Financial Cycle With Text Information Embedding Based on LDA Measurement and Nowcasting

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ABSTRACT

When compared to traditional indicators, text information can capture market sentiment, investor confidence, and public opinion more effectively. Meanwhile, the mixed-frequency dynamic factor model (MF-DFM) can capture current changes. In this study, the authors constructed a financial cycle measurement and nowcasting framework by incorporating text information into factors derived from MF-DFM. The findings reveal that, first, the financial cycle indicator (FCI) provides a more detailed and forward-looking perspective on major events. Second, it can serve as an effective "early warning system" by cross-referencing economic indicators. Third, financial cycles exhibit five short cycles, with contraction periods being longer than expansion phases and expansion amplitudes surpassing contractions. Lastly, the analysis suggests a potential turning point in the second half of 2023. This research represents a valuable attempt to integrate big data for more sensitive, timely, and accurate monitoring of financial dynamics.

KEYWORDS

Financial Cycles, LDA, Mixed-Frequency Dynamic Factor Model, Sentiment Analysis, Text Mining

1. INTRODUCTION

During the long-term development, financial cycles are considered as macro-financial conditions like credit scale, capital flow, leverage level, and asset prices such as stocks, bonds, exchange rate, and derivatives, that have been experienced occasionally extreme booms and busts. More accurate identification, definition, and monitoring of the financial cycle can help enhance risk awareness and promote macroeconomic stability, thereby effectively preventing risks. In terms of financial cycle measurement, Dynamic Factor Model (DFM), whose principle is to reduce the dimensionality

of the data, use one or more extracted dynamic factors to explain the fluctuations, and the factors themselves can also be used for Nowcasting and can predict situations for recent past, current, and short-term future.

Most indicators from financial markets or macroeconomic indicators have limited abilities to capture the full picture of financial activities especially for non-traditional sectors. The emergence of new types of data represented by text information such as news articles and social media posts has opened up new avenues for research. On the one hand, text information can provide governments, central banks, and markets with more timely information on short-term prospects, potential risks and vulnerabilities. On the other hand, it can provide economic sentiment and behavioral insights that traditional indicators cannot provide.

This article aims to construct a methodology on embedding text information into financial cycle measurement and Nowcasting, to obtain more accurate and timely financial cycles. Specifically, by text mining financial news from 2002 to 2022, 10 topics are constructed and their corresponding topic probability distribution form text information sequences based on the Latent Dirichlet Allocation (LDA). Furthermore, the above information sequence combined with 37 traditional indicators from the comprehensive financial risk indicator system form 47 sequences. By building a Mixed Frequency Dynamic Factor Model (MF-DFM) and extract common factors as a new financial cycle index for measuring cycles and conduct Nowcasting.

The potential marginal contribution may include the following. Firstly, enriching the financial cycle measurement. By embedding text information that can include the emotions, public opinions, events and other factors of market participants, the research can not only be more comprehensive, but also conducive to in-depth interpretation of the financial market. Secondly, expanding the application of the big data on finance. Unlike TF-IDF, the LDA can timely integrate financial fluctuations concerning sentiment that can support investment decision-making, risk management, and policy formulation. Thirdly, timely monitoring and early warning the development of the financial cycle. Real-time Nowcasting for financial markets can help capturing changes in market sentiment and public opinion in advance, which is of great significance to investors, regulatory agencies, and policy makers.

2. LITERATURE REVIEW

2.1 Financial Cycle Indicators

As a barometer of financial prosperity, financial cycle is an important indicator to accurately determine the cyclical fluctuation of the financial system, to in-depth explore the linkage between finance and macroeconomics, and to implement regulatory (Deng et al., 2022). However, differences exist in both indicators and methodologies. Early research focused on credit cycle by the amount of credit or its ratio to GDP (Schularick & Taylor, 2012; DeBonis & Silvestrini, 2014; Aikman et al., 2015). Although the single indicator is simple, it also overlooks the potential interacts between credit and other financial assets. Multi indicators as Monetary Condition Index (MCI) and Financial Conditions Index (FCI) incorporates interest rate, exchange rate, stock price, credit and real estate price that can reflect the future financial activities (Hansson et al.,1994; Goodhart & Hofmann, 2001; Lack, 2003; Hatzius et al., 2010; Drehmann et al., 2012). Indicators of balance sheet structure like non-core liabilities to broad money ratio (nc) and so on can also be used (Krupkina & Ponomarenko, 2015). Although research focus on the multi indicators, the overall logic is essentially consistent, that is, the financial cycle mainly reflects the "financing constraints of the financial market" and "risk and asset value". However, research presents relatively insufficient availability and comparability.

2.2 Financial Cycle Measurement

In terms of the financial cycles, many methodologies are extensively used. The Bry-Boschan Turning Point Analysis (B-B method) is mostly chosen by scholars (Bry & Boschan, 1971). Claessens et al.

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