

TIGER: Tracking Indexes for the Global Economic Recovery

By Eswar Prasad, Aryan Khanna, and Caroline Smiltneks

Technical Appendix

April 2023 NOTE: In April 2020, we noted the low availability of data in light of the effects of Covid-19 on the global economy. As of April 2023, the availability of data has improved; however, the data lags are still apparent. As a result, we continue to integrate real-time estimates of forthcoming data alongside the most recent figures from news accounts and data providers to ensure TIGER is up to date. This method has its limitations at a time of heightened economic uncertainty. Where possible, we have made conservative assumptions about the extent of changes in various indicators.

Methodology

In our analysis, we employ a statistical procedure called Principal Component Analysis (PCA) that is used widely in the physical and social sciences to extract indicators that capture common fluctuations among variables in large datasets. PCA is a transparent and straightforward procedure that can easily handle a large number of variables and enables one to construct indicators of comovement across all variables in a dataset or a subset of them. This procedure is ideal for creating the TIGER indexes as it allows us to combine information from different types of economic variables and multiple countries.

Each variable that enters into the PCA is a priori given an equal weight in the calculations. The procedure then assigns different weights to different variables depending on how important they turn out to be in capturing fluctuations in the entire set of variables. PCA is a special case of a more general technique called factor analysis that captures more complicated patterns of lead and lag correlations across the variables—it is important to note that PCA picks up only contemporaneous correlations.

Dataset

Our dataset covers most of the G-20 countries and contains a set of key real, financial and confidence variables. The main constraint in expanding our dataset to cover more variables is the lack of consistent data availability at a high frequency, especially among the emerging markets. For example, it is difficult to get good data on employment levels for the emerging markets. Nevertheless, we have assembled a set of variables on which we were able to get reasonably timely and high-quality data. The countries and variables in our dataset are listed below. Note that composite total indexes include only Advanced Economies and Emerging Market Economies groups.

Advanced Economies

- Australia
- Canada
- France
- Germany
- Italy
- Japan
- Korea
- Netherlands
- Spain
- United Kingdom
- United States

Emerging Market Economies

- Argentina
- Brazil
- China
- India
- Indonesia
- Mexico
- Russia
- South Africa
- Turkey

Euro Periphery

- Greece
- Ireland
- Portugal

Economic Indicators

Real Activity Indicators

- Employment
- Exports
- Industrial Production

Financial Indicators

- Equity Market Index
- Stock Market Capitalization
- Credit Growth

Confidence Indicators

- Business Confidence
- Consumer Confidence

- Imports
- GDP
- Unemployment Rate

By Country:

Composite Index – Business Confidence, Consumer Confidence, Employment, Exports, Imports, Industrial Production, GDP Growth, Equity Markets, Stock Market Capitalization, Credit Growth, Unemployment Rate

Real Activity Index – Employment, Exports, Imports, Industrial Production, GDP Growth, Unemployment Rate

Financial Index – Equity Markets, Stock Market Capitalization, Credit Growth

Confidence Index – Business Confidence, Consumer Confidence

By Indicator Variable:

Advanced Economies, Emerging Market Economies, and Total Indexes are found by aggregating directly across country data. We create composite indexes separately for the groups of advanced economies and emerging markets covering all of the above variables. We also create additional indexes for each of these groups based on each category of variables listed below (real, financial, confidence). Finally, we generate country-specific indicators that cover all the variables for a given country and also variable-specific indicators that cover all countries' data for a given variable.

Description of Data and Source Information:

Indicator Variable	Unit	Description	Source
Business Confidence	Index	National confidence indicator	OECD
Consumer Confidence	Index	National confidence indicator	OECD
Employment	Percent	12-month growth rate of total employment levels	IMF International Financial Statistics; CEIC Data Company, Ltd.; National sources
Exports	Percent	12-month growth rate of 3 month moving average. Goods. USD	IMF Direction of Trade Statistics
Imports	Percent	12-month growth rate of 3 month moving average. Goods. USD	IMF Direction of Trade Statistics
Industrial Production	Percent	12-month growth rate of 3 month moving average. Seasonally Adjusted Volumes	World Bank, Global Economic Monitor; National sources
GDP Growth	Percent	Quarterly, year-over-year real growth rate. Each month in quarter are equal to quarterly rate. Latest quarter uses estimates from source.	Economist Intelligence Unit
Equity Markets	Percent	12-month growth rate of share price index in national currency	CEIC Data Company, Ltd.; IMF International Financial Statistics; Bloomberg
Stock Market Capitalization	Percent	12-month growth rate in national currency	CEIC Data Company, Ltd.
Credit Growth	Percent	12-month growth rate in national currency. Banking claims on private sector	IMF International Financial Statistics; Federal Reserve; Bank of Japan
Unemployment Rate	Percent	OECD Harmonized Unemployment Rate	OECD via Federal Reserve (FRED)

Data Composition of TIGER Indexes

The matrix below shows which countries and variables are included across the aggregated TIGER indexes.

	Bus. Conf.	Cons. Conf.	Employment	Exports	Imports	Industrial Production	GDP	Equity Market	Market Cap.	Credit Growth	Unemp. Rate
Advanced:											
Australia	x	x	x	x	x	-	x	x	x	x	x
Canada	x	-	x	x	x	x	x	-	-	-	x
France	x	x	x	x	x	x	x	x	x	x	x
Germany	x	x	x	x	x	x	x	x	x	x	x
Italy	x	x	x	x	x	x	x	-	x	x	x
Japan	x	x	x	x	x	x	x	x	x	x	x
Korea	x	x	x	x	x	x	x	-	x	x	x
Netherlands	x	x	x	x	x	x	x	x	x	x	x
Spain	x	x	x	x	x	x	x	x	x	x	x
UK	x	x	x	x	x	x	x	x	x	x	x
US	x	x	x	x	x	x	x	x	x	x	x
Emerging Markets:											
Argentina	-	-	-	x	x	-	x	x	-	-	-
Brazil	x	x	-	x	x	x	x	x	x	x	-
China	x	x	-	x	x	x	x	x	x	x	-
India	-	-	-	x	x	x	x	x	x	-	-
Indonesia	x	x	-	x	x	x	x	x	x	x	-
Mexico	x	x	x	x	x	x	x	x	x	x	-
Russia	-	x	-	x	x	x	x	x	x	-	-
South Africa	x	x	x	x	x	x	x	x	x	x	-
Turkey	x	x	x	x	x	x	x	x	x	x	-

Data Availability

The table below describes the availability of each variable by country. All data are monthly, begin on January 2005, and end in the specified month of 2023.

	Bus. Conf.	Cons. Conf.	Employment	Exports	Imports	Industrial Production	GDP	Equity Market	Market Cap.	Credit Growth	Unemp. Rate
Advanced:											
Australia	Nov'22	Jan	Jan	Jan	Jan	-	Q1	Jan	Jan	Dec'22	Jan
Canada	Oct'22	-	Jan	Jan	Jan	Dec'22	Q1	-	-	-	Jan
France	Jan	Jan	Dec'22	Jan	Jan	Dec'22	Q1	Jan	Jan	Oct'22	Jan
Germany	Jan	Jan	Jan	Jan	Jan	Dec'22	Q1	Jan	Dec'22	Dec'22	Jan
Italy	Jan	Jan	Dec'22	Jan	Jan	Dec'22	Q1	-	Jan	Oct'22	Jan
Japan	Dec'22	Jan	Jan	Jan	Jan	Jan	Q1	Jan	Jan	Jan	Jan
Korea	Jan	Jan	Jan	Jan	Jan	Dec'22	Q1	-	Jan	Nov'22	Jan
Netherlands	Jan	Jan	Dec'22	Jan	Jan	Dec'22	Q1	Jan	Jan	Oct'22	Jan
Spain	Jan	Jan	Dec'22	Jan	Jan	Dec'22	Q1	Jan	Sept'22	Oct'22	Jan
UK	Jan	Jan	Dec'22	Jan	Jan	Dec'22	Q1	Jan	Jan	Jan	Nov'22
US	Jan	Jan	Jan	Jan	Jan	Jan	Q1	Jan	Jan	Jan	Jan
Emerging:											
Argentina	-	-	-	Jan	Jan	-	Q1	Jan	-	-	-
Brazil	Jan	Jan	-	Jan	Jan	Dec'22	Q1	Jan	Jan	Dec'22	-
China	Jan	Jan	-	Jan	Jan	Dec'22	Q1	Jan	Jan	Oct'22	-
India	-	-	-	Jan	Jan	Dec'22	Q1	Jan	Jan	-	-
Indonesia	Dec'22	Jan	-	Jan	Jan	Dec'22	Q1	Jan	Jan	Dec'22	-
Mexico	Jan	Jan	Dec'22	Jan	Jan	Dec'22	Q1	Jan	Jan	Dec'22	-
Russia	-	Nov'22	-	Jan	Jan	Jan	Q1	Jan	Jan	-	-
South Africa	Dec'22	Dec'22	Dec'22	Jan	Jan	Dec'22	Q1	Jan	Jan	Jan	-
Turkey	Jan	Jan	Jan	Jan	Jan	Dec'22	Q1	Jan	Jan	Jan	-

Data Composition of Euro Periphery Country Indexes

The matrix below shows which countries and variables are included in the country indexes for Greece, Ireland, and Portugal. Italy and Spain are included in the above Advanced Economy group.

	Bus. Conf.	Cons. Conf.	Employment	Exports	Imports	Industrial Production	GDP	Equity Market	Market Cap.	Credit Growth	Unemp. Rate
Greece	x	x	-	x	x	x	x	-	x	x	x
Ireland	x	x	-	x	x	x	x	-	x	x	x
Portugal	x	x	-	x	x	x	x	-	x	x	x

Data Availability for Euro Periphery

The table below describes the availability of each variable for Greece, Ireland, and Portugal. Availability for Italy and Spain are included in the above Advanced Economy group. All data are monthly, begin on January 2005, and end in the specified month of 2023.

	Bus. Conf.	Cons. Conf.	Employment	Exports	Imports	Industrial Production	GDP	Equity Market	Market Cap.	Credit Growth	Unemp. Rate
Greece	Jan	Jan	-	Nov'22	Nov'22	Oct'22	Q1	-	Jan	Oct'22	Jan
Ireland	Jan	Jan	-	Nov'22	Nov'22	Dec'22	Q1	-	Jan	Oct'22	Jan
Portugal	Jan	Jan	-	Nov'22	Nov'22	Jan	Q1	-	Jan	Oct'22	Jan