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Stock markets and business cycle comovement in Germany before World War I: Evidence from spectral analysis

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Abstract

Historical national account data are often plagued by quality problems, and rivaling series imply different business cycle chronologies. This problem is particularly grave for Germany before World War I [Burhop, C., Wolff, G.B., 2005. A compromise estimate of net national product and the business cycle in Germany 1851–1913. Journal of Economic History 65(3), 615–657]. We exploit the comovement between asset prices and various GNP estimates under the efficient market hypothesis to obtain an improved business cycle dating, and to decide between the various alternative national accounts series. We also examine the comovement between financial markets and various disaggregate indicators of real investment. Employing both time and frequency domain techniques, we find impressive comovement between the stock market, an estimate of the aggregate wage bill, and disaggregate evidence on real investment. Our findings confirm traditional business cycle chronologies for Germany and lead us to discard later, revisionist attempts to date the business cycle.
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1. Introduction

Among the industrialized countries, Germany compares relatively favorably in terms of our knowledge about national income and output in the 19th century.[1] No less than four different estimates exist that go back to the early 1850s. However, there are major differences between these series regarding their business cycle characteristics.

All available estimates rest on the seminal work of Hoffmann (1965) and earlier work of Hoffmann and Müller (1959). Hoffmann and his collaborators collected and aggregated a vast amount of data to produce independent estimates of output, expenditure, factor income-cum-employment, and the income tax base. The inevitable inconsistencies and deviations have generated the literature that called for improvements and corrections of the most obvious problems (Fremdling, 1988, 1995; Holtfrerich, 1980).

Recent work by Burhop and Wolff (2005) is a systematic attempt to apply these corrections to all four data series for the pre-1914 period. They also present a compromise estimate, which is a weighted average of their revised series. Their ambitious contribution is intended to put an end to the debate about the main trends of German economic growth in the 19th century and the implied business cycle chronology. However, even the improvements applied by Burhop and Wolff (2005) exhibit business cycle chronologies that are inconsistent with each other. Also, the new compromise chronology they present contradicts the business cycle dating of an older literature that employed disaggregate evidence, most prominently the NBER business cycle chronology of Burns and Mitchell (1946), as well as related work by Spiethoff (1955).

Among the major industrialized countries, this uncertainty about the business cycle chronology for the later 19th century is unique. Rivaling GNP estimates presented for the US by Balke and Gordon (1989) and Romer (1989) differ in their volatility, but far less so in the business cycle dates they imply. Two independent estimates of British GNP presented by Feinstein (1972) exhibit minor differences in levels but not in the business cycle chronology. In contrast to that, discrepancies between the various German series are so substantial that no consensus view of the business cycle between 1871 and 1913 has emerged so far.

The present paper sets out to shed further light on this issue by introducing additional information. We refrain from refining one or the other of Hoffmann's series, which given the improvements made by Burhop and Wolff (2005) would be subject to decreasing returns. Instead, our approach is to exploit the information content in a completely different set of data that has been neglected in the debate so far. These data include both the stock market and various disaggregate indicators of real activity. After 1870, when the stock market in Germany was deregulated massively, a public offering boom set in. It resulted in a ratio of market capitalization to GDP of over 40%, a level that was only reached again in the 1990s (Rajan and Zingales, 2003). Thus, stock prices reflected information on a substantial portion of the German economy. If the stock market was efficient at the relevant horizons, this information can be exploited to help establish a unified business cycle chronology, and to determine the information content of the rivaling national output series at the business cycle frequencies.

[1] International compilations of historical national account data include Maddison (1995, 2001) and Mitchell (2003).

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