 136 138 155

2000 165 161 198 147 216 227 217 179 205 176

2010 127 169 202 208 228 261 234

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1896B 1928 to 2016 89 years Series 22

[B] Entire series, effect on correlation ( .691) is:

Lower 1983> -.011 1933> -.011 1975< -.010 2016< -.009 1941> -.008 1990< -.008 Higher 1936 .074 1949 .016

1896B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1928 602 479

1930 412 471 626 450 393 422 250 513 414 446

1940 292 387 399 439 466 502 352 467 314 259

1950 335 366 328 268 367 393 345 323 285 301

1960 301 296 249 203 309 290 232 248 246 289

1970 295 290 289 218 184 165 198 197 175 156

1980 224 161 179 173 159 157 139 156 143 149

1990 137 131 139 167 183 142 187 156 220 176

2000 167 166 216 148 242 210 219 201 202 185

2010 184 218 230 232 208 212 180

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1897A 1932 to 2016 85 years Series 23

[B] Entire series, effect on correlation ( .581) is:

Lower 2010< -.052 1980< -.017 1963> -.016 1979> -.012 2002< -.011 1955< -.010 Higher 1936 .093 1949 .015

[E] Outliers 1 3.0 SD above or -4.5 SD below mean for year

1996 +3.5 SD

1897A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1932 306 198 211 220 110 244 247 330

1940 298 218 317 317 275 213 212 254 210 156

1950 160 231 178 155 140 140 170 147 171 155

1960 188 185 150 154 164 142 127 132 179 159

1970 164 164 139 143 113 120 138 112 97 95

1980 92 106 99 87 83 101 80 127 102 117

1990 112 101 93 91 96 90 168 113 123 104

2000 104 117 99 101 127 137 133 122 134 104

2010 74 99 101 121 119 117 111

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1897B 1929 to 2016 88 years Series 24

[B] Entire series, effect on correlation ( .751) is:

Lower 1997> -.028 1955< -.014 1986< -.013 2002< -.010 1980< -.008 1931< -.008 Higher 1936 .066 1979 .026

1897B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1929 354

1930 326 327 394 299 321 354 214 418 395 413

1940 362 288 342 334 304 288 254 314 271 216

1950 219 278 224 208 214 188 198 233 240 256

1960 249 229 191 179 194 195 179 193 187 218

1970 220 200 193 178 146 165 155 143 110 90

1980 108 125 131 108 115 112 93 119 106 129

1990 136 120 138 129 121 110 132 137 149 137

2000 138 138 119 107 143 127 143 136 130 94

2010 87 106 112 140 148 161 143

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1898A 1928 to 2016 89 years Series 25

[B] Entire series, effect on correlation ( .701) is:

Lower 1998< -.020 1967< -.019 1979> -.011 1997> -.011 2006< -.010 2013> -.007 Higher 1936 .078 2004 .008

1898A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1928 477 433

1930 410 443 433 341 299 383 192 353 363 376

1940 307 300 374 384 336 306 246 282 244 236

1950 241 322 301 286 293 338 310 321 336 329

1960 284 225 182 188 292 211 197 171 244 267

1970 298 239 274 224 235 200 206 166 167 143

1980 194 145 140 150 133 132 117 144 136 189

1990 202 153 172 190 210 159 190 170 156 179

2000 204 144 185 150 253 178 146 168 181 160

2010 132 167 177 204 188 197 156

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1898B 1921 to 2016 96 years Series 26

[B] Entire series, effect on correlation ( .737) is:

Lower 1967< -.021 1981< -.015 2010< -.012 1979> -.010 1954> -.008 1978> -.007 Higher 1936 .064 2004 .007

1898B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1921 168 169 178 201 270 254 391 428 457

1930 434 504 491 365 356 402 221 331 308 382

1940 299 300 358 385 384 346 318 339 305 284

1950 284 358 334 302 356 389 367 324 351 355

1960 320 295 229 222 294 238 206 188 228 263

1970 303 273 308 365 321 265 273 261 233 190

1980 255 178 201 163 174 175 155 211 182 228

1990 216 178 200 233 204 162 178 165 191 211

2000 192 171 194 172 226 201 182 214 198 164

2010 142 176 178 185 214 213 198

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1899A 1982 to 2016 35 years Series 27

[A] Segment High -10 -9 -8 -7 -6 -5 -4 -3 -2 -1 +0 +1 +2 +3 +4 +5 +6 +7 +8 +9 +10

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1982 2016 -9 .03 .22\*-.14 -.21 -.03 .13 -.02 .15 -.31 -.12 .18| - - - - - - - - - -

[B] Entire series, effect on correlation ( .178) is:

Lower 2006< -.163 2003> -.069 1995> -.026 2016> -.021 1986> -.013 2012> -.005 Higher 1991 .089 1998 .047

1982 to 2016 segment:

Lower 2006< -.163 2003> -.069 1995> -.026 2016> -.021 1986> -.013 2012> -.005 Higher 1991 .089 1998 .047

[E] Outliers 1 3.0 SD above or -4.5 SD below mean for year

2006 -4.7 SD

1899A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1982 282 297 314 363 383 366 322 360

1990 408 284 392 373 432 453 457 400 530 454

2000 502 419 521 525 512 469 276 361 431 390

2010 434 453 522 490 463 488 500

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1899B 1970 to 2016 47 years Series 28

[B] Entire series, effect on correlation ( .405) is:

Lower 1995> -.023 1986> -.019 1970< -.016 1999< -.013 2012> -.013 1989< -.013 Higher 1979 .040 2009 .033

1899B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1970 113 182 167 211 160 153 198 216 226 206

1980 292 341 312 308 335 381 413 339 337 339

1990 331 285 413 391 420 424 487 399 452 387

2000 425 352 463 403 475 450 411 424 453 378

2010 395 446 531 515 453 469 443

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1900A 1973 to 2016 44 years Series 29

[B] Entire series, effect on correlation ( .552) is:

Lower 2003> -.058 1988< -.029 2000< -.026 1986> -.020 2012< -.017 2001> -.012 Higher 1979 .063 1997 .039

1900A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1973 587 448 353 451 357 301 267

1980 435 389 323 300 346 354 376 316 229 285

1990 289 258 313 277 292 236 294 201 279 246

2000 227 285 344 289 345 273 257 312 261 251

2010 280 306 232 242 308 297 266

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1900B 1978 to 2016 39 years Series 30

[B] Entire series, effect on correlation ( .640) is:

Lower 2010> -.021 1984> -.019 1998< -.016 2004< -.015 2005< -.013 1978> -.011 Higher 1979 .044 2003 .043

1900B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1978 499 396

1980 602 517 470 526 626 640 551 543 480 595

1990 630 441 581 463 438 357 380 268 370 329

2000 323 297 337 233 300 250 298 312 270 236

2010 292 313 215 265 284 308 227

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PART 7: DESCRIPTIVE STATISTICS: QURU\_IBR\_EWLW\_ORIGINAL-50 12:52 Fri 26 Jan 2018 Page 6

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Corr //-------- Unfiltered --------\\ //---- Filtered -----\\

No. No. No. with Mean Max Std Auto Mean Max Std Auto AR

Seq Series Interval Years Segmt Flags Master msmt msmt dev corr sens value dev corr ()

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1 1440A 1963 2016 54 2 0 .608 3.48 4.95 .618 .503 .147 2.48 .578 .050 1

2 1440B 1957 2016 60 2 0 .531 2.66 4.27 .561 .635 .143 2.53 .481 -.020 2

3 1441A 1936 2016 81 3 0 .692 2.71 5.19 .840 .720 .179 2.77 .632 .069 1

4 1441B 1940 2016 77 3 0 .627 2.93 5.66 1.302 .873 .166 2.42 .367 .011 1

5 1442A 1911 2016 106 4 0 .724 1.74 3.02 .572 .604 .214 2.76 .468 .006 1

6 1442B 1933 2016 84 3 0 .771 2.07 4.11 .590 .571 .186 2.63 .545 -.017 1

7 1443A 1904 2016 113 4 0 .699 1.69 4.47 .771 .825 .194 2.75 .410 .004 1

8 1443B 1929 2016 88 3 0 .785 2.18 4.89 .696 .629 .172 2.54 .387 .007 1

9 1444A 1930 2016 87 3 0 .744 1.88 5.01 .800 .785 .142 2.49 .434 .033 1

10 1444B 1933 2016 84 3 0 .702 2.10 5.07 .908 .808 .162 2.76 .579 -.025 2

11 1445A 1911 2016 106 4 0 .592 3.22 5.21 .994 .798 .169 2.49 .405 -.058 3

12 1445B 1903 2016 114 4 0 .555 3.06 6.74 1.394 .917 .147 2.88 .464 -.005 1

13 1446A 1920 2016 97 4 0 .448 2.78 5.69 .832 .707 .161 2.50 .427 -.066 1

14 1447A 1922 2016 95 4 0 .598 3.12 4.90 .774 .695 .145 2.57 .507 .026 1

15 1448A 1971 2016 46 1 0 .509 5.91 9.01 1.477 .648 .171 2.45 .373 .064 2

16 1448B 1973 2016 44 1 0 .565 4.66 7.29 1.221 .743 .164 2.42 .509 -.039 2

17 1449A 1954 2016 63 2 0 .638 4.58 7.60 1.333 .862 .122 2.68 .400 .006 1

18 1449B 1955 2016 62 2 0 .536 4.33 7.19 1.086 .821 .126 2.46 .465 -.047 1

19 1895A 1953 2016 64 2 1 .336 3.62 7.90 1.658 .953 .125 2.92 .606 -.046 1

20 1895B 1946 2016 71 3 0 .421 3.65 7.03 1.328 .911 .127 2.69 .436 .101 1

21 1896A 1928 2016 89 3 0 .610 2.38 6.36 1.022 .805 .170 2.61 .409 .004 1

22 1896B 1928 2016 89 3 0 .691 2.72 6.26 1.152 .826 .157 2.52 .445 -.036 1

23 1897A 1932 2016 85 3 0 .581 1.51 3.30 .606 .804 .156 2.80 .434 .032 1

24 1897B 1929 2016 88 3 0 .751 1.96 4.18 .864 .901 .122 2.56 .395 -.008 1

25 1898A 1928 2016 89 3 0 .701 2.39 4.77 .867 .838 .157 2.56 .319 -.047 1

26 1898B 1921 2016 96 4 0 .737 2.65 5.04 .855 .854 .135 2.54 .388 -.017 1

27 1899A 1982 2016 35 1 1 .178 4.18 5.30 .762 .602 .129 2.36 .489 -.023 1

28 1899B 1970 2016 47 1 0 .405 3.55 5.31 1.069 .879 .127 2.54 .520 -.020 1

29 1900A 1973 2016 44 1 0 .552 3.09 5.87 .714 .551 .168 2.54 .541 -.051 1

30 1900B 1978 2016 39 1 0 .640 3.96 6.40 1.324 .806 .172 2.48 .503 -.062 1

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Total or mean: 2297 80 2 .618 2.82 9.01 .946 .771 .157 2.92 .457 -.005

- = [ COFECHA QURU COF ] = -