An Improved Annual Chronology of U.S. Business Cycles since the 1790's*

Joe Davis
The Vanguard Group, Inc.
Investment Counseling and Research & Fixed Income Groups
Joseph_Davis@Vanguard.com
and NBER

Abstract

The NBER's pre-WWI chronology of business cycles implies that the U.S. economy spent nearly every other year in recession. This paper extends earlier efforts at redating for the 1796-1914 period using a single metric: Davis' (2004) annual industrial production index. This chronology alters more than 40% of the peak and troughs, and removes cycles long considered the most questionable. An important implication of the new chronology is the lack of discernible differences in the frequency and duration of industrial cycles among the pre-Civil War, Civil War to WWI, and post-WWII periods.

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Historical comparisons of the frequency and duration of NBER-dated recessions and expansions proffer persuasive evidence that the American business cycle has moderated recently. Indeed, the NBER chronology indicates that post-World War II expansions are twice as long as their pre-WWI counterparts, with post-WWII recessions occurring less frequently.

Yet a 1990s investigation into Burns and Mitchell's (1946) disclaimer on the very limited and rather circumstantial empirical support for the pre-WWII NBER chronology revealed inherent biases in the official turning points. Watson (1994) showed that when post-WWII (hence, "postwar") cycles are based solely upon nominal price data for commodities, crude materials, and financial instruments, subsequent differences in cyclical properties between the pre-WWI (hence, "prewar") and postwar periods appear small. Furthermore, Romer (1994) demonstrated that, contrary to modern NBER practices, the monthly peaks and troughs between 1884 and 1927 were derived from detrended data that dated prewar peaks earlier and troughs later vis-à-vis postwar turning points derived from data in levels.

These important studies have raised additional questions regarding what we think we know about the earliest U.S. business cycles. Do the systematic dating errors that Romer documents for the post-1884 NBER chronology afflict earlier peaks and troughs, as some historians have long suspected? How reliably could early NBER researchers judge if and when a recession occurred before the Civil War if they only had access to scattered press reports and "prices current" listings of commodity prices? Did persistent deflationary episodes lead the nineteenth-century NBER chroniclers to mistake declines in nominal aggregates for falls in real output?

Researchers have long questioned the reliability of several prewar recessions, yet a resolution of these questions has remained elusive because of the lack of reliable time-series data, especially for the pre-Civil War period. In this paper, I propose an alternative set of annual peaks and troughs between 1796 and 1914 by mapping to the absolute peaks and troughs in a new dataset: my annual index of U.S. industrial production (see Davis 2004). My chronology alters more than 40% of the peak and troughs, and removes cycles long considered the most questionable. An important implication of the new chronology is the lack

of discernible differences in the frequency and duration of industrial cycles among the pre-Civil War, Civil War to WWI, and post-WWII periods

The paper proceeds as follows. Section I discusses the data employed to construct an alternative set of prewar peak and trough years. I then turn my attention to the limitations of employing a single annual index (as opposed to many monthly series) in establishing an alternative set of industrial cycles. Section I ends with a focus on the differences between the new and old prewar chronologies. Section II examines the differences in the characteristics between the NBER dates and my alternative chronology, and investigates the potential implications of these revisions when compared to similarly-constructed annual peaks and troughs for the postwar period. Section III contains some concluding remarks.

I. Reevaluating the prewar NBER business-cycle chronology

As is well known, Willard Thorp's *Business Annals* (published in 1926) marks the initial step that the then-recently-formed National Bureau of Economic Research (NBER) took toward identifying business-cycle turning points. The *Business Annals* are a brief summary and interpretation of U.S. economic conditions in every year from 1790 through 1925 based upon contemporaneous business and popular press reports. Thorp compiled the annals by consulting extant newspapers and other trade publications held at the New York Public Library. In doing so, he formed an annual "phrase summary" across four broad categories: (*i*.) industry, commerce, and labor; (*ii*.) money, security, and foreign exchange markets; (*iii*.) agricultural production and farm prices; and, (*iv*.) non-economic phenomena, such as political events, wars, and catastrophes. He then qualitatively weighed the four narrative summaries that, in his judgment, best reflected one (or more) of the four phase cycles that business conditions were likely in:

depression, revival, prosperity, and recession.[1] Thorp gave primacy to industrial and commercial activity in arriving at his aggregate assessment.

Thorp's anecdotal-based assessment of annual business conditions still underpins whether a U.S. recession officially occurred between 1790 and 1915. This is true because Mitchell (1926; 1927, 387, table 23) mapped one-for-one Thorp's inflection years marked recessions and revival as *peaks* and *troughs*, respectively, to serve as the critical foundation for the NBER's business-cycle chronology.[2] The first two columns of Table 1 present the annual peaks and troughs to the prewar NBER chronology.

a. New dates from new data

I have constructed an alternative set of annual peaks and troughs for the 1796–1915 period as a basis for evaluating the reliability of Thorp's annual business cycles. The alternative chronology is based upon an entirely new annual dataset on U.S. industrial production in Davis (2004) that is similar to the Federal Reserve Board's present-day industrial production series.

The Davis index assembles 43 annual components in the manufacturing and mining industries that are consistently defined from 1790 until WWI.[3] It is a comprehensive industrial output measure in so far as its components directly or indirectly represent close to 90 percent of the value added produced by the U.S. industrial sector during the nineteenth century. Changes in this index reflect only fluctuations in real output.

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[1] For example, Thorp's phrase summary for 1813 is simply "prosperity," but his assessment of 1847 is "revival; prosperity; panic; recession." On several occasions, Thorp interjected adjectives to indicate the relative severity of a contraction, such as "deep depression" for 1894 or "mild depression" for 1911.

[2] The term recession was a novel one suggested by Wesley Mitchell (Thorp's dissertation advisor at Columbia) to replace the more vague and confusing term crisis found in previously written and often-contradictory business annals unaffiliated with the NBER. Mitchell's use of the term recession marked the NBER's attempt at discriminating "periods of dull business" from the less obvious effects of financial panics during the nineteenth century.

[3] The relative importance of the 43 components in the Davis index changes over time by using two separate base years (1850 and 1880) and linking the overlapping series in chronological segments. The index possesses complete industry coverage after 1826, with moderate attrition back through 1790. The attribution of annual fluctuations in the aggregate index to any single component series may vary from year to year based upon additional factors, including data attrition and the emergence of new products. See Davis (2002) and Davis (2004) for complete details.

I adopted my dating algorithm from Romer (1994) to develop an alternative prewar chronology of annual peaks and troughs for the U.S. industrial sector. Since I consult annual data to date peaks and troughs, the methodology is quite simple: A year immediately preceding an absolute decline in the aggregate level of Davis' industrial production index defines a peak, and the last consecutive decline following a peak defines a trough.[4] The new, alternative prewar chronology is listed in the middle columns of Table 1.

b. Limitations of approach

This simple approach in establishing peaks and troughs possesses at least four shortcomings compared to how the NBER currently identifies turning points. First, the present study consults only one annual series to date prewar cycles. By comparison, the modern NBER dates (including the annual ones) are based on a vast database of monthly series that gauge consumer and business activity across a wide array of manufacturing and non-manufacturing industries.

Second, the Davis index for 1790–1915 may not be as reliable a cyclical measure as is the Federal Reserve Board's (FRB) index of industrial production, which is considered among the most important coincident indicators of U.S. business cycles. Conceptually, the Davis and FRB indexes attempt to measure the same fundamentals, namely the level of physical production in the nation's manufacturing and mining industries. However, the FRB index, which begins in 1919, consists of a larger set of underlying components, ranging from 60 series in 1919 to more than 200 series by the 1950's (U.S. Board of Governors 1986, 63, table 5.1).

While there is no period of overlap between the two series, I can gauge the relative cyclical sensitivities of the two series by regressing logarithmic growth rates in each index on a *third* industrial production index that partially spans both the Davis and FRB index. This is appropriate if we consult the Miron and Romer (1990) industrial production index for the 1884–1940 period, since all three indexes are

[4] I had to exclude the long U.S. expansion from 1790 through 1796 from the analysis because the validity of Thorp's 1790 trough cannot be addressed without an index that spans the 1780s.

defined fairly consistently over their respective periods of overlap. Regression analysis shows that the annual fluctuations in the Davis index (for the 1885–1915 period) and those in the FRB index (for the 1920–1940 period) are each less sensitive to the cyclical swings represented in the Miron-Romer index.[5] The coefficients on the log differences in the Miron-Romer series are similar for the two indexes, suggesting that the Davis index is a reasonable coincident indicator.

A third limitation of the present study is that it relies on industrial production rather than a more comprehensive output measure such as GDP. This choice was made on grounds of reliability and consistency. While improved estimates of postbellum U.S. GDP are available (e.g., Balke and Gordon 1989), similarly reliable estimates for the antebellum period are not. In the 1960s, Robert Gallman did compile annual gross output estimates for the 1834–1859 period. Yet while Gallman's GNP series is more comprehensive than the Davis industrial production index, the Davis index should be more reliable in pinpointing turning points in industrial output. The Gallman GNP series is heavily benchmarked, and annual observations in Gallman's commodity output series (the primary cyclical component of the GNP estimates) were interpolated on a hodge-podge of spliced sources. It is primarily for these reasons that Gallman was never sufficiently confident of the reliability of his annual estimates to publish them, and chastised researchers who attempted to use them in an analysis of early American business cycles.[6]

That said, it is likely that peaks and troughs in my index are indicative of absolute peaks and troughs in broader economic conditions because the industrial sector has historically derived demand directly from non-industrial occupations, particularly farmers, merchants, and the construction trades. This synchronous relationship between non-industrial and industrial sectors is precisely why even today the Federal Reserve's industrial production index is classified as a coincident indicator of U.S. business

[5] For the FRB index, the beta coefficient on log differences in the Miron–Romer index is 0.82, with a t-statistic of 7.14 and an adjusted R^2 of 0.82. For the Davis index, the beta coefficient is 0.73, with a t-statistic of 7.72 and an adjusted R^2 of 0.59. The smaller beta for the Davis index is likely due, in part, to the over-representation of raw materials among the 13 components in the Miron-Romer index.

[6] See Rhode (2002) and Davis (2002, 2004) for details. Rhode (2002, 12) points out that a 1963 mimeograph from Robert Gallman containing the annual data circulated with the following disclaimer: "NOTE: These figures should not be regarded as reliable, annual estimates. They were derived for the purpose of computing decade averages and are supplied to interested technicians for testing, not for analysis as annual series."

cycles even though the industrial sector presently accounts for roughly the same share of U.S. GDP as it did in 1840.

A fourth limitation of this study is the reliance upon annual data to isolate cyclical turning points. While it is true that Burns and Mitchell set the lower bound of a business cycle to last at least one year, they also noted that setting turning points from annual data may lead to measurement problems because yearly changes can obfuscate a minor cycle. For example, a small recession in the middle of a year may just show up in annual data as a year of weak growth, not as an actual decline. While the present study's revised chronology does capture the brief prewar downturns of 1812 and 1861, other peaks and troughs could be distorted if the turning point occurred toward the middle of a calendar year.

c. Spurious NBER cycles

Table 1 reveals important similarities but also differences between the NBER reference years and those peaks and troughs derived from my physical-output data. For one, the new industrial production index does not generate any "false signals" by furnishing a cycle that has not previously been identified by NBER economists. Rather, 21 cycles in my revised chronology correspond exactly with the incidence of NBER cycles.

The revised business-cycle dates, based upon my data, are notably more selective in isolating genuine contractions. The new NBER chronology dismisses several NBER recessions as merely growth cycles. Overall, my new set of prewar peaks and troughs removes 8 out of the 29 prewar NBER recessions because they are either growth cycles or entirely spurious selections.[7] The revised chronology removes four cycles from both the antebellum and postbellum period, suggesting my identification of spurious cycles is not the result of time-series data that reflect the continued industrialization of the prewar American economy.

[7] By convention I differentiate a growth cycle from a spurious one simply by examining whether the trend-adjusted series is falling. The index was detrended using a band-pass filter.

This paper is not the first to question the validity of several postbellum downturns. The elimination of the four NBER postbellum recessions (1869–1870, 1887–1888, 1890–1891, and 1899–1900) is consistent with other postbellum output measures that suggest that these NBER recessions should be reclassified as growth cycles. The identification of these spurious recessions will not surprise many economic historians. Burns and Mitchell (1946, 403) rank the 1887–1888 contraction as the mildest of the prewar period. Fels (1959, 142) goes further in stating that "the only difference of opinion to be found in the literature is whether it should be recognized as a cyclical contraction at all." Similar contentions have been long voiced with respect to the apparently minor 1869–1870, 1890–1891, and 1899–1900 recessions (Hull 1911; Fels 1959; Mishkin 1991; Romer 1994; Temin 1998). Indeed, Thorp affixes the word "brief" in front of each of these three contractions.

The alternative chronology in Table 1 also identifies four spurious recessions for the antebellum period: 1825–1826, 1845–1846, 1847–1848, and 1853–1855. According to Davis' industrial production index, the NBER reference cycles for 1826 and 1855 are, in fact, growth cycles. While certain commodity-producing industries are stagnant in my data set in 1854 and 1855, many durable goods manufacturers posted tremendous growth. This is particularly the case for merchant shipbuilding, where the construction boom in clipper ships resulted in the highest gross tonnage built at any time during the nineteenth century.

The former pair of recessions for 1845–1846 and 1847–1848 appear even more dubious than the growth cycles of 1826 and 1855. Expansion in industrial activity during the purported NBER troughs of 1846 and 1848 was apparently robust and broad based. Growth rates in the Davis index are 15.0% and 8.3%, respectively. Such industrial strength confirms what numerous studies have previously suspected regarding these questionable dates adjoining the Mexican War. Lightner (1922, 139) notes that the cycles of the late 1840s were "short and not so thorough and widespread in its effects," while Ayres (1939, 11) argues that there was "no real depression" during the period. Zarnowitz (1992, chap. 7, 220–23) examines closely the scant statistics available for the mid-1840s and 1850s and concludes "it is possible that in

terms of production, all that happened was a phase of below-average growth rather than an actual decline of cyclical proportions."

d. A robustness check: Breadth versus depth

Although absolute rises and declines in an aggregate output measure constitute a necessary first step toward locating cyclical turning points, Burns and Mitchell (1946) also emphasized that *future* business cycles should consider the breadth of changes in economic activity. The word "future" is emphasized because Romer (1994) finds that volatile movements in only one or two component series often drove the fluctuations in many nineteenth-century nominal business condition measures. In order to examine whether this phenomenon plagues my new prewar chronology, I can compare the year-to-year changes in the Davis index (i.e., "depth") with a diffusion index of its components (i.e., "breadth"). A diffusion index is a common measure of the breadth in business activity because it represents the net fraction of industries that are expanding.[8]

The scatter plot in Figure 1 presents the growth and diffusion measures for each prewar year beginning in 1800. Figure 1 reveals an important regularity: the diffusion index is *never negative* when the Davis industrial production index rises. The blank lower right quadrant is reassuring because it is consistent with the NBER's modern-day concept of an expansion: real output is growing and the growth is broad based. Indeed, the diffusion index rises significantly above zero during an industrial depression in only one instance—the Embargo of 1808. The Jeffersonian embargo had a dichotomous impact on the American manufacturing sector, stimulating import-competing "infant" industries while hammering trade-dependent industries (Irwin and Davis 2003).

[8] More specifically, a diffusion index is calculated as the percentage of industries expanding less the percentage of industries contracting. A diffusion value of zero means that an equal number of industries are expanding and contracting.

e. Accurate peaks and inaccurate troughs: Possible factors

Closer inspection of the NBER and alternative reference years reveals systematic differences between the common cycles. The characteristics of the revisions in the officially measured peaks and troughs can be seen in the summary data of Table 2. The most salient feature of the revised chronology is that troughs are consistently dated earlier than those inferred from the *Business Annals*. Of the 21 common troughs, the revised chronology predates 8 troughs and never generates a later bottom. Conversely, the revised peaks proposed by the Davis index agree with 20 of the 21 peaks shared by the NBER reference set.

Since such turning-point asymmetry exists before and after the Civil War, Thorp's *Business Annals* is the likely source of the historical dating biases. But why do these differences exist? Table 2 supports the contention that the popular and trade press of the prewar period were more likely to pinpoint the beginning of economic downturns accurately, than they were upturns from subsequent bottoms.[9] In an era devoid of routine government economic reports, significant declines in production were easier for the casual observer to detect. Conversely, the *Annals* were less successful in isolating troughs in industrial activity primarily because contemporary newspapers tended to portray business conditions as "still weak" following a downturn. The prevailing evidence suggests that Thorp tended to interpret such cryptic narratives as a "revival" from an economic bottom in his top-line conditions, even though they often seem (in retrospect) to have referred to a return-to-peak "revival" in business conditions. This may help explain why recessions appear more drawn out in the early chronology.

Another contributing factor to the systematic peak-trough revisions could stem from Mitchell's strict interpretation of Thorp's annual inflection points. It is not entirely clear, for instance, whether Thorp's notion of "revival" was to be interpreted as a bottom in economic activity, or a phase rebounding from a

[9] Other researchers examining the contemporaneous commentary of nineteenth-century business cycles have made similar observations. Zarnowitz (1992, 219) suggests that "after a strong expansion, a mild decline (or even only a slowdown, if sufficiently long and diffused) may cause as much discomfort and alarm as a larger decline coming from a weaker expansion. Hence it is possible that observers would tend to overstate the dimension of some movements in the former category, perhaps even mistaking at times a major retardation for a business contraction." Indeed, Mitchell (1927, 421-22) suggests that press reports tended to devote "less attention to the upward than the downward turning points of business cycles."

bottom. Since the two interpretations may not always agree in an annual setting, Mitchell may have introduced biases in the mapping that may have tended to elongate prewar annual recessions.

Another potential bias is the strong influence that fluctuations in wholesale and commodity prices apparently had on confirming turning points in the *Business Annals*. Thorp consulted a limited number of economic statistics (mostly wholesale prices) that available during the 1790-1925 period to confirm his descriptive assessments.[10]

But were rises and declines in an aggregate wholesale price indexes for the nineteenth century a reliable gauge of the state of the nation's business conditions? Over the 1790–1915 period, annual fluctuations in wholesale prices and industrial production are positively correlated, but the correlation coefficient is only approximately 0.4. One explanation for why the correlation was not higher may be the stark differences in the prewar trends of the price and output indexes. For instance, one can show that the Warren-Pearson wholesale price index is stationary over the nineteenth century.[11] Since Thorp closely tracked the local commentary on commodity prices, persistent price deflation during long stretches of the 1800s likely exacerbated the *Annals*' tendency to elongate recessions. Figure 2 demonstrates that years characterized by vigorous industrial output growth (declines) were generally accompanied by inflation (deflation). Yet the fact that a nonparametric fit of Figure 2's scatter plot crosses below the origin underscores an inherent bias in the prewar NBER chronology: periods of modest albeit positive real output growth (i.e, growth cycles) tended to be accompanied by price deflation.

One could even argue that the biases that generated drawn-out prewar recessions in the NBER chronology were largely reinforcing. Since price quotations for various basic commodities (i.e., cotton, flour, iron) were widely circulated in nineteenth-century newspapers but traded quantities were not, it is probable that press reports were heavily influenced by price movements, particularly for farm products. The fact that Thorp consulted the same wholesale-price data in identifying prewar cycles—coupled with

[10] Thorp makes repeated reference to movements in wholesale commodity prices in his analysis, and in fact thanks Walter Smith, co-author of the seminal 1935 volume *Fluctuations in American Business, 1790–1860*, for providing him the price data. See p. 105 of Thorp's prefatory note, which, incidentally, is mistyped. Thorp thanks Smith for providing him with monthly wholesale price data for the period 1805–1824; the correct period is 1805–1924.

the fact that Mitchell often consulted indexes of business conditions heavily skewed with price components to "check" Thorp's assessments—suggests that prices played a key secondary role in setting nineteenth-century peak and trough years.

II. Implications of the revised pre-WWI chronology

a. General implications

The new chronology contributes to our understanding of the characteristics of early American business cycles. Broadly, the prewar chronology alters (by either dropping or re-dating) roughly 40% (25 of 58) of the prewar NBER peaks and troughs. The largest changes in the duration of cycles shared by the new and NBER chronologies involve periods when wholesale prices dropped dramatically and persistently, such as following the War of 1812 and the financial panics of 1837 and 1873. The quantity-based production data display shorter contractions and shallower losses following those crises than that portrayed in the popular and trade press. One plausible explanation for the disparity may be that the media confused commercial crises with financial ones, because the latter were better characterized by falling commodity and security prices, rather than declines in real industrial activity (Temin 1969; Kindleberger 2000).

b. Antebellum-postbellum comparisons

This paper's chronology alters the summary statistics of prewar industrial expansions and contractions. To further examine whether their characteristics changed significantly before and after the Civil War, Table 3 presents the average frequency and duration of American business cycles. Specifically, I employ nonparametric tests to explore whether the mean phase and whole-cycle duration

[11] Augmented Dickey-Fuller tests reject the null hypothesis of a unit root in the price index at the 5% level.

changed between the Civil War under both the old and new chronologies.[12] The critical result of Table 3 is that, under either peak-trough chronology, there is no appreciable change in the frequency or duration of prewar American cycles when one treats the Civil War as the sample break. Thus, the Wilcoxon tests confirm the conventional view that the frequency and duration of antebellum and postbellum business cycles were analogous. Since the spurious prewar NBER cycles removed here are equally distributed between the antebellum and postbellum eras, sample differences in prewar business cycles remain statistically unimportant. This result is consistent with the consonant business-cycle volatility in the two period, as reported in Davis (2004).

Another salient feature of Table 3 is that the new annual peaks and troughs reduce the average frequency of prewar recessions from nearly every other year in the NBER set, to one out of five years.[13] By removing dating inconsistencies from the conventional scale, the new peaks and troughs systematically double the mean duration of prewar expansions, while they truncate the average length of contractions by one-third.

c. Prewar versus postwar cycles: Tentative comparisons

As it stands today, the NBER chronology suggests that the U.S. business cycle has significantly "stabilized" or "moderated" following WWII. This is clearly evident in the first row (entitled "NBER") of the prewar-postwar comparisons in Table 4.

Yet, as is obvious from Figure 3, the extensive modifications to the annual prewar chronology could significantly alter historical comparisons made between prewar and postwar cycles. How does one (if at all) compare the new prewar cycles to a postwar NBER chronology that is undoubtedly based on more comprehensive information?

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[12] Following Diebold and Rudebusch (1992), the hypothesis of whether the mean duration of expansions, recessions, or entire peak-to-peak cycles are equal between two samples can be formally tested using a Wilcoxon rank-sum test.

[13] More accurately, the revised chronology demonstrates that the U.S. industrial sector was in recession in 26 out of the 118 years (22% of the time) over the 1796–1914 period. Under the NBER chronology, the U.S. economy spent 54 of the 118 years in recession, or 46% of the time.

Perhaps the most valid comparison would be to build an annual postwar chronology in a manner similar to how the alternative prewar chronology was established. Consequently, I have constructed an alternative annual postwar chronology simply by mapping to absolute peaks and troughs in the annual values of the FRB monthly industrial production index.[14] Table 4 recalculates the average frequency and mean expansion, contraction, and peak-to-peak whole-cycle durations for both the prewar period (1796–1914) and the postwar period (1946–2000) using the Davis and FRB indexes, respectively. Note that, unlike for the case of the NBER prewar-postwar chronologies, Table 4 does not explicitly test the null hypothesis that prewar-postwar differences are zero. As discussed, this is because I cannot speak to the long-run comparability between the Davis and FRB indexes (Davis 2004, 1191–1192).

That said, it is surely appropriate to qualitatively compare the summary statistics of the prewar and postwar cycles under the alternative (IP-based) chronology. The prewar-postwar comparisons based solely on annual industrial production data are quite striking: *the proportion of time that the U.S. industrial sector has spent in recession has remained fairly constant over the past two centuries*. The characteristics of industrial contractions, expansions, and peak-to-peak cycles appear largely unchanged among the pre-Civil War, Civil War to WWI, and post-WWII periods, a result that differs somewhat from those previously documented in Diebold and Rudebusch (1992) and Romer (1994).

[14] It is worth noting that my alternative postwar chronology possesses a slightly lower frequency of recession and slightly longer expansions than had I "annualized" the monthly turning points. This is because the Federal Reserve's industrial production index expanded marginally in 1961, whereas the NBER determined that the recession officially ended in February of that year. As a result, my alternative postwar chronology should be more inclined to find "stabilization" in the U.S. business cycle when compared to its prewar counterpart than had I used the actual NBER monthly turning points for the postwar period

III. **Conclusion**

The purpose of this paper is to reexamine the NBER's prewar annual business cycle, which have the remarkable implication that the U.S. economy spent close to one-half of the 1796-1914 period in recession. Of course, researchers have long questioned the validity of the early set of American business-cycle dates. Watson (1994), Romer (1994), and others have suggested that the NBER's chronology for the late 19th century and early 20th century appears to be a growth-cycle chronology.

This study broadens the scope of previous research by constructing an alternative set of turning points between 1796 and 1914 using Davis' (2004) annual index of U.S. industrial production for the 1790-1915 period. In doing so, it contributes to our understanding of the characteristics of early American business cycles. Overall, the alternative prewar chronology alters (by either dropping or re-dating) roughly 40% of the annual prewar NBER peaks and troughs. As long suspected, the nineteenth-century NBER chronology recognizes several growth cycles as genuine contractions. Since the revised chronology removes spurious recessions that interrupted genuinely long booms (e.g., the 1820s, 1840s, and 1880s), the average phase duration of prewar expansions doubles and the length of full cycles rises one-half. The revised prewar peaks correspond closely with existing NBER peaks, but the new troughs are dated systematically earlier. I hypothesize on potential explanations for such systematic bias in the dating errors.

The new chronology also suggests avenues for future research. For instance, while Figure 3 suggests that much of the 1800s looks similar to the post–1945 period, the period 1890 through 1940 looks noticeably more volatile. The era 1890–1930, which several authors have used as the prewar era, continues to have more frequent cycles than the postwar era even when the new dates are used. What factors caused the increased volatility during this period?

Taking a longer view, the paper's extensive revisions to the prewar chronology tempers the widespread conventional view that, as early as WWII, U.S. recessions have occurred less frequently and U.S. expansions last longer. While the paper's comparison between pre-WWI and post-WWII cycles is

limited by its reliance on a single annual index (as opposed to many monthly series) of industrial production (as opposed to a more comprehensive GDP measure), it does suggest that the most ardent proponents of U.S. macroeconomic stabilization should embrace a broader historical perspective before claiming decisive victory over the business cycle.

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TABLE 1: Turning points in the prewar U.S. industrial economy, 1790-1915

NBER Chronology		Alternative Chronology		*Net change to NBER phase duration (in yrs.)*
Peak	**Trough**	**Peak**	**Trough**	
		Antebellum industrial cycles		
1796	1799	1796	**1798**	*less 1*
1802	1804	1802	**1803**	*less 1*
1807	1810	1807	**1808**	*less 2*
1811	1812	1811	1812	
1815	1821	1815	**1816**	*less 5*
1822	1823	1822	1823	
1825	1826			**no recession***
1828	1829	1828	1829	
1833	1834	1833	1834	
1836	1838	1836	**1837**	*less 1*
1839	1843	1839	**1840**	*less 3*
1845	1846			**no recession**
1847	1848			**no recession**
1853	1855			**no recession***
1856	1858	1856	1858	
		Civil War industrial cycles		
1860	1861	1860	1861	
1864	1867	1864	**1865**	*less 2*
		Postbellum industrial cycles		
1869	1870			**no recession***
1873	1878	1873	**1875**	*less 3*
1882	1885	**1883**	1885	*less 1*
1887	1888			**no recession***
1890	1891			**no recession***
1892	1894	1892	1894	
1895	1896	1895	1896	
1899	1900			**no recession***
1903	1904	1903	1904	
1907	1908	1907	1908	
1910	1911	1910	1911	
1913	1914	1913	1914	

Notes and sources: All reference dates are calendar-year cycles. Bolded text reflects deviation from current NBER record. **No recession*** indicates a "growth recession," or a slowdown in the rate of economic growth based upon detrended values of the industrial production index. Victor Zarnowitz summarized the annual NBER peak-trough chronology from 1790 in Glasner ed. (1997, 731–33, tables 1–2). For the pre-WWI era, the annual chronology ultimately corresponds to Thorp's verbal assessment (1926, 113–45) later summarized in Burns and Mitchell (1946, 78, table 16) and Moore and Zarnowitz (1986, 746, table A.2). The only change I made to the NBER chronology is that I have assigned 1811 (rather than 1812) as the peak year for the 1812 recession.

TABLE 2: Selection bias in prewar NBER reference cycles

Sample	NBER cycles	Revised cycles	Revised Peaks			Revised Troughs		
			Earlier	*Same*	Later	Earlier	*Same*	Later
All prewar era	**29**	**21**	**none**	**20**	**1**	**8**	**13**	**none**
Antebellum era	15	11	**none**	11	**none**	6	5	**none**
Postbellum era	12	8	**none**	7	1	1	7	**none**

Notes: Revised number of peaks and troughs show relative change to cycles in common with NBER.

Sources: See Table 1.

TABLE 3: Frequency and duration of prewar U.S. business cycles

	Sample size		Mean freq. (%)		Mean duration		*Mean-duration test*	
Prewar Chronology	Ante-bellum	Post-bellum	Ante-bellum	Post-bellum	Ante-bellum	Post-bellum	Wilcoxon statistic	*p*- value
Contractions *(peak to trough)*								
NBER	15	12	48.4	38.8	2.07	1.58	233.5	*0.20*
Davis IP index	11	8	20.3	22.4	1.18	1.38	101.5	*0.36*
Expansions *(trough to peak)*								
NBER	15	12	51.6	60.9	2.20	2.33	180.0	*0.54*
Davis IP index	11	8	79.7	77.6	4.64	4.75	83.0	*0.80*
Peak-to-peak cycles								
NBER	15	12	100.0	100.0	4.27	4.08	157.5	*0.60*
Davis IP index	11	8	100.0	100.0	5.82	6.13	82.5	*0.83*
(Antebellum years: 1796 - 1860; Postbellum years: 1866 - 1914)								

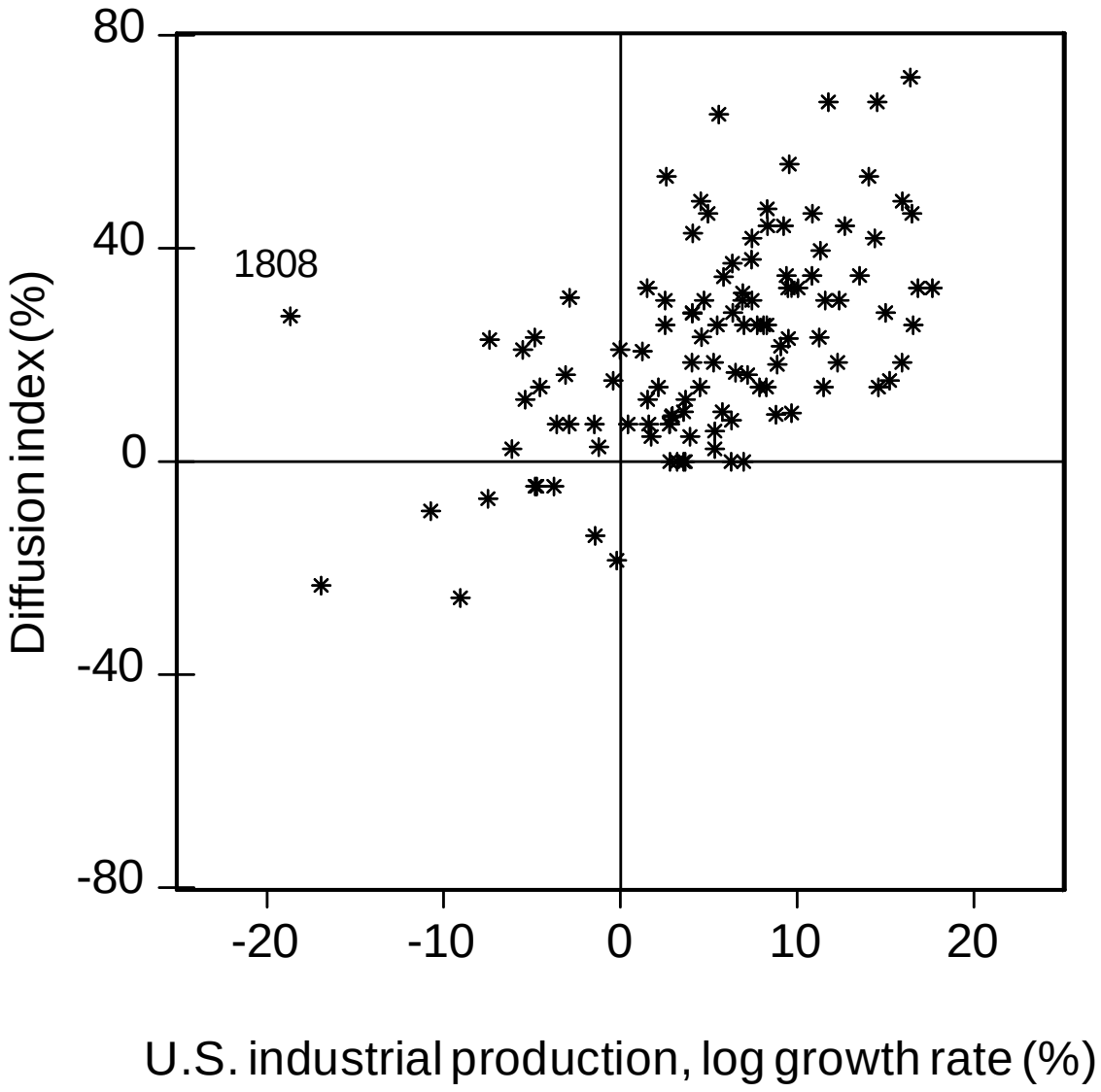
Notes: Mean durations and Wilcoxon statistics are given in years. The two-sample Wilcoxon rank-sum test statistic is the sum of the ranks for the observations in the first (i.e., antebellum) sample. If the data are tied, average ranks are used. One-sided *p*- values relate to the null hypothesis of no mean-duration stabilization. Results are similar for trough-to-trough cycles.

TABLE 4: Prewar-postwar comparisons of U.S. industrial cycles - Where is the stabilization?

Annual Chronology		Sample size		Mean freq. (%)		Mean duration		*Mean-duration test*	
Pre-WWI Source	Post-WWII Source	Pre-WWI	Post-WWII	Pre-WWI	Post-WWII	Pre-WWI	Post-WWII	*Wilcoxon statistic*	*p*-value
Contractions *(peak to trough)*									
NBER	NBER	29	9	45.8	18.5	1.86	1.11	608.5	***0.08***
Davis IP index	FRB's IP index	21	8	22.0	16.7	1.24	1.13	*Test inappropriate*	
Expansions *(trough to peak)*									
NBER	NBER	28	10	54.2	81.5	2.29	4.40	480.5	***0.03***
Davis IP index	FRB's IP index	20	9	78.0	83.3	4.60	5.00	*Test inappropriate*	
Peak-to-peak cycles									
NBER	NBER	28	10	100.0	100.0	4.18	5.60	505.0	***0.16***
Davis IP index	FRB's IP index	20	9	100.0	100.0	5.85	6.22	*Test inappropriate*	

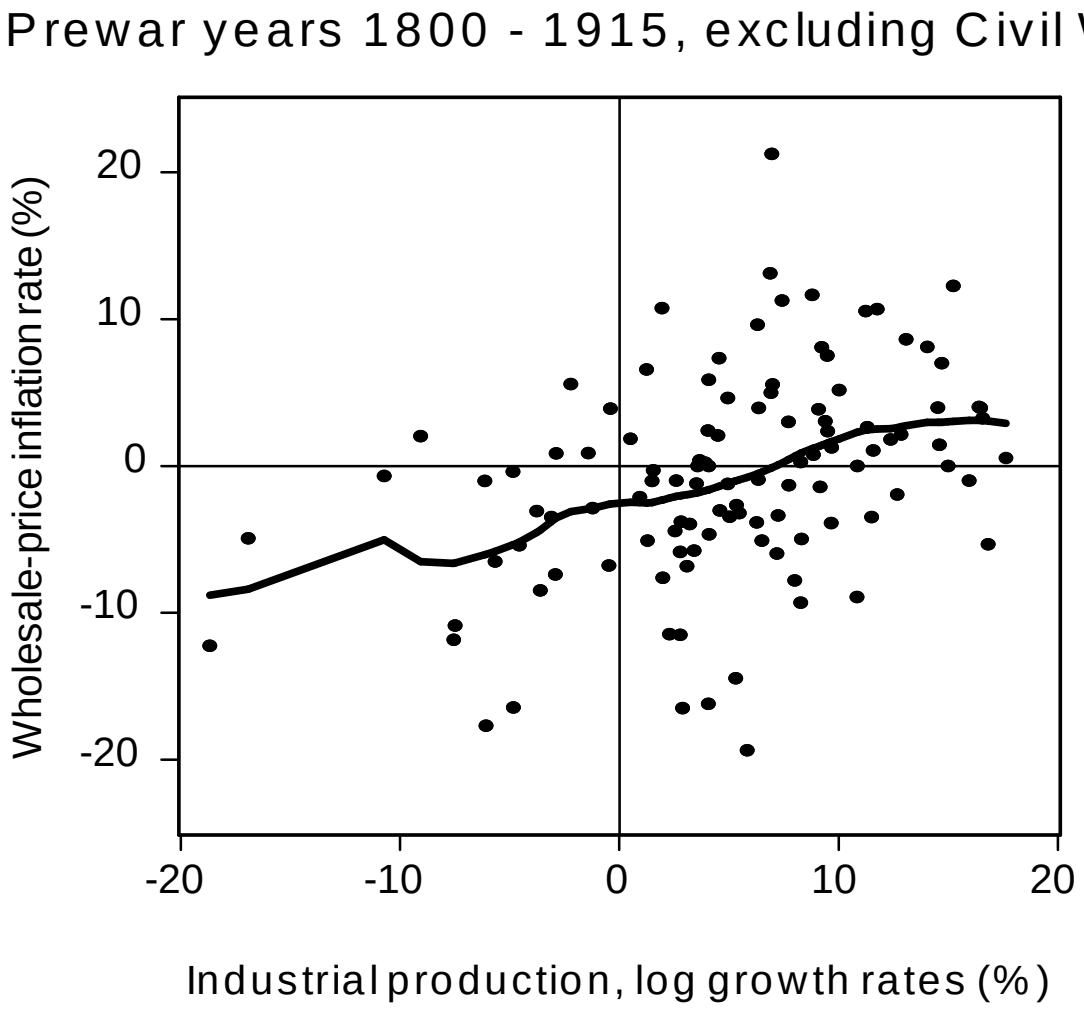
Notes: Pre-WWI sample spans the years 1796 - 1914. Post-WWII sample covers the years 1946-2000. The peak-trough pairs for the post-WWII cycles are: 1948-1949, 1953-1954, 1957-1958, 1969-1970, 1973-1975, 1979-1980, 1981-1982, 1990-1991, and 2000-2002.

Figure 1: Absolute index declines correspond with broad-based sector downturns.



Sources: Author's calculations from the dataset described in Davis (2004).

Figure 2: Wholesale prices and the tendency toward prewar cycle misclassifications

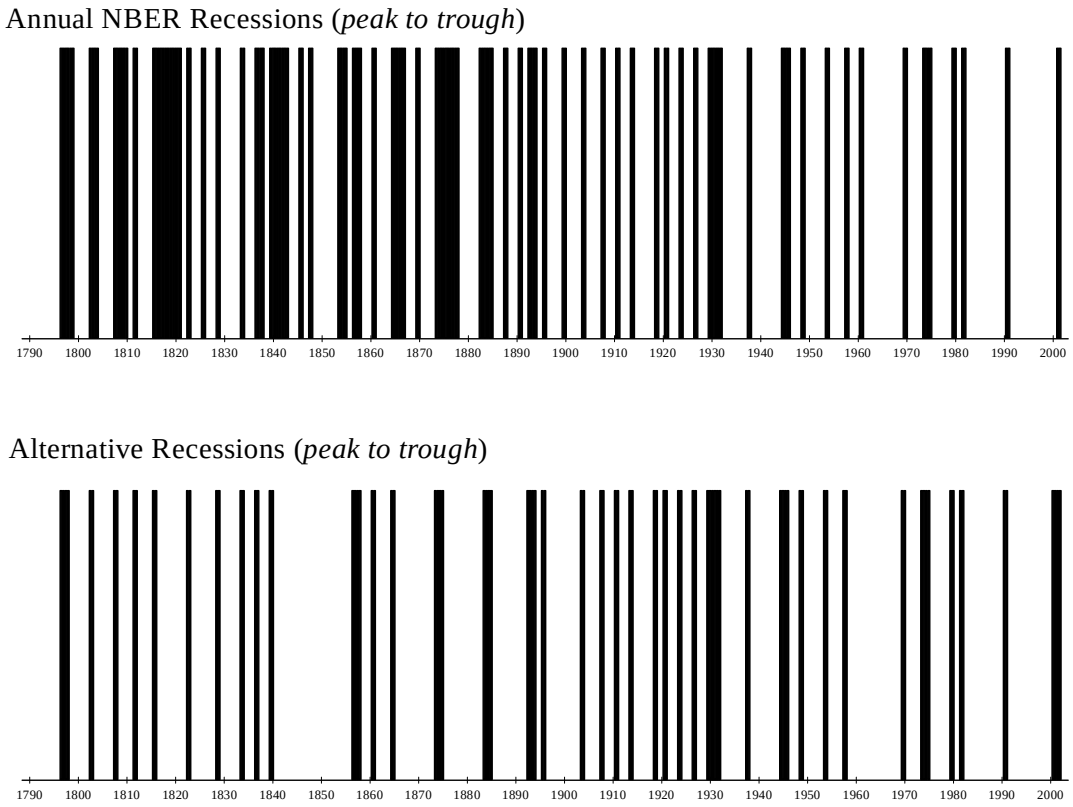


Notes: Bold line in the scatter plot represents a nonparametric local-linear regression from an Epanechnikov kernel using the linear binning method. Note that the bold line falls below the origin.

Sources: Warren-Pearson wholesale price index, as adapted by Hanes (1998), and Davis (2004).

Figure 3: U.S. recessions since the 1790s

The NBER chronology versus an alternative set based on annual industrial production data.



Alternative recessions defined solely on the basis of declines in annual industrial production

Sources: See the text and the notes to Table 1.