[] Dendrochronology Program Library Run QURU Program COF 10:47 Fri 04 Sep 2020 Page 1

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[] P R O G R A M C O F E C H A Version 6.06P 31295

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QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

File of DATED series: SCBI\_quru.rwl

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 N

8 Parts printed 1234567

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

Time span of Master dating series is 1877 to 2017 141 years

Continuous time span is 1877 to 2017 141 years

Portion with two or more series is 1885 to 2017 133 years

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

\*C\* Number of dated series 71 \*C\*

\*O\* Master series 1877 2017 141 yrs \*O\*

\*F\* Total rings in all series 5764 \*F\*

\*E\* Total dated rings checked 5756 \*E\*

\*C\* Series intercorrelation .474 \*C\*

\*H\* Average mean sensitivity .193 \*H\*

\*A\* Segments, possible problems 43 \*A\*

\*\*\* Mean length of series 81.2 \*\*\*

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

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

No ring measurements of zero value

PART 2: TIME PLOT OF TREE-RING SERIES: 10:47 Fri 04 Sep 2020 Page 2

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1050 1100 1150 1200 1250 1300 1350 1400 1450 1500 1550 1600 1650 1700 1750 1800 1850 1900 1950 2000 2050 Ident Seq Time-span Yrs

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. . . . . . . . . . . . . . . . . <============> . 70502 1 1877 2009 133

. . . . . . . . . . . . . . . . . <===========> . 70421 2 1885 2009 125

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. . . . . . . . . . . . . . . . . <============> . 121434 4 1886 2016 131

. . . . . . . . . . . . . . . . . <==========> . 60353 5 1894 2009 116

. . . . . . . . . . . . . . . . . <==========> . 80330 6 1895 2009 115

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. . . . . . . . . . . . . . . . . .<========> . 62281 14 1917 2009 93

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. . . . . . . . . . . . . . . . . . <========> . 190907 32 1927 2015 89

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. . . . . . . . . . . . . . . . . . <======> . 121186 38 1932 2009 78

. . . . . . . . . . . . . . . . . . <======> . 70407 39 1933 2009 77

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. . . . . . . . . . . . . . . . . . <======> . 60116 45 1935 2009 75

. . . . . . . . . . . . . . . . . . <======> . 32516 46 1936 2009 74

. . . . . . . . . . . . . . . . . . <======> . 112082 47 1939 2009 71

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. . . . . . . . . . . . . . . . . . <=====> . 121310 49 1941 2009 69

. . . . . . . . . . . . . . . . . . <======> . 40617A 50 1942 2016 75

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1050 1100 1150 1200 1250 1300 1350 1400 1450 1500 1550 1600 1650 1700 1750 1800 1850 1900 1950 2000 2050

PART 2: TIME PLOT OF TREE-RING SERIES: 10:47 Fri 04 Sep 2020 Page 3

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1050 1100 1150 1200 1250 1300 1350 1400 1450 1500 1550 1600 1650 1700 1750 1800 1850 1900 1950 2000 2050 Ident Seq Time-span Yrs

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. . . . . . . . . . . . . . . . . . .<===> . 161524 68 1964 2009 46

. . . . . . . . . . . . . . . . . . .<===> . 12460 69 1965 2009 45

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. . . . . . . . . . . . . . . . . . . <==> . 110727 71 1975 2009 35

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1050 1100 1150 1200 1250 1300 1350 1400 1450 1500 1550 1600 1650 1700 1750 1800 1850 1900 1950 2000 2050

PART 3: Master Dating Series: 10:47 Fri 04 Sep 2020 Page 4

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Year Value No Ab Year Value No Ab Year Value No Ab Year Value No Ab Year Value No Ab Year Value No Ab

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1900 1.455 6 1950 -.184 61 2000 -1.215 71

1901 .904 6 1951 .071 61 2001 1.051 71

1902 .911 7 1952 -.819 61 2002 .397 71

1903 -.160 8 1953 -1.493 63 2003 .770 71

1904 1.300 10 1954 -.853 63 2004 .364 71

1905 .636 10 1955 -.245 63 2005 .153 71

1906 -.147 10 1956 1.058 63 2006 -.404 71

1907 -.964 10 1957 .888 63 2007 -.140 70

1908 -1.423 10 1958 2.188 63 2008 .058 70

1909 -1.623 10 1959 .086 63 2009 1.103 69

1910 -1.204 11 1960 .839 65 2010 .699 12

1911 -1.947 11 1961 .549 66 2011 .963 10

1912 -.422 11 1962 -.031 66 2012 .364 10

1913 -1.363 12 1963 -.290 67 2013 -.227 10

1914 -.997 13 1964 -.214 68 2014 -.316 10

1915 .650 13 1965 -.411 69 2015 -1.010 10

1916 .862 13 1966 -1.690 69 2016 -.956 8

1917 .502 17 1967 -.259 69 2017 -4.334 3

1918 -.451 17 1968 1.256 69

1919 -.080 17 1969 .894 70

1920 .568 19 1970 1.066 70

1921 .633 19 1971 -.384 70

1922 .118 23 1972 -.823 70

1923 -1.090 24 1973 -.722 70

1924 .199 24 1974 -.682 70

1925 -.798 26 1975 .480 71

1926 -.278 29 1976 .824 71

1877 2.867 1 1927 .202 32 1977 -1.609 71

1878 .535 1 1928 1.112 32 1978 1.077 71

1879 -.885 1 1929 .907 33 1979 -.085 71

1880 -.923 1 1930 -.486 36 1980 -1.223 71

1881 .123 1 1931 -.223 37 1981 -.778 71

1882 .805 1 1932 -1.173 38 1982 -.413 71

1883 2.112 1 1933 -.131 40 1983 -.031 71

1884 1.405 1 1934 -.416 43 1984 .399 71

1885 -1.496 2 1935 .359 45 1985 .065 71

1886 2.625 4 1936 .592 46 1986 1.161 71

1887 .434 4 1937 .932 46 1987 .541 71

1888 -.988 4 1938 1.385 46 1988 -.152 71

1889 -1.078 4 1939 -.086 47 1989 -.348 71

1890 -.569 4 1940 .291 48 1990 .730 71

1891 .543 4 1941 .331 49 1991 -1.628 71

1892 1.357 4 1942 -.031 55 1992 .471 71

1893 .143 4 1943 -.561 58 1993 .809 71

1894 .538 5 1944 -.572 60 1994 1.397 71

1895 1.588 6 1945 .401 60 1995 .701 71

1896 .764 6 1946 -.583 61 1996 -.304 71

1897 .326 6 1947 -.963 61 1997 -2.660 71

1898 -.355 6 1948 -.638 61 1998 -.478 71

1899 -.592 6 1949 -.555 61 1999 -1.226 71

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PART 4: Master Bar Plot: 10:47 Fri 04 Sep 2020 Page 5

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Year Rel value Year Rel value Year Rel value Year Rel value Year Rel value Year Rel value Year Rel value Year Rel value

1900----------F 1950----a 2000-e

1901--------D 1951-----@ 2001---------D

1902---------D 1952--c 2002------B

1903----a 1953f 2003--------C

1904----------E 1954-c 2004------A

1905-------C 1955----a 2005------A

1906----a 1956---------D 2006---b

1907-d 1957--------D 2007----a

1908f 1958----------I 2008-----@

1909f 1959-----@ 2009---------D

1910-e 1960--------C 2010--------C

1911h 1961-------B 2011---------D

1912---b 1962-----@ 2012------A

1913e 1963----a 2013----a

1914-d 1964----a 2014----a

1915-------C 1965---b 2015-d

1916--------C 1966g 2016-d

1917-------B 1967----a 2017q

1918---b 1968----------E

1919-----@ 1969--------D

1920-------B 1970---------D

1921-------C 1971---b

1922-----@ 1972--c

1923-d 1973--c

1924------A 1974--c

1925--c 1975-------B

1926----a 1976--------C

1877----------K 1927------A 1977f

1878-------B 1928---------D 1978---------D

1879-d 1929--------D 1979-----@

1880-d 1930---b 1980-e

1881-----@ 1931----a 1981--c

1882--------C 1932-e 1982---b

1883----------H 1933----a 1983-----@

1884----------F 1934---b 1984------B

1885f 1935------A 1985-----@

1886----------K 1936-------B 1986---------E

1887-------B 1937---------D 1987-------B

1888-d 1938----------F 1988----a

1889-d 1939-----@ 1989---a

1890--b 1940------A 1990--------C

1891-------B 1941------A 1991g

1892----------E 1942-----@ 1992-------B

1893-----A 1943--b 1993--------C

1894-------B 1944--b 1994----------F

1895----------F 1945------B 1995--------C

1896--------C 1946--b 1996----a

1897------A 1947-d 1997k

1898---a 1948--c 1998---b

1899--b 1949--b 1999-e

PART 5: CORRELATION OF SERIES BY SEGMENTS: 10:47 Fri 04 Sep 2020 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 1875 1900 1925 1950 1975

1924 1949 1974 1999 2024

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

1 70502 1877 2009 .35 .44 .57 .58 .52

2 70421 1885 2009 .39 .35 .63 .80 .73

3 70126 1886 2009 .68 .60 .59 .64 .61

4 121434 1886 2016 .36 .32A .31B .33B .35

5 60353 1894 2009 .08B .14B .19B .47 .39

6 80330 1895 2009 .26A .33 .53 .71 .67

7 122060 1902 2009 .34 .42B .69 .68

8 70096 1903 2009 .51 .64 .62 .60

9 80233 1904 2009 .54 .55 .37 .29B

10 80491 1904 2009 .41 .33B .55 .51

11 121026 1910 2009 .31B .49 .76 .71

12 202496 1913 2009 .30A .27A .42 .39

13 161576 1914 2009 .37 .60 .65 .65

14 62281 1917 2009 .33 .42 .62 .53

15 80235 1917 2009 .50 .53 .43 .45

16 80316 1917 2009 .51 .56 .32A .32A

17 180952 1917 2009 .35 .35 .38 .36

18 10636 1920 2009 .25B .18B .49 .54

19 42092 1920 2009 .35 .50 .76 .72

20 40649 1922 2009 .47 .38 .57 .51

21 50499 1922 2009 .41 .50 .64 .67

22 60522 1922 2009 .48 .45 .53 .46

23 121305 1922 2009 .45 .50 .71 .69

24 22336 1923 2009 .54 .52 .65 .63

25 72396 1925 2009 .59 .68 .62

26 92250A 1925 2010 .24A .42 .35

27 60143 1926 2010 .35 .52 .43

28 60550A 1926 2009 .55 .73 .50

29 62372 1926 2009 .71 .80 .73

30 82228A 1927 2016 .39B .53 .59

31 111314 1927 2009 .31A .55 .49

32 190907 1927 2015 .32A .51 .63

33 111252 1929 2009 .53 .51 .41

34 50274 1930 2009 .40 .72 .77

35 90529 1930 2009 .28A .52 .50

36 131087 1930 2009 .38 .58 .55

37 100540 1931 2009 .27A .35 .39

38 121186 1932 2009 .30A .41 .31A

39 70407 1933 2009 .63 .76 .69

40 151021 1933 2009 .71 .78 .78

41 30343A 1934 2015 .57 .70 .72

42 60345 1934 2009 .38 .34 .27A

43 82115 1934 2009 .29A .27B .21B

44 52343A 1935 2017 .51 .52 .40

45 60116 1935 2009 .55 .67 .59

46 32516 1936 2009 .27A .28A .28A

47 112082 1939 2009 .32A .43 .36

48 121329 1940 2009 .67 .66 .63

49 121310 1941 2009 .34 .30A .22B

50 40617A 1942 2016 .47 .66 .62

51 72140 1942 2009 .63 .66 .63

52 172202 1942 2009 .35 .41 .33B

53 182060 1942 2009 .34 .31A .21B

54 192112 1942 2016 .24A .36 .42

55 202248 1942 2017 .33 .28A .53

56 52287 1943 2009 .46 .52 .56

57 101136 1943 2009 .33 .37 .44

58 110811 1943 2009 .65 .69 .69

59 50046 1944 2009 .43 .45 .38

60 120911 1944 2016 .30A .44 .38

61 100771 1946 2009 .68 .66 .57

62 100552 1953 2006 .44 .45

63 150890 1953 2009 .67 .71

64 82138 1960 2009 .64

65 110331 1960 2009 .33

66 142490 1961 2017 .32B .50

67 62019 1963 2009 .75

68 161524 1964 2009 .58

69 12460 1965 2009 .57

70 50506 1969 2008 .41

71 110727 1975 2009 .30A

Av segment correlation .35 .40 .44 .54 .51

PART 6: POTENTIAL PROBLEMS: 10:47 Fri 04 Sep 2020 Page 6

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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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70502 1877 to 2009 133 years Series 1

[\*] Early part of series cannot be checked from 1877 to 1884 -- not matched by another series

[B] Entire series, effect on correlation ( .446) is:

Lower 1886< -.044 1970< -.017 1977> -.016 1905< -.012 1896> -.011 1915< -.008 Higher 1991 .016 1958 .010

[C] Year-to-year changes diverging by over 4.0 std deviations:

1885 1886 -5.3 SD

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70421 1885 to 2009 125 years Series 2

[B] Entire series, effect on correlation ( .550) is:

Lower 1887> -.048 1923> -.023 1899< -.018 1936< -.013 1903> -.012 2003< -.009 Higher 1997 .047 1958 .012

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70126 1886 to 2009 124 years Series 3

[B] Entire series, effect on correlation ( .626) is:

Lower 1977> -.022 1985< -.020 1980> -.017 1970< -.010 1899< -.010 1975< -.009 Higher 1997 .043 1886 .027

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121434 1886 to 2016 131 years Series 4

[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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1900 1949 0 .22 .10 .09 .08 -.08 .16 .02 -.21 -.07 .32 .32\*-.04 .06 -.04 .16 .05 -.17 -.12 -.11 -.40 -.15

1925 1974 -8 .12 .14 .35\* .18 -.05 .14 -.08 -.18 -.10 .13 .31|-.18 .07 -.01 -.06 -.18 .10 -.13 -.17 -.04 -.12

1950 1999 -7 .31 .06 .17 .34\*-.13 .07 -.23 -.19 .05 -.13 .33| .20 -.08 -.04 -.05 -.21 -.03 -.11 .11 .15 .18

[B] Entire series, effect on correlation ( .319) is:

Lower 1966> -.021 1888> -.015 1997> -.010 1946> -.010 2012< -.010 1940< -.008 Higher 1886 .047 1958 .017

1900 to 1949 segment:

Lower 1940< -.029 1946> -.029 1939> -.021 1928< -.019 1943> -.018 1906< -.018 Higher 1900 .040 1904 .037

1925 to 1974 segment:

Lower 1966> -.075 1946> -.034 1940< -.031 1939> -.025 1956< -.023 1943> -.022 Higher 1958 .060 1959 .044

1950 to 1999 segment:

Lower 1966> -.056 1987< -.028 1997> -.023 1985> -.020 1965> -.020 1956< -.014 Higher 1958 .050 1978 .039

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

1966 +3.1 SD

====================================================================================================================================

60353 1894 to 2009 116 years Series 5

[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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1894 1943 -9 -.28 .17\*-.05 .06 -.10 .05 -.02 -.01 -.08 -.15 .08| .17 .05 .06 -.11 .11 -.24 .04 -.02 -.03 -.01

1900 1949 8 -.10 .02 -.06 -.01 -.12 .05 -.07 -.12 -.05 -.11 .14| .07 -.01 .02 -.01 -.01 -.32 .03 .17\* .04 .06

1925 1974 8 -.16 .08 -.04 .18 .00 .07 -.12 -.14 .05 -.08 .19|-.10 -.15 -.15 .00 .01 -.10 .04 .19\*-.02 .07

[B] Entire series, effect on correlation ( .207) is:

Lower 1896< -.029 1939< -.027 1899> -.024 1997> -.019 1900< -.011 1943> -.010 Higher 1958 .027 1980 .018

1894 to 1943 segment:

Lower 1896< -.047 1899> -.047 1943> -.019 1900< -.015 1898> -.013 1930> -.012 Higher 1939 .043 1895 .036

1900 to 1949 segment:

Lower 1900< -.022 1943> -.021 1931< -.014 1930> -.014 1932> -.013 1939< -.011 Higher 1911 .026 1916 .017

1925 to 1974 segment:

Lower 1943> -.023 1952> -.018 1932> -.016 1930> -.016 1939< -.015 1931< -.014 Higher 1958 .067 1966 .024

[C] Year-to-year changes diverging by over 4.0 std deviations:

1899 1900 -4.2 SD 1939 1940 5.9 SD

[E] Outliers 2 3.0 SD above or -4.5 SD below mean for year

1899 +3.2 SD; 1939 -8.6 SD

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80330 1895 to 2009 115 years Series 6

[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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1895 1944 0 -.07 .13 -.01 -.17 -.06 -.01 .23 .08 -.07 .00 .26\* .20 .09 .13 .04 -.12 .01 .01 .07 -.06 .14

[B] Entire series, effect on correlation ( .519) is:

Lower 1899> -.016 1916< -.016 1902< -.014 1895< -.013 1923> -.011 2000> -.010 Higher 1997 .052 1958 .013

1895 to 1944 segment:

Lower 1899> -.042 1916< -.036 1902< -.031 1898> -.023 1923> -.022 1915< -.018 Higher 1900 .050 1938 .044

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122060 1902 to 2009 108 years Series 7

[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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1925 1974 -7 -.18 -.01 -.05 .47\* .15 .11 -.12 -.20 -.03 -.06 .42|-.17 .02 -.33 -.27 -.09 .04 .13 -.14 .06 -.07

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

Lower 1937< -.025 1911> -.021 1938< -.020 1975< -.013 1913> -.011 2007< -.010 Higher 1980 .020 1991 .020

1925 to 1974 segment:

Lower 1937< -.059 1938< -.049 1943> -.023 1934> -.022 1960< -.017 1974> -.014 Higher 1966 .063 1932 .052

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70096 1903 to 2009 107 years Series 8

[B] Entire series, effect on correlation ( .578) is:

Lower 1985< -.060 1924< -.010 1906> -.010 1942< -.008 1909> -.007 1918> -.007 Higher 1977 .020 1966 .017

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80233 1904 to 2009 106 years Series 9

[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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1960 2009 -9 -.02 .44\* .01 .00 .09 -.10 -.15 -.17 -.03 .00 .29|-.14 .07 .11 -.31 -.12 .27 -.03 -.01 - -

[B] Entire series, effect on correlation ( .422) is:

Lower 2006< -.033 1994< -.033 1980> -.026 1986< -.019 1991> -.016 1945< -.016 Higher 1997 .043 1978 .017

1960 to 2009 segment:

Lower 1994< -.053 1980> -.043 2006< -.039 1986< -.031 1991> -.022 1999> -.019 Higher 1997 .105 1978 .038

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80491 1904 to 2009 106 years Series 10

[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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1925 1974 7 -.07 -.43 -.10 -.07 -.15 .04 -.04 .07 -.04 .31 .33|-.14 .04 -.42 -.02 -.01 .27 .40\*-.13 .01 .08

[B] Entire series, effect on correlation ( .457) is:

Lower 1967< -.021 2009< -.021 1945< -.015 1907> -.014 1906> -.011 1933< -.011 Higher 1980 .027 1923 .014

1925 to 1974 segment:

Lower 1967< -.048 1945< -.036 1933< -.023 1934> -.023 1957< -.019 1952> -.014 Higher 1958 .035 1968 .032

====================================================================================================================================

121026 1910 to 2009 100 years Series 11

[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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1910 1959 -7 .03 .11 .15 .37\* .16 .20 -.12 -.35 -.06 -.30 .31| .02 -.15 -.24 -.23 .21 -.26 .30 -.03 .06 -.01

[B] Entire series, effect on correlation ( .553) is:

Lower 1911> -.025 1938< -.022 1923> -.020 1973< -.016 1947> -.016 1916< -.011 Higher 1997 .024 1991 .024

1910 to 1959 segment:

Lower 1911> -.048 1938< -.048 1923> -.040 1947> -.033 1916< -.023 1910> -.022 Higher 1959 .041 1913 .039

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202496 1913 to 2009 97 years Series 12

[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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1913 1962 0 .19 -.12 -.09 -.06 -.22 .07 .01 .07 -.06 .01 .30\* .23 .25 -.12 .11 -.08 -.14 -.17 -.09 .14 -.09

1925 1974 0 -.11 .07 -.09 .27 -.14 .13 -.08 .17 .07 .05 .27\* .12 .00 .03 .14 .00 -.06 -.27 .07 -.14 -.28

[B] Entire series, effect on correlation ( .346) is:

Lower 1921< -.032 2005< -.023 1932> -.015 1925> -.015 1998< -.013 1985> -.012 Higher 1991 .037 1923 .032

1913 to 1962 segment:

Lower 1921< -.072 1932> -.041 1925> -.038 1934> -.029 1959> -.025 1951< -.016 Higher 1923 .102 1913 .043

1925 to 1974 segment:

Lower 1932> -.038 1925> -.037 1934> -.031 1951< -.029 1926< -.022 1959> -.019 Higher 1966 .050 1970 .031

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161576 1914 to 2009 96 years Series 13

[B] Entire series, effect on correlation ( .535) is:

Lower 1924< -.025 1927< -.023 1923> -.018 1932> -.017 1919< -.013 1918> -.011 Higher 1980 .030 1966 .016

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62281 1917 to 2009 93 years Series 14

[B] Entire series, effect on correlation ( .435) is:

Lower 2003< -.053 2008< -.031 1953> -.025 1924< -.018 1980> -.017 1917< -.016 Higher 1977 .063 1966 .033

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

1953 +3.1 SD

====================================================================================================================================

80235 1917 to 2009 93 years Series 15

[B] Entire series, effect on correlation ( .451) is:

Lower 1982< -.039 1980> -.038 1959> -.019 1996> -.019 1993< -.017 1975< -.014 Higher 1997 .049 1923 .018

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80316 1917 to 2009 93 years Series 16

[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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1950 1999 0 .06 .09 .10 .04 .04 .02 -.21 -.33 .05 .18 .32\* .12 .18 -.08 -.28 -.21 -.10 .01 .30 .05 .10

1960 2009 0 .00 .14 .09 .11 .03 .02 -.13 -.15 .00 .17 .32\* .04 .22 -.05 -.30 -.27 -.13 -.06 .16 - -

[B] Entire series, effect on correlation ( .408) is:

Lower 1991> -.054 1977> -.031 1920< -.015 1958< -.015 1948< -.013 1989< -.012 Higher 1923 .028 1932 .017

1950 to 1999 segment:

Lower 1991> -.078 1977> -.038 1989< -.031 1958< -.024 1959> -.008 1963< -.006 Higher 1992 .026 1956 .023

1960 to 2009 segment:

Lower 1991> -.089 1977> -.045 1989< -.026 2003< -.013 1999> -.005 2008> -.005 Higher 1992 .026 1994 .019

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180952 1917 to 2009 93 years Series 17

[B] Entire series, effect on correlation ( .372) is:

Lower 1969< -.041 1919< -.038 1977> -.032 1999> -.030 1932> -.023 1980> -.022 Higher 1997 .073 1991 .057

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10636 1920 to 2009 90 years Series 18

[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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1920 1969 -10 .31\* .12 -.03 -.28 -.10 -.23 .20 -.07 .05 -.07 .25|-.06 .17 .12 .00 -.13 -.12 .00 .15 .10 .07

1925 1974 -10 .34\* .19 .14 -.20 -.14 -.37 .10 .01 .13 -.08 .18|-.08 .12 .21 .02 .01 -.08 -.07 .15 .02 .07

[B] Entire series, effect on correlation ( .427) is:

Lower 1957< -.029 1946> -.021 1930> -.018 1982> -.013 1932> -.012 1951< -.011 Higher 1980 .044 1977 .027

1920 to 1969 segment:

Lower 1957< -.053 1946> -.044 1930> -.037 1932> -.023 1945< -.020 1959> -.018 Higher 1923 .068 1958 .066

1925 to 1974 segment:

Lower 1957< -.053 1946> -.043 1930> -.037 1932> -.022 1945< -.021 1951< -.018 Higher 1958 .080 1968 .045

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42092 1920 to 2009 90 years Series 19

[B] Entire series, effect on correlation ( .544) is:

Lower 1922< -.048 1923> -.028 1925> -.024 1928< -.024 2001< -.021 1980> -.009 Higher 1991 .053 1997 .016

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40649 1922 to 2009 88 years Series 20

[B] Entire series, effect on correlation ( .466) is:

Lower 2002< -.031 2009< -.027 1957< -.015 1931< -.013 1997> -.013 1956< -.012 Higher 1977 .044 1980 .039

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50499 1922 to 2009 88 years Series 21

[B] Entire series, effect on correlation ( .528) is:

Lower 1923> -.049 1957< -.027 1946< -.026 1984< -.016 1994< -.014 1929< -.013 Higher 1997 .044 1980 .020

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60522 1922 to 2009 88 years Series 22

[B] Entire series, effect on correlation ( .495) is:

Lower 1980> -.048 2004< -.036 1967< -.028 1990< -.015 1966> -.012 1938< -.011 Higher 1997 .037 1977 .032

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

1945 +3.1 SD

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121305 1922 to 2009 88 years Series 23

[B] Entire series, effect on correlation ( .602) is:

Lower 1991> -.028 1950< -.024 1922> -.022 1947> -.019 2004< -.016 1928< -.009 Higher 1997 .077 1980 .024

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22336 1923 to 2009 87 years Series 24

[B] Entire series, effect on correlation ( .607) is:

Lower 1931< -.015 1972> -.014 1969< -.013 1943> -.013 1954< -.011 1942> -.008 Higher 1980 .023 1966 .019

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72396 1925 to 2009 85 years Series 25

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

Lower 1980> -.025 1966> -.020 2000> -.017 1933< -.014 2001< -.014 1987< -.014 Higher 1991 .048 1977 .034

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92250A 1925 to 2010 86 years Series 26

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

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

1925 1974 0 -.05 .09 .16 -.17 .04 -.06 -.23 -.15 .17 .16 .24\* .10 .00 .19 -.13 .14 -.05 -.03 -.12 -.07 .02

[B] Entire series, effect on correlation ( .301) is:

Lower 1997> -.034 1937< -.033 1946> -.024 1931< -.022 1990< -.020 1953> -.013 Higher 1980 .049 1958 .021

1925 to 1974 segment:

Lower 1937< -.058 1946> -.046 1931< -.033 1953> -.027 1966> -.023 1925> -.016 Higher 1958 .047 1956 .026

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60143 1926 to 2010 85 years Series 27

[B] Entire series, effect on correlation ( .415) is:

Lower 2000< -.047 1937< -.031 1997> -.021 1946> -.011 2006> -.011 1966> -.010 Higher 1991 .034 1956 .016

[C] Year-to-year changes diverging by over 4.0 std deviations:

1999 2000 -4.1 SD

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

2000 -6.6 SD

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60550A 1926 to 2009 84 years Series 28

[B] Entire series, effect on correlation ( .515) is:

Lower 2004< -.044 1932> -.033 2009< -.026 2000> -.010 1984< -.010 1934< -.010 Higher 1980 .036 1958 .019

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62372 1926 to 2009 84 years Series 29

[B] Entire series, effect on correlation ( .721) is:

Lower 1999> -.018 1977> -.015 2007< -.014 2008> -.011 2000< -.008 1979< -.007 Higher 1997 .048 1980 .016

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82228A 1927 to 2016 90 years Series 30

[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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1927 1976 -7 -.32 .01 -.04 .42\*-.04 .07 -.27 -.34 -.20 .04 .39|-.06 .08 .11 .04 .09 .30 .09 -.27 -.02 -.13

[B] Entire series, effect on correlation ( .499) is:

Lower 1980> -.044 1977> -.023 1960< -.019 1937< -.013 1940< -.012 1938< -.011 Higher 1997 .106 1966 .028

1927 to 1976 segment:

Lower 1960< -.039 1937< -.026 1940< -.021 1938< -.021 1952> -.021 1934> -.019 Higher 1966 .092 1932 .021

====================================================================================================================================

111314 1927 to 2009 83 years Series 31

[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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1927 1976 0 -.12 .04 -.10 .06 .09 .02 .04 -.01 .08 .13 .31\*-.13 -.11 -.28 -.22 .05 -.01 .27 -.10 -.17 .13

[B] Entire series, effect on correlation ( .477) is:

Lower 2009< -.047 1977> -.033 1956< -.023 1999> -.016 1996> -.014 1973> -.013 Higher 1997 .098 1980 .041

1927 to 1976 segment:

Lower 1956< -.058 1973> -.034 1967< -.020 1971> -.018 1963> -.018 1974> -.017 Higher 1966 .052 1959 .045

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190907 1927 to 2015 89 years Series 32

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

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

1927 1976 0 .00 .08 -.17 .32 -.18 .05 -.34 -.27 -.30 -.19 .32\*-.24 .11 -.14 -.01 .11 .07 .20 .13 -.14 .06

[B] Entire series, effect on correlation ( .506) is:

Lower 1960< -.032 1958< -.023 1953> -.015 1979> -.015 1952> -.010 1947> -.010 Higher 1997 .044 1980 .037

1927 to 1976 segment:

Lower 1960< -.069 1958< -.046 1953> -.033 1947> -.023 1952> -.023 1969< -.016 Higher 1966 .093 1932 .048

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

1990 +3.1 SD

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111252 1929 to 2009 81 years Series 33

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

Lower 1995< -.046 1980> -.025 1968< -.023 1945< -.017 1946> -.017 2003< -.014 Higher 1977 .073 1991 .043

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50274 1930 to 2009 80 years Series 34

[B] Entire series, effect on correlation ( .532) is:

Lower 1933< -.070 1930> -.022 1959> -.021 1935< -.017 1932> -.016 2000> -.016 Higher 1980 .028 1997 .027

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90529 1930 to 2009 80 years Series 35

[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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1930 1979 0 .16 -.14 .10 .01 .03 -.08 -.15 -.14 -.09 -.10 .28\*-.11 -.04 .16 .05 .21 -.01 -.09 .00 -.24 -.03

[B] Entire series, effect on correlation ( .424) is:

Lower 1961< -.047 1934> -.036 1935< -.029 1966> -.028 1997> -.012 1952> -.012 Higher 1980 .047 1977 .036

1930 to 1979 segment:

Lower 1961< -.074 1934> -.056 1935< -.047 1966> -.043 1952> -.018 1979> -.017 Higher 1977 .090 1958 .079

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

1934 +3.0 SD

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131087 1930 to 2009 80 years Series 36

[B] Entire series, effect on correlation ( .430) is:

Lower 1970< -.034 1947> -.022 2001< -.017 1932< -.016 1939> -.016 1980> -.015 Higher 1997 .049 1977 .018

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

1947 +3.1 SD

====================================================================================================================================

100540 1931 to 2009 79 years Series 37

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

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

1931 1980 0 .07 .02 -.11 .21 -.09 -.21 -.21 -.32 .11 -.33 .27\*-.09 -.04 .02 -.17 -.14 -.01 .06 .04 -.01 .19

[B] Entire series, effect on correlation ( .368) is:

Lower 1982< -.032 1980> -.028 1977> -.021 1960< -.020 1947> -.019 1937< -.016 Higher 1997 .030 1999 .024

1931 to 1980 segment:

Lower 1980> -.045 1960< -.037 1947> -.032 1937< -.030 1977> -.028 1952> -.019 Higher 1932 .053 1968 .032

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

1948 +3.2 SD

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121186 1932 to 2009 78 years Series 38

[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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1932 1981 0 -.04 .03 .08 -.09 -.10 -.22 -.10 -.04 .04 -.13 .30\* .13 -.13 .23 .19 -.04 .13 -.15 -.06 .07 -.01

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1960 2009 0 -.10 -.08 .11 .07 -.03 -.15 .00 -.13 .04 -.10 .31\*-.11 .00 .00 .05 -.04 .16 -.11 .09 - -

[B] Entire series, effect on correlation ( .307) is:

Lower 1932> -.031 1980> -.030 1966> -.022 2006> -.020 2001< -.017 1998< -.015 Higher 1991 .075 1978 .023

1932 to 1981 segment:

Lower 1932> -.050 1980> -.050 1966> -.035 1943< -.021 1981> -.018 1959> -.015 Higher 1977 .041 1978 .039

1960 to 2009 segment:

Lower 1980> -.048 2006> -.035 1966> -.035 1998< -.024 2001< -.024 1986< -.022 Higher 1991 .118 1978 .038

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70407 1933 to 2009 77 years Series 39

[B] Entire series, effect on correlation ( .634) is:

Lower 2007< -.044 1936< -.019 2000> -.017 1933> -.012 1945< -.010 1959> -.009 Higher 1997 .035 1978 .014

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151021 1933 to 2009 77 years Series 40

[B] Entire series, effect on correlation ( .757) is:

Lower 1966> -.012 1980> -.011 1959> -.011 1971< -.009 2008< -.007 1988> -.006 Higher 1991 .029 1977 .026

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30343A 1934 to 2015 82 years Series 41

[B] Entire series, effect on correlation ( .658) is:

Lower 1983< -.043 1952> -.024 1938< -.012 2000> -.010 1955< -.008 1988> -.008 Higher 1997 .073 1991 .020

====================================================================================================================================

60345 1934 to 2009 76 years Series 42

[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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1960 2009 0 -.09 .08 -.04 .06 -.14 -.19 .02 .03 .21 -.03 .27\*-.03 .11 -.25 .02 .06 .05 .03 .10 - -

[B] Entire series, effect on correlation ( .339) is:

Lower 1997> -.046 1980> -.031 1971> -.018 2006> -.011 1975< -.011 1956< -.011 Higher 1977 .035 1958 .034

1960 to 2009 segment:

Lower 1997> -.054 1980> -.039 1971> -.023 1975< -.015 2006> -.015 2009< -.014 Higher 1977 .056 1991 .037

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82115 1934 to 2009 76 years Series 43

[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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1934 1983 0 .25 -.14 -.03 -.30 .10 .17 -.15 .07 -.05 .08 .29\*-.09 .19 .05 -.26 .05 -.02 -.09 .10 .02 -.14

1950 1999 2 .14 -.12 -.25 -.23 .21 .15 -.06 -.02 .01 .01 .27|-.01 .31\* .00 -.21 .04 -.11 -.08 .09 -.01 -.16

1960 2009 -5 -.04 -.13 -.33 -.24 .22 .30\*-.06 .16 .04 -.15 .21|-.12 .25 .04 -.10 .07 -.10 -.08 .07 - -

[B] Entire series, effect on correlation ( .191) is:

Lower 1991> -.044 1940< -.025 2002< -.023 1980> -.021 1975< -.016 1966> -.014 Higher 1977 .091 1997 .041

1934 to 1983 segment:

Lower 1940< -.049 1980> -.043 1966> -.030 1975< -.028 1939> -.025 1959> -.021 Higher 1977 .141 1938 .028

1950 to 1999 segment:

Lower 1991> -.066 1980> -.031 1975< -.026 1966> -.021 1988> -.018 1959> -.015 Higher 1977 .119 1997 .054

1960 to 2009 segment:

Lower 1991> -.062 2002< -.037 1980> -.029 1975< -.022 1966> -.020 1988> -.015 Higher 1977 .123 1997 .054

====================================================================================================================================

52343A 1935 to 2017 83 years Series 44

[B] Entire series, effect on correlation ( .459) is:

Lower 2000< -.026 1982< -.024 1968< -.023 1997> -.022 2017> -.022 1938< -.013 Higher 1958 .024 1966 .018

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60116 1935 to 2009 75 years Series 45

[B] Entire series, effect on correlation ( .547) is:

Lower 2002< -.040 1936< -.023 1999> -.020 2007< -.019 1972> -.016 1959> -.009 Higher 1977 .058 1991 .026

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32516 1936 to 2009 74 years Series 46

[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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1936 1985 0 .10 -.13 -.18 .23 -.02 .02 .01 .09 .17 -.07 .27\* .11 .01 -.04 .05 .06 -.24 .16 .02 -.16 -.08

1950 1999 0 .11 -.12 -.05 .10 .06 -.12 .18 -.01 .06 -.20 .28\* .00 .13 -.18 -.09 .06 -.08 .14 .15 -.01 -.12

1960 2009 0 -.04 -.07 .05 .05 .13 -.13 .09 -.06 -.03 -.30 .28\* .00 .19 -.17 -.08 .11 -.10 .18 .09 - -

[B] Entire series, effect on correlation ( .327) is:

Lower 1980> -.058 1997> -.045 1984< -.040 1995< -.022 1975< -.018 1959> -.015 Higher 1991 .080 1977 .041

1936 to 1985 segment:

Lower 1980> -.102 1984< -.070 1975< -.032 1969< -.025 1959> -.025 1945< -.019 Higher 1977 .086 1938 .033

1950 to 1999 segment:

Lower 1980> -.071 1997> -.053 1984< -.049 1995< -.027 1975< -.022 1959> -.018 Higher 1991 .104 1977 .052

1960 to 2009 segment:

Lower 1980> -.070 1997> -.054 1984< -.047 1995< -.025 1975< -.022 1969< -.018 Higher 1991 .108 1977 .054

[C] Year-to-year changes diverging by over 4.0 std deviations:

1979 1980 4.4 SD

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112082 1939 to 2009 71 years Series 47

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

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

1939 1988 0 .11 -.18 -.27 .12 -.02 -.02 -.06 .08 -.09 -.16 .32\* .10 .03 .02 -.05 -.07 .01 .24 .03 -.02 -.19

[B] Entire series, effect on correlation ( .315) is:

Lower 1997> -.029 1946< -.029 2004< -.020 1991> -.019 1978< -.014 1939> -.014 Higher 1980 .025 1959 .024

1939 to 1988 segment:

Lower 1946< -.036 1939> -.023 1978< -.022 1977> -.021 1943> -.015 1976< -.015 Higher 1959 .037 1980 .034

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

1946 -5.0 SD

====================================================================================================================================

121329 1940 to 2009 70 years Series 48

[B] Entire series, effect on correlation ( .654) is:

Lower 1999> -.033 1988> -.016 1981> -.010 1978< -.010 2001< -.007 1985> -.007 Higher 1997 .039 1958 .016

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121310 1941 to 2009 69 years Series 49

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

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

1950 1999 0 -.10 -.08 .29 .03 -.18 -.11 -.12 -.14 .06 -.03 .30\*-.06 .07 -.10 .20 -.17 .27 -.14 .04 .01 -.07

1960 2009 6 -.26 .00 .10 .04 -.16 .13 -.06 .12 .03 -.11 .22|-.18 .04 -.09 .23 -.20 .28\*-.22 .06 - -

[B] Entire series, effect on correlation ( .279) is:

Lower 1997> -.082 1966> -.028 1968< -.021 2002< -.018 1977> -.015 1961< -.012 Higher 1991 .072 1980 .033

1950 to 1999 segment:

Lower 1997> -.105 1966> -.035 1968< -.029 1985< -.022 1961< -.019 1977> -.018 Higher 1991 .094 1980 .042

1960 to 2009 segment:

Lower 1997> -.101 1966> -.036 1968< -.022 1977> -.019 2002< -.017 1999> -.016 Higher 1991 .095 1980 .042

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

1997 +3.0 SD

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40617A 1942 to 2016 75 years Series 50

[B] Entire series, effect on correlation ( .495) is:

Lower 1952> -.026 1947< -.024 2009< -.023 2016> -.021 2011< -.020 1961< -.017 Higher 1997 .114 1977 .029

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72140 1942 to 2009 68 years Series 51

[B] Entire series, effect on correlation ( .628) is:

Lower 1980> -.053 2009< -.018 1978< -.014 2008< -.009 1944> -.007 1947< -.006 Higher 1977 .029 1958 .015

====================================================================================================================================

172202 1942 to 2009 68 years Series 52

[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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1960 2009 -9 -.10 .38\* .15 .04 .14 -.23 -.26 -.08 .02 -.09 .33|-.04 .01 -.05 -.16 -.19 -.03 .03 .11 - -

[B] Entire series, effect on correlation ( .364) is:

Lower 1977> -.055 2006< -.047 1991> -.032 1994< -.027 1948> -.014 1944> -.013 Higher 1997 .031 2001 .028

1960 to 2009 segment:

Lower 1977> -.069 2006< -.054 1991> -.041 1994< -.031 1993< -.011 2000> -.009 Higher 1997 .042 2001 .037

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

1977 +3.1 SD

====================================================================================================================================

182060 1942 to 2009 68 years Series 53

[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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1950 1999 0 -.10 -.04 .01 .06 .26 -.01 -.17 -.23 .02 -.32 .31\*-.05 .02 .01 .18 -.04 .25 .02 -.07 -.14 -.16

1960 2009 6 -.29 .04 .05 -.25 .19 -.03 -.16 .01 .21 -.26 .21| .00 .00 .09 .24 .12 .32\*-.22 -.01 - -

[B] Entire series, effect on correlation ( .304) is:

Lower 1968< -.022 1966> -.021 1980> -.016 1954> -.011 1978< -.008 1943> -.007 Higher 1991 .024 1956 .023

1950 to 1999 segment:

Lower 1968< -.026 1966> -.025 1980> -.019 1959< -.015 1954> -.014 1978< -.010 Higher 1991 .029 1956 .028

1960 to 2009 segment:

Lower 1968< -.043 1966> -.031 1980> -.019 2007> -.015 1993< -.015 1975< -.013 Higher 1991 .079 1997 .043

====================================================================================================================================

192112 1942 to 2016 75 years Series 54

[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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1942 1991 0 -.17 -.03 .12 -.09 .15 .05 .20 .21 -.06 -.05 .24\*-.23 .06 .07 -.13 -.12 -.09 -.02 .08 -.11 -.13

[B] Entire series, effect on correlation ( .317) is:

Lower 1958< -.029 1959> -.029 1968< -.028 2001< -.024 1971> -.020 1943> -.016 Higher 1977 .069 1997 .064

1942 to 1991 segment:

Lower 1968< -.047 1958< -.047 1959> -.044 1971> -.031 1943> -.024 1956< -.016 Higher 1977 .140 1980 .067

====================================================================================================================================

202248 1942 to 2017 76 years Series 55

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

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

1950 1999 0 -.03 -.20 -.01 .11 .04 -.18 -.14 .00 -.08 .08 .28\* .13 .15 -.07 .14 .06 -.08 -.17 .26 -.13 .11

[B] Entire series, effect on correlation ( .429) is:

Lower 1997> -.035 1959> -.026 1998< -.023 1966> -.016 1972< -.014 1980> -.014 Higher 2017 .152 1991 .037

1950 to 1999 segment:

Lower 1997> -.044 1959> -.040 1998< -.031 1966> -.023 1980> -.019 1967< -.018 Higher 1991 .080 1977 .055

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52287 1943 to 2009 67 years Series 56

[B] Entire series, effect on correlation ( .477) is:

Lower 1946> -.031 1943> -.023 1955< -.020 1990< -.018 1978< -.015 1951< -.011 Higher 1991 .037 1966 .036

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101136 1943 to 2009 67 years Series 57

[B] Entire series, effect on correlation ( .379) is:

Lower 1955< -.026 1966> -.025 1980> -.023 1972> -.019 1961< -.018 1976< -.018 Higher 1977 .069 1991 .056

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110811 1943 to 2009 67 years Series 58

[B] Entire series, effect on correlation ( .629) is:

Lower 1987< -.017 1952> -.015 1947> -.015 1953> -.015 1996> -.012 2005< -.012 Higher 1991 .035 1977 .025

====================================================================================================================================

50046 1944 to 2009 66 years Series 59

[B] Entire series, effect on correlation ( .435) is:

Lower 1980> -.063 1970< -.039 1949< -.027 1986< -.021 1998< -.017 1988> -.014 Higher 1991 .063 1977 .025

====================================================================================================================================

120911 1944 to 2016 73 years Series 60

[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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1944 1993 0 .08 -.01 -.29 .10 .10 -.05 -.04 .24 .07 -.23 .30\*-.01 .03 -.23 -.07 -.15 .05 .08 .08 .04 .00

[B] Entire series, effect on correlation ( .375) is:

Lower 1990< -.036 1968< -.032 1999> -.032 2009< -.016 2012> -.014 1959> -.014 Higher 1997 .173 1991 .058

1944 to 1993 segment:

Lower 1990< -.066 1968< -.056 1959> -.022 1988> -.022 1947> -.019 1969< -.017 Higher 1991 .129 1966 .044

====================================================================================================================================

100771 1946 to 2009 64 years Series 61

[B] Entire series, effect on correlation ( .589) is:

Lower 1997> -.031 1980> -.027 2008< -.019 1946< -.014 1996> -.013 1992< -.012 Higher 1977 .036 1991 .034

====================================================================================================================================

100552 1953 to 2006 54 years Series 62

[B] Entire series, effect on correlation ( .413) is:

Lower 1980> -.045 1954< -.038 1999> -.035 1977> -.018 1991> -.018 1986< -.017 Higher 1966 .043 1958 .030

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

1993 +3.6 SD

====================================================================================================================================

150890 1953 to 2009 57 years Series 63

[B] Entire series, effect on correlation ( .674) is:

Lower 1977> -.076 1954< -.020 2002< -.018 1958< -.014 1979> -.014 1991> -.007 Higher 1997 .052 1980 .024

====================================================================================================================================

82138 1960 to 2009 50 years Series 64

[B] Entire series, effect on correlation ( .645) is:

Lower 1977> -.055 1979> -.034 1962> -.025 2008< -.017 2000> -.011 1968< -.011 Higher 1997 .078 1980 .029

====================================================================================================================================

110331 1960 to 2009 50 years Series 65

[B] Entire series, effect on correlation ( .331) is:

Lower 1980> -.056 1967< -.047 1990< -.038 1987< -.022 1972> -.022 1977> -.014 Higher 1997 .137 1966 .036

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142490 1961 to 2017 57 years Series 66

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

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

1961 2010 6 .03 -.09 .18 -.19 -.10 -.01 -.24 -.04 .18 -.43 .32|-.06 -.09 .17 .27 -.03 .35\* .04 - - -

[B] Entire series, effect on correlation ( .494) is:

Lower 1993< -.086 1976< -.042 2010< -.034 1980> -.016 1971> -.014 1975< -.013 Higher 2017 .178 1991 .023

1961 to 2010 segment:

Lower 1993< -.101 1976< -.050 2010< -.040 1971> -.018 1975< -.017 1980> -.016 Higher 1991 .053 1977 .036

====================================================================================================================================

62019 1963 to 2009 47 years Series 67

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

Lower 1994< -.027 2000> -.017 1981< -.014 1969< -.013 1979> -.012 2007< -.011 Higher 1997 .053 1991 .025

====================================================================================================================================

161524 1964 to 2009 46 years Series 68

[B] Entire series, effect on correlation ( .580) is:

Lower 1980> -.105 1973< -.020 1992< -.018 1998< -.014 1965> -.013 1986< -.012 Higher 1991 .083 1977 .041

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

1980 +3.6 SD

====================================================================================================================================

12460 1965 to 2009 45 years Series 69

[B] Entire series, effect on correlation ( .574) is:

Lower 1997> -.038 2005< -.032 1976< -.031 1975< -.023 1985> -.012 1988< -.009 Higher 1991 .087 2001 .023

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50506 1969 to 2008 40 years Series 70

[B] Entire series, effect on correlation ( .408) is:

Lower 1969< -.087 1986< -.054 1980> -.042 2008< -.038 1987< -.015 2006> -.015 Higher 1997 .117 1978 .035

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110727 1975 to 2009 35 years Series 71

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

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

1975 2009 0 .05 .01 .07 -.12 .02 -.27 .19 -.16 .21 .21 .30\* .06 -.04 -.09 -.02 -.35 .06 .02 .07 - -

[B] Entire series, effect on correlation ( .303) is:

Lower 1981< -.091 1991> -.035 1977> -.033 1993< -.015 1998< -.013 1982> -.012 Higher 1997 .076 1986 .029

1975 to 2009 segment:

Lower 1981< -.091 1991> -.035 1977> -.033 1993< -.015 1998< -.013 1982> -.012 Higher 1997 .076 1986 .029

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PART 7: DESCRIPTIVE STATISTICS: 10:47 Fri 04 Sep 2020 Page 7

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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 ()

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

1 70502 1877 2009 133 5 0 .446 1.62 4.33 .994 .883 .215 2.88 .480 -.037 2

2 70421 1885 2009 125 5 0 .550 2.17 4.29 .889 .894 .160 2.63 .432 .044 1

3 70126 1886 2009 124 5 0 .626 2.39 5.06 1.040 .760 .199 3.04 .385 -.050 1

4 121434 1886 2016 131 5 3 .319 2.12 3.84 .854 .880 .159 3.24 .460 -.159 1

5 60353 1894 2009 116 5 3 .207 1.32 3.58 .679 .859 .188 2.45 .282 -.024 2

6 80330 1895 2009 115 5 1 .519 1.82 4.29 .940 .912 .196 2.73 .352 -.013 1

7 122060 1902 2009 108 4 1 .552 2.17 4.85 .833 .828 .188 2.66 .426 -.039 1

8 70096 1903 2009 107 4 0 .578 3.13 7.79 1.534 .888 .162 2.61 .420 -.002 2

9 80233 1904 2009 106 4 1 .422 2.75 6.24 1.017 .724 .193 2.66 .413 .008 1

10 80491 1904 2009 106 4 1 .457 2.43 4.74 .733 .713 .185 2.72 .499 -.013 2

11 121026 1910 2009 100 4 1 .553 2.63 4.29 .718 .779 .138 2.61 .461 -.026 1

12 202496 1913 2009 97 4 2 .346 1.03 2.73 .617 .850 .267 2.82 .547 .051 1

13 161576 1914 2009 96 4 0 .535 2.56 5.17 1.028 .702 .231 2.67 .473 .005 1

14 62281 1917 2009 93 4 0 .435 2.72 7.79 1.390 .913 .152 2.75 .474 -.135 1

15 80235 1917 2009 93 4 0 .451 2.86 8.64 1.400 .847 .206 2.68 .487 -.054 1

16 80316 1917 2009 93 4 2 .408 3.27 6.25 1.345 .846 .176 2.65 .480 -.033 1

17 180952 1917 2009 93 4 0 .372 2.67 8.37 1.992 .885 .199 2.60 .559 -.038 2

18 10636 1920 2009 90 4 2 .427 1.78 6.67 1.039 .874 .178 2.74 .473 .019 1

19 42092 1920 2009 90 4 0 .544 1.94 7.04 .984 .843 .185 2.91 .508 -.073 1

20 40649 1922 2009 88 4 0 .466 2.88 6.90 1.660 .896 .184 2.65 .484 -.007 1

21 50499 1922 2009 88 4 0 .528 2.82 6.45 1.378 .849 .192 2.58 .433 .034 1

22 60522 1922 2009 88 4 0 .495 1.29 3.01 .648 .828 .218 2.94 .606 -.097 1

23 121305 1922 2009 88 4 0 .602 2.70 6.01 1.243 .880 .163 2.61 .393 .005 1

24 22336 1923 2009 87 4 0 .607 3.41 6.51 1.295 .748 .218 2.62 .495 .010 3

25 72396 1925 2009 85 3 0 .610 3.33 6.71 1.218 .849 .155 2.62 .509 -.148 2

26 92250A 1925 2010 86 3 1 .301 .45 .79 .144 .732 .197 2.69 .560 .097 4

27 60143 1926 2010 85 3 0 .415 1.42 3.98 .576 .678 .251 2.61 .338 .018 1

28 60550A 1926 2009 84 3 0 .515 1.24 2.27 .302 .607 .161 2.70 .569 -.008 1

29 62372 1926 2009 84 3 0 .721 2.26 3.86 .688 .727 .176 2.66 .508 .017 1

30 82228A 1927 2016 90 3 1 .499 2.82 6.41 1.429 .855 .197 2.61 .387 -.028 1

31 111314 1927 2009 83 3 1 .477 2.49 5.88 .830 .655 .182 2.63 .470 -.041 2

32 190907 1927 2015 89 3 1 .506 1.82 4.94 .882 .762 .216 2.98 .452 .005 1

33 111252 1929 2009 81 3 0 .448 1.75 3.15 .477 .600 .191 2.51 .438 -.029 1

34 50274 1930 2009 80 3 0 .532 2.18 5.09 .830 .779 .182 2.95 .522 .044 1

35 90529 1930 2009 80 3 1 .424 1.58 20.99 2.259 .080 .215 3.04 .509 .004 1

36 131087 1930 2009 80 3 0 .430 2.64 4.50 .721 .724 .147 2.55 .358 -.036 1

37 100540 1931 2009 79 3 1 .368 1.81 5.32 1.244 .911 .204 2.66 .523 -.072 1

38 121186 1932 2009 78 3 2 .307 1.12 2.93 .538 .803 .231 2.69 .463 -.036 1

39 70407 1933 2009 77 3 0 .634 2.96 5.65 1.373 .861 .182 2.67 .421 .020 1

40 151021 1933 2009 77 3 0 .757 2.58 4.49 1.181 .854 .201 2.62 .583 -.060 1

41 30343A 1934 2015 82 3 0 .658 2.63 4.32 .638 .730 .151 2.60 .384 -.045 1

42 60345 1934 2009 76 3 1 .339 1.13 2.09 .376 .726 .198 2.71 .488 .005 1

43 82115 1934 2009 76 3 3 .191 1.05 1.83 .325 .617 .229 2.65 .523 -.054 1

44 52343A 1935 2017 83 3 0 .459 1.94 5.47 .850 .793 .193 2.80 .453 .037 1

45 60116 1935 2009 75 3 0 .547 1.92 3.01 .455 .602 .175 2.61 .492 -.068 1

46 32516 1936 2009 74 3 3 .327 1.97 8.29 1.522 .871 .268 2.78 .612 -.110 3

47 112082 1939 2009 71 3 1 .315 1.78 3.24 .580 .831 .152 2.49 .349 -.018 1

48 121329 1940 2009 70 3 0 .654 1.98 4.66 .795 .871 .138 2.47 .351 -.011 1

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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 ()

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

49 121310 1941 2009 69 3 2 .279 1.09 2.79 .528 .842 .167 2.94 .658 -.179 1

50 40617A 1942 2016 75 3 0 .495 2.81 4.91 1.009 .730 .204 2.64 .419 -.058 1

51 72140 1942 2009 68 3 0 .628 2.66 4.04 .507 .421 .165 2.46 .376 -.012 1

52 172202 1942 2009 68 3 1 .364 1.42 5.40 .933 .590 .235 2.63 .417 -.089 1

53 182060 1942 2009 68 3 2 .304 1.13 4.24 .759 .890 .203 2.55 .345 -.097 1

54 192112 1942 2016 75 3 1 .317 .45 1.43 .255 .763 .257 2.55 .432 -.043 1

55 202248 1942 2017 76 3 1 .429 .89 2.44 .606 .816 .326 2.85 .493 -.041 1

56 52287 1943 2009 67 3 0 .477 4.11 7.51 1.426 .767 .162 2.54 .432 .041 4

57 101136 1943 2009 67 3 0 .379 1.16 2.83 .728 .934 .208 2.57 .505 .012 1

58 110811 1943 2009 67 3 0 .629 4.00 7.16 1.573 .889 .157 2.62 .484 .001 1

59 50046 1944 2009 66 3 0 .435 1.39 3.26 .585 .711 .227 2.87 .616 -.067 2

60 120911 1944 2016 73 3 1 .375 1.29 2.50 .451 .760 .194 2.51 .370 -.049 1

61 100771 1946 2009 64 3 0 .589 4.43 7.36 .967 .561 .161 2.72 .576 -.061 1

62 100552 1953 2006 54 2 0 .413 1.96 4.39 1.010 .785 .216 3.20 .577 .028 1

63 150890 1953 2009 57 2 0 .674 4.01 8.29 1.371 .746 .182 2.86 .591 .070 1

64 82138 1960 2009 50 1 0 .645 4.62 7.50 1.121 .496 .178 2.81 .615 -.062 1

65 110331 1960 2009 50 1 0 .331 1.78 3.22 .700 .728 .223 2.84 .650 .062 1

66 142490 1961 2017 57 2 1 .494 2.09 4.00 .617 .761 .155 2.58 .511 -.004 1

67 62019 1963 2009 47 1 0 .751 6.09 8.17 1.102 .380 .157 2.53 .574 .027 1

68 161524 1964 2009 46 1 0 .580 2.77 5.15 .791 .725 .162 2.63 .522 .029 2

69 12460 1965 2009 45 1 0 .574 3.20 4.68 .790 .523 .202 2.59 .473 -.047 2

70 50506 1969 2008 40 1 0 .408 1.27 2.79 .495 .663 .231 2.78 .676 -.049 1

71 110727 1975 2009 35 1 1 .303 2.22 4.89 1.029 .801 .234 2.60 .487 -.081 2

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Total or mean: 5764 226 43 .474 2.21 20.99 .939 .772 .193 3.24 .472 -.026

- = [ COFECHA QURU COF ] = -