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Trend movements and inverted Kondratieff waves in the Dutch economy, 1800–1913

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ABSTRACT

This paper presents the results of an effort to dissect 19th century economic growth in the Netherlands into two principal long run components: the domain of the trend and the domain of long waves. Spectral and cross-spectral analysis is used to identify Kondratieffs in volume series. It appears that the long term pattern of development is composed of an inverse S-shaped trend and a Kondratieff wave that is superimposed upon it. Contrary to the British case, long waves in Dutch volume series appear to run contrary to the corresponding long waves in price series. This finding is at variance with the received view on long waves. This typical result is explained by so-called 'Keynes effect' in combination with the characteristics of a small open economy that has to dance to the tune of the dominant British economy.

1. Introduction

When studying economic growth, economic historians try to distinguish certain patterns or different phases in the growth process. More often than not the effort to differentiate between phases of growth relies on a two-point measurement of the economic process. The axis of time is divided into fixed portions, say decades, and economic conditions are measured at such specified intersections. Subsequently patterns are identified through the comparison of average growth rates between these points. Decades appear to make perfect sense because we are accustomed to using the decimal scale. But does it make sense to measure historic processes of unknown composition with unknown time dimensions by means of an arbitrary subdivision of the time scale? (compare Smits et al., 1999).

There are at least three types of problems that may occur. One problem is that we might miss true turning points when they do not coincide with the mark off points of the arbitrary time scale. The second (more serious problem) occurs when the process in question is a composite because in this case two-point measurement might ascribe changes in one component to the workings of the other. The obvious example of this is when two-point measurement is applied to an economic time series that consists of a cyclical component plus a trend. If the first point happens to correspond to the peak of the cycle and the next to a trough of the cycle (or the other way around) one might mistake the amplitude of the cycle for a structural break in the trend. The third (also more serious problem, related to the second) is that time lags between elements of a composite

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may obscure the true relations between them (Reijnders, 1990, p. 96 ff.).

In many cases decadal or quarter-century 'snapshots' are used for practical reasons, that is to cut back the data-collection effort with the view that only long term patterns matter. But the use of decades or quarter-century data have also become a convention and are used even in circumstances in which much more detailed data are available. A case in point is the analysis of the reconstructed national accounts for the Netherlands 1800–1913 (Smits et al., 1996, 2000). In spite of the availability of this excellent set of yearly data, allowing for a comprehensive analysis of the development of the Dutch economy in this period, many scholars only use these yearly data for drawing graphs, while sticking to the convention of mainly using two-point measurement over (multiples of) decades where the actual analysis and the periodisation of the growth process is concerned (see for instance Albers, 1998; Burger, 1996; Groote et al., 1996; Horlings, 1995; Horlings and Smits, 1996; Smits, 1995, 2001a; van Zanden and van Riel, 2000; Wintle, 2000). It is true that the study of this data set along conventional lines brought about a great number of valuable new insights into the nature and timing of the process of Dutch growth and development in this period. Nevertheless, one cannot exclude the possibility that analyses along these lines in one way or the other fall victim to all of the earlier mentioned problems. Especially the complications that arise if the historical process is a composite wherein several causal factors with distinct patterns of development operating within different time frames jointly produce one single observable reality. In this case the analysis has to try and capture the patterns of development that identify various (classes) of causal factors simultaneously.

In this paper an effort is made to pave the way for such an approach. It is inspired by Joseph Schumpeter's theory of economic development (Schumpeter, 1911, 1939) wherein causal factors manifest themselves in cyclical patterns. Because there is a multitude of causal factors which all have their typical gestation periods, adjustment processes and time sequences, there is also a multitude of cyclical patterns. The challenge is to deal with all patterns simultaneously and then dissect them in order to group them together in classes according to average duration. As a first step I will concentrate only on long run aspects and focus on movements in the domain of the trend and of the so-called Kondratieff wave.

In Section 2 attention is paid to the assumptions regarding the composition of economic time series and the appropriate method for simultaneously distinguishing patterns in various time domains. Spectral analysis, of which the general principles are dealt with in Appendix A, seems to be the most appropriate in this case.

In Sections 3–5 spectral and cross-spectral techniques are applied to the principal price and volume series contained in the reconstructed national accounts of the Netherlands 1800–1913.[1] It appears that Kondratieff waves are a prominent aspect of Dutch economic development in this period. A typical characteristic is, however, that Dutch volume Kondratieffs run in the opposite direction of the price Kondratieffs whereas British volume and price Kondratieffs run in step. Something similar applies to the trend domain where the Dutch series exhibit an inverse S-shape whereas the British series show a regular S-shape. In Sections 7 and 8 these particular inverse patterns are explained by reference to the circumstance that the Dutch economy had to dance to the tune played by the dominant British economy. In the trend domain this mainly manifests itself through a structural change affecting the relative size of the services sector. In the domain of Kondratieff waves it is transmitted through the international price system which affects Dutch volume growth through the Keynes effect. The final section summarizes and assesses the main results.

2. Assumptions regarding the composition of time series

With regard to the composition of time series, the assumption is made that economic time series are the sum of a number of elements where cyclical components are superimposed on an underlying trend.[2] Cyclical components can be distinguished according to their 'duration' or 'period'. In economic theory the following cyclical components are distinguished:

a. 'Kitchin' cycles with an average duration of 3–5 years;
b. 'Juglar' cycles with an average duration of 7–12 years;
c. 'Kuznets' cycles with an average duration of 15–25 years;
d. 'Kondratieff' cycles with an average duration of 40–60 years;
e. 'Hegemonial cycles' (Wallerstein, 1980; Kleinknecht, 1987; Simiand, 1932), 'Logistics' (Cameron, 1973), 'Life Cycles of Economic Development' (van Duijn, 1983; Forrester, 1973) or 'Systematic Long Run Movements' (Reijnders, 1990, 1992): wave-like movements of very long duration.

The mentioned cyclical components are superimposed upon a general tendency: the trend.

With this assumption regarding the composition of time series, the Kondratieff cycle is a so-called *hidden periodicity* that is covered with and masked by all other cycles to the extend that it must, so to speak, be 'distilled' out of the time series. To be able to do this, the time series under consideration must be split up into, at least, three domains:

1. The domain of short- and medium-term cycles, comprising the 'Kitchin', 'Juglar' and 'Kuznets' cycles.
2. The domain of 'Kondratieff' cycles.

[1] The subsequent analysis is based upon the data contained in Smits et al. (2000) and Smits et al. (1997), which are publicly available through the Historical Data Archive of the Dutch Academy of Sciences: DHDA (2000). Also see Smits (2001b).

[2] This position is analogous to Schumpeter's 'three cycle scheme' (Schumpeter, 1939). However, here the catalogue of cycles is extended to cover the possibility of a greater number of cycles.