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# Economic indicators for the US transportation sector

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## Abstract

Since the transportation sector plays an important role in business cycle propagation, we develop indicators for this sector to identify its current state, and predict its future. We define the reference cycle, including both business and growth cycles, for this sector over the period from 1979 using both the conventional National Bureau of Economic Research (NBER) method and modern time series models. A one-to-one correspondence between cycles in the transportation sector and those in the aggregate economy is found; however, both business and growth cycles of transportation often start earlier and end later than those of the overall economy. We also construct an index of leading indicators for the transportation sector using rigorous statistical procedures, and is found to perform well as a forecasting tool.
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## 1. Introduction

Business cycle studies play an important role in the decision-making processes of government agencies and private sectors. For instance, recessions and expansions dated by NBER are often utilized as an important input for macroeconomic policies or business planning (Zarnowitz, 1992). In the current NBER indicators system, information from services sectors is significantly underrepresented. Among the current four coincident and ten leading indicators, there is not a single series specifically measuring services sectors, and most of the attention in business cycle studies has remained focused on manufacturing sectors since the beginning of NBER. Yet services have become increasingly more important in the contemporary economy and business cycles. For instance, in the US over the period 1953:I–2003:II, the share of goods in the GDP has declined from 54% to 35%, compared with an increase in the share of services from 34% to 56%. Moore (1987) points out that the ability of the service sectors to create jobs has differentiated business cycles since the 1980s from their earlier counterparts, and thus led economy-wide recessions to be shorter and less severe.

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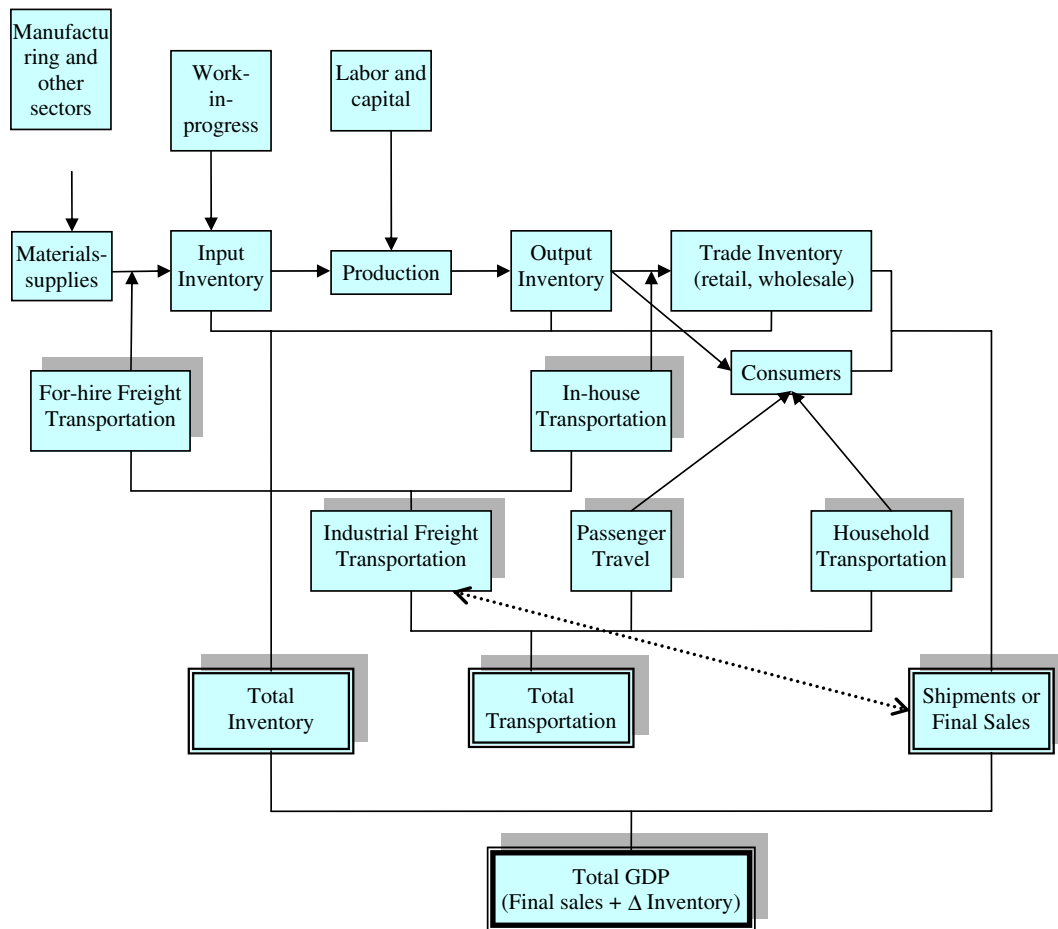 *E-mail addresses:* klahiri@albany.edu (K. Lahiri), wxyao@ualr.edu (V.W. Yao).

Fig. 1. Stage-of-fabrication model with transportation.

This paper studies business cycles of an important services sector, namely transportation services.[1] Besides the sizable proportion of US Gross Domestic Product (GDP)[2] it represents, transportation plays a crucial role in facilitating economic activities between sectors and across regions. Fig. 1 provides a schematic illustration of the stage-of-fabrication production process employed by a typical firm to transform input inventories (purchased materials/supplies and work-in-progress) into output inventories (finished goods). The middle and lower parts illustrate that the role of freight transportation in the overall economy is closely related to input inventories, which account for 65% of total manufacturing inventories by value and 67% by variance (Blinder and Maccini, 1991). Since it is well known in the economics literature since Abramovitz (1950) that inventory cycles have been the dominant feature of economic fluctuations in GDP, information from transportation sector should be useful to help discover the mystery of the fluctuations and learn how to control them better; see Humphreys et al. (2001) for more recent studies on inventory cycles. NBER scholars had also noticed the pervasive influence of transportation on all sectors of the economy and paid attention to the recurrent feature of

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[1] There are three transportation-related industries in the economy: transportation services (NAICS codes 48–49), transportation equipment (NAICS code 336) and transportation infrastructure. NAICS represents the North American Industrial Classification System, which replaced US Standard Industrial Classification (SIC) in 1997 to define each industry. The above three industries belong to three different product categories in the National Income and Product Account (NIPA), namely, services, goods (more accurately manufacturing) and structure respectively. Transportation services sector is what is being studied in this paper.

[2] Using different concepts about the scope of the transportation industry would yield different measures of its importance in aggregate output, varying anywhere from 3.09% (Transportation GDP) to 16.50% (Transportation-driven GDP). See Han and Fang (2000).