

TIGER: Tracking Indexes for the Global Economic Recovery

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Technical Appendix

APRIL 2020 NOTE: As Covid-19 has ravaged the global economy in a matter of weeks, the data have been slow to follow. And while lags in data availability are nothing new, the speed of the present economic collapse is. To ensure TIGER is able to keep pace, this update integrates real-time estimates of forthcoming data alongside the most recent figures from news accounts and data providers.

We leverage forecasts and estimates of real-time data from the Federal Reserve, Economist Intelligence Unit, and Now-Casting Economics to obtain an approximation of GDP growth in the first months of 2020. We also estimate several real activity and confidence measures by calculating weighted averages of the measure's year-on-year growth and recent stock market losses. The aim is to roughly simulate declines in economic activity and confidence, based on the assumption that these declines are being driven by the same forces as are driving financial market deterioration, about which we do have recent data.

This method has its limitations at a time of heightened economic uncertainty. Where possible, we have made conservative assumptions about the extent of declines in various indicators. Yet, despite such conservative assumptions, this iteration of TIGER offers gloomy prospects for the global economy, a testament to the depth of this crisis.

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

Emerging Market Economies

- Argentina
- Brazil
- China
- India
- Indonesia
- Mexico
- Russia

Euro Periphery

- Greece
- Italy (Advanced)
- Ireland
- Portugal
- Spain (Advanced)

- Netherlands
- Spain
- United Kingdom
- United States

- South Africa
- Turkey

Economic Indicators

Real Activity Indicators

- Capacity Utilization
- Employment
- Exports
- Industrial Prodn.
- Imports
- GDP
- Manufacturing Orders
- Retail Sales
- Unemployment Rate

Financial Indicators

- Equity Market Index
- Stock Market Capitalization
- Credit Growth
- Emerging Market Bond Spreads
- TED Spread
- VIX

Confidence Indicators

- Business Confidence
- Consumer Confidence

By Country:

Composite Index – Business Confidence, Consumer Confidence, Capacity Utilization, Employment, Exports, Imports, Industrial Production, GDP Growth, Manufacturing Orders, Retail Sales, Unemployment Rate, Equity Markets, Credit Growth, Ted Spread¹, VIX

Real Activity Index – Capacity Utilization, Employment, Exports, Imports, Industrial Production, GDP Growth, Manufacturing Orders, Retail Sales, Unemployment Rate

Financial Index – Equity Markets, Market Capitalization, Credit Growth, Emerging Bond Spreads, TED Spread, VIX

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
Capacity Utilization	Percent	Capacity utilization rate for industrial sector	Haver Analytics; National sources
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

¹ The TED Spread, by construction, is available only as a single variable and is not country-specific.

GDP Growth	Percent	Quarterly, year-over-year real growth rate. Each month in quarter are equal to quarterly rate	Economist Intelligence Unit
Manufacturing Orders	Percent	12-month growth rate of new manufacturing orders. Seasonally adjusted, local currency or index.	Haver Analytics; National sources
Retail Sales	Percent	12-month growth rate of 3 month moving average. Seasonally adjusted, Volume, Index	World Bank, Global Economic Monitor; National sources
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
Emerging Bond Spreads	Level	Basis points over US treasury	World Bank, Global Economic Monitor
TED Spread	Level	Difference between 3-month LIBOR and U.S. Treasury, basis Points	US Department of Treasury via Federal Reserve (FRED)
Unemployment Rate	Percent	OECD Harmonized Unemployment Rate	OECD via Federal Reserve (FRED)
VIX	Level	Volatility index for national stock markets	Bloomberg

Data Composition of TIGER Indexes

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

	Bus Conf.	Cons. Conf.	Cap. Utilization	Employ ment	Export	Import	Ind. Prodn	GDP	Man. Orders	Retail Sales	Equity Market	Market Cap	Credit Growth	Emerging Bond Spreads	Unem ploom ent Rate	VIX
Advanced:																
Australia	-	x	-	x	x	x	-	x	-	-	x	x	-	-	x	-
Canada	-	x	-	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	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	x
Netherlands	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	x
Emerging Markets:																
Argentina	-	-	-	-	x	x	-	x	-	-	x	x	-	-	-	-
Brazil	x	x	-	x	x	x	x	x	-	-	x	x	-	-	-	-
China	x	-	-	-	x	x	x	x	-	-	x	x	x	-	-	-
India	-	-	-	-	x	x	x	x	-	-	x	x	-	-	-	-
Indonesia	-	-	-	-	x	x	x	x	-	-	x	x	-	-	-	-
Mexico	x	x	-	-	x	x	x	x	-	-	x	x	x	-	-	-
Russia	x	-	-	-	x	x	x	x	-	-	x	x	x	-	-	-
South Africa	x	-	-	-	x	x	x	x	-	-	x	x	x	-	-	x
Turkey	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 2020. *Note: TED Spread data, not country specific, ranges from January 2005 through March 2020.*

	Bus Conf.	Cons. Conf.	Cap. Utilization	Employ ment	Export	Import	Ind. Prodn	GDP	Man. Ord.	Retail Sales	Equity Market	Market Cap	Credit Growth	Emerg. Bond Spreads	Unemp. Rate	VIX
Advanced:																
Australia	Nov'19	Feb	Jun'17	Feb	Dec'19	Dec'19	-	Q4	-	-	Mar	Mar	Jun'19	-	Dec'19	-
Canada	Oct'19	Feb	Jun'17	Feb	Dec'19	Dec'19	Dec'19	Q4	Jul'17	Jul'17	Mar	-	-	-	Dec'19	-
France	Feb	Feb	Aug'17	Dec'19	Dec'19	Dec'19	Dec'19	Q4	-	Jul'17	Mar	Mar	Jan	-	Dec'19	Mar
Germany	Feb	Feb	Aug'17	Feb	Dec'19	Dec'19	Dec'19	Q4	Jul'17	Jul'17	Mar	Mar	Jan	-	Dec'19	-
Italy	Feb	Feb	Jun'17	Dec'19	Dec'19	Dec'19	Dec'19	Q4	May	Jul'17	-	Mar	Jan	-	Dec'19	-
Japan	Dec'19	Feb	Jul'17	Feb	Dec'19	Dec'19	Dec'19	Q4	Jul'17	Jul'17	Mar	Mar	Feb	-	Dec'19	Mar
Korea	Feb	Feb	-	Feb	Dec'19	Dec'19	Dec'19	Q4	-	Jul'17	Mar	Mar	Dec'19	-	Dec'19	Mar
Netherlands	Feb	Feb	Jun'17	Dec'19	Dec'19	Dec'19	Dec'19	Q4	-	Jul'17	Mar	Mar	Jan	-	Dec'19	-
Spain	Feb	Feb	Jul'17	Dec'19	Dec'19	Dec'19	Dec'19	Q4	Jul'17	Jul'17	Mar	Mar	Jan	-	Dec'19	-
UK	Feb	Feb	-	Dec'19	Dec'19	Dec'19	Dec'19	Q4	-	Jul'17	Mar	Mar	Jan	-	Nov'19	-
US	Feb	Feb	Aug'17	Feb	Dec'19	Dec'19	Dec'19	Q4	Jul'17	Jul'17	Mar	Mar	Feb	-	Jun	Mar
Emerging:																
Argentina	-	-	-	-	Dec'19	Dec'19	Jun'19	Q4	-	-	Mar	Mar	Jul'18	May '14	-	-
Brazil	Feb	Feb	-	Dec'19	Dec'19	Dec'19	Dec'19	Q4	-	Jul'17	Mar	Mar	Dec'19	May '14	-	-
China	Feb	Dec'19	-	-	Dec'19	Dec'19	Dec'19	Q4	-	Jul'17	Mar	Mar	Feb	May '14	-	-
India	May'19	-	-	-	Dec'19	Dec'19	Dec'19	Q4	-	-	Mar	Mar	Nov'19	-	-	-
Indonesia	Dec'19	Jan	-	-	Dec'19	Dec'19	Dec'19	Q4	-	Jul'17	Mar	Mar	-	-	-	-
Mexico	Jan	Jan	-	Dec'19	Dec'19	Dec'19	Dec'19	Q4	-	Jul'17	Mar	Mar	Jan	May '14	-	-
Russia	Feb	Nov'19	-	-	Dec'19	Dec'19	Dec'19	Q4	-	-	Mar	Mar	Jan	May '14	-	-
South Africa	Dec'19	Dec'19	-	Dec'19	Dec'19	Dec'19	Dec'19	Q4	-	Jul'17	Mar	Mar	Jan	May '14	-	Mar
Turkey	Feb	Feb	-	Dec'19	Dec'19	Dec'19	Dec'19	Q4	-	Jul'17	Mar	Mar	Jan	May '14	-	-

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 2020.

	Bus Conf.	Cons.C onf.	Cap. Utilization	Employ ment	Export	Import	Ind. Prodn	GDP	Man. Order	Retail Sales	Equity Market	Market Cap	Credit Growth	Emerging Bond Spreads	Unem ploy ment Rate	VIX
Greece	Feb	Feb	-	-	Dec'19	Dec'19	Sept'19	Q4	-	Jan'17	Mar	Mar	Jan	-	Dec'19	-
Ireland	-	Feb	-	-	Dec'19	Dec'19	Dec'19	Q4	-	Jun'17	Mar	Mar	Jan	-	Dec'19	-
Portugal	Feb	Feb	-	-	Dec'19	Dec'19	Dec'19	Q4	-	Jun'17	Mar	Mar	Jan	-	Dec'19	-

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.	Cap. Utilization	Employ ment	Export	Import	Ind. Prodn	GDP	Man. Orders	Retail Sales	Equity Market	Market Cap	Credit Growth	Emerging Bond Spreads	Unemp. Rate	VIX
Greece	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	-