[] Dendrochronology Program Library Run SBO Program COF 15:27 Mon 03 Jul 2017 Page 1

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[] P R O G R A M C O F E C H A Version 6.06P 30136

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QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

File of DATED series: sbo.txt

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 1837 to 2016 180 years

Continuous time span is 1837 to 2016 180 years

Portion with two or more series is 1838 to 2015 178 years

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

\*C\* Number of dated series 26 \*C\*

\*O\* Master series 1837 2016 180 yrs \*O\*

\*F\* Total rings in all series 3591 \*F\*

\*E\* Total dated rings checked 3589 \*E\*

\*C\* Series intercorrelation .607 \*C\*

\*H\* Average mean sensitivity .285 \*H\*

\*A\* Segments, possible problems 4 \*A\*

\*\*\* Mean length of series 138.1 \*\*\*

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

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: 15:27 Mon 03 Jul 2017 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

: : : : : : : : : : : : : : : : : : : : : -------- --- ---- ---- ----

. . . . . . . . . . . . . . . . <==============>. . SBO01B 1 1848 1999 152

. . . . . . . . . . . . . . . . <=================> . SBO02b 2 1837 2015 179

. . . . . . . . . . . . . . . . . . <========> . SBO03A 3 1928 2016 89

. . . . . . . . . . . . . . . . . . <========> . SBO03B 4 1921 2012 92

. . . . . . . . . . . . . . . . . <=============> . SBO14A2 5 1871 2015 145

. . . . . . . . . . . . . . . . <===============> . SBO04B 6 1858 2015 158

. . . . . . . . . . . . . . . . . <==========> . SBO05A 7 1902 2015 114

. . . . . . . . . . . . . . . . <===============> . SBO5B 8 1851 2015 165

. . . . . . . . . . . . . . . . <===============> . SBO6A 9 1850 2015 166

. . . . . . . . . . . . . . . . <=================> . SBO06B 10 1838 2015 178

. . . . . . . . . . . . . . . . . <=============> . SBO7A 11 1879 2015 137

. . . . . . . . . . . . . . . . <================> . SBO07B 12 1843 2015 173

. . . . . . . . . . . . . . . . <===============> . SBO8A 13 1850 2014 165

. . . . . . . . . . . . . . . . .<==============> . SBO08B 14 1864 2015 152

. . . . . . . . . . . . . . . . . . <======> . SBO09A 15 1949 2015 67

. . . . . . . . . . . . . . . . . . <========> . SBO09B 16 1928 2015 88

. . . . . . . . . . . . . . . . . <===========>. . SBO10A 17 1872 1999 128

. . . . . . . . . . . . . . . . <================> . SBO10B 18 1841 2015 175

. . . . . . . . . . . . . . . . <==========> . . SBO11A 19 1851 1965 115

. . . . . . . . . . . . . . . . .<==========> . . SBO11B 20 1862 1975 114

. . . . . . . . . . . . . . . . . . <=======> . SBO12B 21 1939 2015 77

. . . . . . . . . . . . . . . . <===============> . SBO13A 22 1853 2015 163

. . . . . . . . . . . . . . . . <===========> . . SBO13B 23 1857 1975 119

. . . . . . . . . . . . . . . . .<==============> . SBO14B 24 1860 2015 156

. . . . . . . . . . . . . . . . .<==============> . SBO15A 25 1867 2015 149

. . . . . . . . . . . . . . . . <================> . SBO15B 26 1841 2015 175

: : : : : : : : : : : : : : : : : : : : :

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: 15:27 Mon 03 Jul 2017 Page 3

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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

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

1850 -.188 8 1900 -.188 20 1950 1.175 26 2000 .814 21

1851 .243 10 1901 .384 20 1951 .635 26 2001 .980 21

1852 .859 10 1902 -2.489 21 1952 -.771 26 2002 -.281 21

1853 .734 11 1903 .015 21 1953 -.684 26 2003 .057 21

1854 .609 11 1904 2.022 21 1954 -1.940 26 2004 .944 21

1855 -.894 11 1905 .556 21 1955 -1.349 26 2005 .047 21

1856 .273 11 1906 .992 21 1956 .330 26 2006 .628 21

1857 -1.141 12 1907 1.687 21 1957 1.627 26 2007 -.897 21

1858 -.017 13 1908 1.429 21 1958 .605 26 2008 -1.981 21

1859 .055 13 1909 .675 21 1959 -.059 26 2009 -.611 21

1860 -.792 14 1910 -.962 21 1960 1.327 26 2010 .096 21

1861 -.711 14 1911 -1.287 21 1961 -2.018 26 2011 .898 21

1862 .332 15 1912 .722 21 1962 1.042 26 2012 -.566 21

1863 1.020 15 1913 -.774 21 1963 .433 26 2013 -.303 20

1864 .073 16 1914 -2.065 21 1964 .332 26 2014 -.690 20

1865 -.336 16 1915 .347 21 1965 -1.099 26 2015 .538 19

1866 -.186 16 1916 1.191 21 1966 -1.093 25 2016 1.780 1

1867 -.049 17 1917 -.349 21 1967 .283 25

1868 -.543 17 1918 -.131 21 1968 .559 25

1869 -.484 17 1919 -.219 21 1969 -.054 25

1870 -1.238 17 1920 -.587 21 1970 1.067 25

1871 -.832 18 1921 -1.207 22 1971 .010 25

1872 .236 19 1922 -.082 22 1972 -1.637 25

1873 .145 19 1923 .104 22 1973 .819 25

1874 -1.038 19 1924 1.919 22 1974 .889 25

1875 -1.508 19 1925 -.088 22 1975 1.223 25

1876 .437 19 1926 .418 22 1976 .688 23

1877 -.061 19 1927 .799 22 1977 -.524 23

1878 .596 19 1928 1.732 24 1978 .226 23

1879 .404 20 1929 -.466 24 1979 -1.549 23

1880 .255 20 1930 .099 24 1980 -2.415 23

1881 .062 20 1931 -2.244 24 1981 -.333 23

1882 .696 20 1932 -.964 24 1982 1.172 23

1883 1.925 20 1933 -.725 24 1983 .134 23

1884 1.776 20 1934 -1.213 24 1984 -.661 23

1885 1.283 20 1935 .872 24 1985 1.379 23

1886 .792 20 1936 -.120 24 1986 1.576 23

1837 -.018 1 1887 -2.104 20 1937 -.998 24 1987 -.053 23

1838 .395 2 1888 -1.569 20 1938 2.224 24 1988 -1.389 23

1839 -.424 2 1889 .693 20 1939 .872 25 1989 -.726 23

1840 .287 2 1890 -.155 20 1940 .060 25 1990 -2.502 23

1841 -.405 4 1891 -1.070 20 1941 -1.018 25 1991 -.611 23

1842 .762 4 1892 .240 20 1942 .570 25 1992 -.508 23

1843 .881 5 1893 .633 20 1943 -1.104 25 1993 .382 23

1844 .229 5 1894 -.624 20 1944 -1.361 25 1994 .454 23

1845 -.736 5 1895 1.388 20 1945 -.542 25 1995 1.031 23

1846 .213 5 1896 -1.187 20 1946 .365 25 1996 .002 23

1847 .274 5 1897 -2.821 20 1947 .049 25 1997 -.306 23

1848 .742 6 1898 -.994 20 1948 1.701 25 1998 .107 23

1849 1.207 6 1899 -.313 20 1949 .749 26 1999 1.645 23

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PART 4: Master Bar Plot: 15:27 Mon 03 Jul 2017 Page 4

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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

1850----a 1900----a 1950---------E 2000--------C

1851------A 1901------B 1951-------C 2001---------D

1852--------C 1902j 1952--c 2002---a

1853--------C 1903-----@ 1953--c 2003-----@

1854-------B 1904----------H 1954h 2004---------D

1855--d 1905-------B 1955-e 2005-----@

1856------A 1906---------D 1956------A 2006-------C

1857-e 1907----------G 1957----------G 2007--d

1858----@ 1908----------F 1958-------B 2008h

1859-----@ 1909--------C 1959----@ 2009--b

1860--c 1910-d 1960---------E 2010-----@

1861--c 1911-e 1961h 2011---------D

1862------A 1912--------C 1962---------D 2012---b

1863---------D 1913--c 1963-------B 2013---a

1864-----@ 1914h 1964------A 2014--c

1865---a 1915------A 1965-d 2015-------B

1866----a 1916---------E 1966-d 2016----------G

1867----@ 1917---a 1967------A

1868---b 1918----a 1968-------B

1869---b 1919----a 1969----@

1870-e 1920--b 1970---------D

1871--c 1921-e 1971-----@

1872------A 1922----@ 1972g

1873-----A 1923-----@ 1973--------C

1874-d 1924----------H 1974--------D

1875-f 1925----@ 1975---------E

1876-------B 1926-------B 1976--------C

1877----@ 1927--------C 1977---b

1878-------B 1928----------G 1978------A

1879------B 1929---b 1979f

1880------A 1930-----@ 1980j

1881-----@ 1931i 1981---a

1882--------C 1932-d 1982---------E

1883----------H 1933--c 1983-----A

1884----------G 1934-e 1984--c

1885---------E 1935--------C 1985----------F

1886--------C 1936----@ 1986----------F

1837----@ 1887h 1937-d 1987----@

1838------B 1888f 1938----------I 1988-f

1839---b 1889--------C 1939--------C 1989--c

1840------A 1890----a 1940-----@ 1990j

1841---b 1891-d 1941-d 1991--b

1842--------C 1892------A 1942-------B 1992---b

1843--------D 1893-------C 1943-d 1993------B

1844------A 1894--b 1944-e 1994-------B

1845--c 1895----------F 1945---b 1995---------D

1846------A 1896-e 1946------A 1996-----@

1847------A 1897k 1947-----@ 1997---a

1848--------C 1898-d 1948----------G 1998-----@

1849---------E 1899---a 1949--------C 1999----------G

PART 5: CORRELATION OF SERIES BY SEGMENTS: 15:27 Mon 03 Jul 2017 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 1825 1850 1875 1900 1925 1950 1975

1874 1899 1924 1949 1974 1999 2024

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

1 SBO01B 1848 1999 .67 .69 .69 .60 .75 .73

2 SBO02b 1837 2015 .48 .70 .71 .71 .82 .83 .71

3 SBO03A 1928 2016 .33 .69 .63

4 SBO03B 1921 2012 .70 .68 .74 .74

5 SBO14A2 1871 2015 .60 .62 .88 .75 .66 .65

6 SBO04B 1858 2015 .62 .82 .55 .36 .51 .50

7 SBO05A 1902 2015 .70 .78 .77 .60

8 SBO5B 1851 2015 .20B .43 .62 .76 .78 .65

9 SBO6A 1850 2015 .61 .75 .69 .76 .75 .67

10 SBO06B 1838 2015 .29A .58 .76 .70 .80 .75 .57

11 SBO7A 1879 2015 .47 .53 .59 .77 .79

12 SBO07B 1843 2015 .46 .50 .64 .68 .72 .76 .51

13 SBO8A 1850 2014 .57 .78 .77 .58 .58 .57

14 SBO08B 1864 2015 .65 .71 .74 .70 .66 .54

15 SBO09A 1949 2015 .75 .76 .77

16 SBO09B 1928 2015 .77 .71 .48

17 SBO10A 1872 1999 .69 .71 .71 .61 .45

18 SBO10B 1841 2015 .45 .67 .79 .73 .64 .58 .55

19 SBO11A 1851 1965 .45 .69 .78 .75

20 SBO11B 1862 1975 .70 .73 .81 .70 .71

21 SBO12B 1939 2015 .71 .69 .50

22 SBO13A 1853 2015 .47 .67 .73 .64 .53 .44

23 SBO13B 1857 1975 .72 .83 .71 .31A .30A

24 SBO14B 1860 2015 .74 .74 .76 .60 .44 .47

25 SBO15A 1867 2015 .47 .62 .65 .67 .69 .48

26 SBO15B 1841 2015 .47 .54 .82 .76 .68 .55 .42

Av segment correlation .47 .59 .70 .70 .66 .66 .58

PART 6: POTENTIAL PROBLEMS: 15:27 Mon 03 Jul 2017 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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SBO01B 1848 to 1999 152 years Series 1

[B] Entire series, effect on correlation ( .655) is:

Lower 1916< -.036 1990> -.015 1912< -.008 1849< -.008 1850> -.007 1866> -.007 Higher 1902 .021 1887 .020

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

SBO02b 1837 to 2015 179 years Series 2

[\*] Early part of series cannot be checked from 1837 to 1837 -- not matched by another series

[B] Entire series, effect on correlation ( .673) is:

Lower 1848< -.013 1843> -.010 1904< -.008 1839< -.007 1866> -.007 1856< -.006 Higher 1961 .016 1990 .013

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

SBO03A 1928 to 2016 89 years Series 3

[\*] Later part of series cannot be checked from 2016 to 2016 -- not matched by another series

[B] Entire series, effect on correlation ( .465) is:

Lower 1929> -.025 1931> -.022 1938< -.022 1948< -.019 1977> -.018 1935< -.017 Higher 1961 .058 2008 .023

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

SBO03B 1921 to 2012 92 years Series 4

[B] Entire series, effect on correlation ( .714) is:

Lower 1941> -.014 1929> -.012 1961> -.010 1978< -.010 1927< -.009 1971> -.008 Higher 1924 .009 1980 .008

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

SBO14A2 1871 to 2015 145 years Series 5

[B] Entire series, effect on correlation ( .676) is:

Lower 1875< -.020 1887> -.019 1896> -.014 1973< -.012 1876< -.011 1961> -.007 Higher 1990 .014 1931 .012

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

SBO04B 1858 to 2015 158 years Series 6

[B] Entire series, effect on correlation ( .526) is:

Lower 1971< -.035 1980> -.024 1870> -.024 1939< -.021 1941> -.020 1938< -.013 Higher 1990 .023 1961 .019

[E] Outliers 3 3.0 SD above or -4.5 SD below mean for year

1870 +4.0 SD; 1941 +3.4 SD; 1980 +3.6 SD

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

SBO05A 1902 to 2015 114 years Series 7

[B] Entire series, effect on correlation ( .669) is:

Lower 2009> -.015 2000< -.014 1911< -.011 2007> -.011 2013> -.009 1925> -.008 Higher 1990 .020 1980 .012

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

2009 +3.1 SD

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

SBO5B 1851 to 2015 165 years Series 8

[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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1851 1900 -1 .16 .11 -.02 -.14 .19 .01 .18 .10 .04 .33\* .20|-.08 -.05 -.13 -.19 .08 .09 -.27 -.12 .10 -.08

[B] Entire series, effect on correlation ( .533) is:

Lower 1887> -.035 1910> -.016 1902> -.016 1857> -.012 1874> -.011 1871> -.010 Higher 1990 .020 1931 .013

1851 to 1900 segment:

Lower 1887> -.106 1857> -.035 1874> -.033 1871> -.029 1885< -.021 1863< -.019 Higher 1884 .050 1896 .047

[E] Outliers 4 3.0 SD above or -4.5 SD below mean for year

1871 +3.1 SD; 1874 +3.1 SD; 1887 +3.7 SD; 1910 +3.2 SD

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

SBO6A 1850 to 2015 166 years Series 9

[B] Entire series, effect on correlation ( .679) is:

Lower 1850> -.009 1862< -.008 1905< -.007 1993< -.007 1892< -.006 1941> -.006 Higher 1961 .017 1897 .012

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SBO06B 1838 to 2015 178 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

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

1838 1887 0 - - - - - - - - - .09 .29\* .01 -.04 -.05 -.13 .11 .23 -.02 -.25 .09 .20

[B] Entire series, effect on correlation ( .601) is:

Lower 1847< -.016 1857> -.015 1843> -.013 1839> -.009 1995< -.009 1862< -.007 Higher 1961 .022 1897 .014

1838 to 1887 segment:

Lower 1857> -.056 1847< -.055 1843> -.042 1839> -.029 1862< -.022 1867> -.018 Higher 1887 .104 1883 .051

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

1857 +3.1 SD

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

SBO7A 1879 to 2015 137 years Series 11

[B] Entire series, effect on correlation ( .619) is:

Lower 1928< -.019 1897> -.011 1887> -.011 1926< -.010 1927< -.010 1879< -.009 Higher 1990 .019 1938 .012

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SBO07B 1843 to 2015 173 years Series 12

[B] Entire series, effect on correlation ( .572) is:

Lower 2011< -.026 1851< -.014 1925> -.011 2007> -.010 1897> -.010 2012> -.010 Higher 1902 .015 1896 .011

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SBO8A 1850 to 2014 165 years Series 13

[B] Entire series, effect on correlation ( .625) is:

Lower 1965< -.018 2012> -.015 1850> -.014 1939< -.010 1929> -.009 1865> -.007 Higher 1887 .020 1980 .009

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SBO08B 1864 to 2015 152 years Series 14

[B] Entire series, effect on correlation ( .647) is:

Lower 2012< -.016 1965> -.010 1956< -.009 1876< -.008 2009> -.008 1864> -.008 Higher 1961 .020 1897 .013

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SBO09A 1949 to 2015 67 years Series 15

[B] Entire series, effect on correlation ( .758) is:

Lower 1965> -.034 1969< -.028 1962< -.015 2004< -.014 1979> -.011 1975< -.007 Higher 1961 .026 1990 .026

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SBO09B 1928 to 2015 88 years Series 16

[B] Entire series, effect on correlation ( .613) is:

Lower 2013< -.031 1997< -.025 2012> -.023 2002> -.018 1999< -.012 2008> -.009 Higher 1961 .036 1980 .022

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SBO10A 1872 to 1999 128 years Series 17

[B] Entire series, effect on correlation ( .588) is:

Lower 1896> -.038 1999< -.023 1948< -.014 1990> -.010 1984> -.010 1915< -.010 Higher 1897 .023 1902 .022

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

1896 +3.4 SD

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SBO10B 1841 to 2015 175 years Series 18

[B] Entire series, effect on correlation ( .551) is:

Lower 1843< -.061 1985< -.014 2015< -.010 1841> -.009 1925> -.008 2005> -.008 Higher 1887 .025 1938 .012

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

1857 -4.9 SD

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

SBO11A 1851 to 1965 115 years Series 19

[B] Entire series, effect on correlation ( .613) is:

Lower 1887> -.036 1857> -.026 1871< -.026 1925> -.011 1860> -.011 1865< -.008 Higher 1897 .019 1931 .013

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

1857 +3.0 SD

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SBO11B 1862 to 1975 114 years Series 20

[B] Entire series, effect on correlation ( .707) is:

Lower 1875> -.039 1970< -.019 1885< -.011 1950< -.008 1962< -.008 1974< -.007 Higher 1887 .020 1931 .015

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

1875 +4.1 SD

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SBO12B 1939 to 2015 77 years Series 21

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

Lower 1981< -.032 2011< -.025 2009> -.020 1985< -.013 1999< -.011 1998< -.009 Higher 1990 .033 1954 .022

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

2009 +3.2 SD

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SBO13A 1853 to 2015 163 years Series 22

[B] Entire series, effect on correlation ( .523) is:

Lower 1857> -.029 1858< -.019 2007< -.012 1994< -.010 1882< -.008 1887> -.007 Higher 1902 .032 1961 .020

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

1857 +3.9 SD

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

SBO13B 1857 to 1975 119 years Series 23

[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 .20 -.16 .10 -.22 .18 -.10 .02 -.16 -.02 -.02 .31\* .22 .21 -.21 -.01 -.35 -.06 .03 .04 .09 -.08

1926 1975 0 .21 -.14 .09 -.22 .18 -.10 .00 -.15 -.02 .00 .30\* .23 .22 -.19 -.02 -.33 -.09 .02 .03 .08 -.07

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

Lower 1961> -.055 1962< -.021 1944> -.021 1960< -.018 1870< -.014 1954> -.012 Higher 1887 .030 1896 .016

1925 to 1974 segment:

Lower 1961> -.115 1962< -.046 1944> -.044 1960< -.038 1954> -.019 1939< -.012 Higher 1931 .046 1938 .037

1926 to 1975 segment:

Lower 1961> -.114 1944> -.045 1962< -.045 1960< -.037 1954> -.018 1955> -.012 Higher 1931 .048 1938 .037

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

1960 1961 4.8 SD

[E] Outliers 3 3.0 SD above or -4.5 SD below mean for year

1870 -4.6 SD; 1944 +3.1 SD; 1961 +3.2 SD

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

SBO14B 1860 to 2015 156 years Series 24

[B] Entire series, effect on correlation ( .612) is:

Lower 1954> -.016 1976< -.015 1943> -.013 1993< -.012 1910> -.012 1981< -.010 Higher 1902 .025 1990 .016

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

SBO15A 1867 to 2015 149 years Series 25

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

Lower 2002< -.043 1896> -.024 1867< -.016 1910> -.015 1925< -.009 1868> -.009 Higher 1902 .022 1897 .012

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

SBO15B 1841 to 2015 175 years Series 26

[B] Entire series, effect on correlation ( .568) is:

Lower 1857< -.025 1981< -.010 1850< -.008 1847> -.008 1970< -.007 1990> -.007 Higher 1887 .023 1902 .016

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

1857 -5.5 SD

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PART 7: DESCRIPTIVE STATISTICS: 15:27 Mon 03 Jul 2017 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 ()

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

1 SBO01B 1848 1999 152 6 0 .655 1.22 2.47 .428 .591 .240 2.67 .488 .029 1

2 SBO02b 1837 2015 179 7 0 .673 1.29 4.32 .657 .510 .339 2.74 .393 -.007 2

3 SBO03A 1928 2016 89 3 0 .465 1.90 4.54 .752 .346 .358 2.86 .548 .016 1

4 SBO03B 1921 2012 92 4 0 .714 1.70 4.82 .782 .478 .334 2.65 .408 .018 1

5 SBO14A2 1871 2015 145 6 0 .676 1.14 2.42 .385 .269 .324 2.79 .436 .055 1

6 SBO04B 1858 2015 158 6 0 .526 1.20 3.19 .459 .456 .306 2.72 .447 .001 1

7 SBO05A 1902 2015 114 4 0 .669 1.33 2.89 .464 .399 .298 2.67 .478 -.012 1

8 SBO5B 1851 2015 165 6 1 .533 1.36 2.75 .554 .665 .246 2.75 .504 -.038 1

9 SBO6A 1850 2015 166 6 0 .679 1.21 3.69 .682 .740 .255 2.89 .445 -.022 1

10 SBO06B 1838 2015 178 7 1 .601 .97 2.09 .410 .702 .269 2.85 .437 -.013 1

11 SBO7A 1879 2015 137 5 0 .619 1.36 3.08 .585 .651 .276 2.87 .479 .019 1

12 SBO07B 1843 2015 173 7 0 .572 1.27 2.82 .616 .687 .275 2.77 .474 -.040 1

13 SBO8A 1850 2014 165 6 0 .625 1.00 2.87 .473 .749 .234 2.65 .407 .020 1

14 SBO08B 1864 2015 152 6 0 .647 1.18 2.48 .467 .684 .246 2.72 .421 -.027 1

15 SBO09A 1949 2015 67 3 0 .758 1.95 3.94 .616 .288 .295 2.80 .494 .018 1

16 SBO09B 1928 2015 88 3 0 .613 1.79 3.98 .654 .291 .343 2.65 .552 -.049 1

17 SBO10A 1872 1999 128 5 0 .588 1.62 4.36 .876 .550 .371 3.06 .473 -.029 1

18 SBO10B 1841 2015 175 7 0 .551 .91 2.20 .352 .576 .262 2.73 .415 -.049 1

19 SBO11A 1851 1965 115 4 0 .613 1.30 2.44 .498 .546 .289 2.58 .455 .033 1

20 SBO11B 1862 1975 114 5 0 .707 1.20 2.57 .495 .563 .310 2.70 .469 .016 1

21 SBO12B 1939 2015 77 3 0 .634 1.55 3.07 .441 .244 .265 2.98 .613 .065 1

22 SBO13A 1853 2015 163 6 0 .523 .93 2.67 .474 .767 .249 2.66 .406 -.074 1

23 SBO13B 1857 1975 119 5 2 .553 .80 2.27 .387 .689 .272 2.74 .465 .061 1

24 SBO14B 1860 2015 156 6 0 .612 1.02 3.25 .519 .646 .296 2.75 .432 -.008 1

25 SBO15A 1867 2015 149 6 0 .535 1.32 3.00 .549 .551 .304 2.55 .393 -.040 1

26 SBO15B 1841 2015 175 7 0 .568 1.16 2.76 .468 .654 .257 2.73 .384 -.047 1

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Total or mean: 3591 139 4 .607 1.24 4.82 .530 .577 .285 3.06 .450 -.008

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