

## **TIGER: Tracking Indexes for the Global Economic Recovery**

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### **Technical Appendix**

#### **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
- Italy (Advanced)
- Ireland
- Portugal
- Spain (Advanced)

#### **Economic Indicators**

##### *Real Activity Indicators*

- Employment
- Exports
- Industrial Prodn.
- Imports
- GDP
- Unemployment Rate

##### *Financial Indicators*

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

##### *Confidence Indicators*

- Business Confidence
- Consumer Confidence

**By Country:**

Overall Growth Index – Business Confidence, Consumer Confidence, Employment, Exports, Imports, Industrial Production, GDP Growth, Unemployment Rate, Equity Markets, Credit Growth, Ted Spread<sup>1</sup>

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

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

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	Confidence indicator for manufacturing	OECD
Consumer Confidence	Index	National confidence indicator	OECD
Employment	Percent	12-month growth rate of total employment levels	IMF International Finance Statistics; Official statistics
Exports	Percent	12-month growth rate of 3 month moving average. Seasonally Adjusted, Volume, USD	World Bank, Global Economic Monitor; Official statistics
Imports	Percent	12-month growth rate of 3 month moving average. Seasonally Adjusted, Volume, USD	World Bank, Global Economic Monitor
Industrial Production	Percent	12-month growth rate of 3 month moving average. Seasonally Adjusted Volumes	World Bank, Global Economic Monitor
GDP Growth	Percent	Quarterly, year-over-year real growth rate. Each month in quarter are equal to quarterly rate	Economist Intelligence Unit
Equity Markets	Percent	12-month growth rate of share price index in national currency	Yahoo Finance; IMF International Finance Statistics
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 Finance 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; Federal Reserve (FRED)
Unemployment Rate	Percent	Percent of labor force as defined by country	Official statistics

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

## Data Composition of TIGER Indexes

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

	Business Confidence	Consumer Confidence	Employment	Exports	Imports	Industrial Production	GDP Growth	Equity Markets	Market Capitalization	Credit Growth	Emerging Bond Spreads	Unemployment Rate
<b>Advanced:</b>												
Australia	x	x	x	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
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	-	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
<b>Emerging Markets:</b>												
Argentina	-	-	-	x	x	x	x	x	x	x	x	-
Brazil	x	x	x	x	x	x	x	x	x	x	x	-
China	x	x	x	x	x	x	x	x	x	x	x	-
India	-	-	-	x	x	x	x	x	x	x	-	-
Indonesia	-	-	-	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	x	-
South Africa	x	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 and begin on January 2003 and end in the specified month of 2014.

	Business Confidence	Consumer Confidence	Employment	Exports	Imports	Industrial Production	GDP Growth	Equity Markets	Market Capitalization	Credit Growth	Emerging Bond Spreads	Unemployment Rate
<b>Advanced:</b>												
Australia	May	Aug	Aug	Jul	Jul	Dec '13	Q2	Sep	Aug	Jun	-	Aug
Canada	-	Aug	Aug	Jul	Jul	Jun	Q2	Sep	-	-	-	Aug
France	Aug	Aug	Jun	Jul	Jul	Jul	Q2	Sep	Aug	Jun	-	Jun
Germany	Aug	Aug	Jun	Jul	Jul	Jul	Q2	Sep	Aug	Jun	-	Aug
Italy	Aug	Aug	Jun	Jul	Jul	Jul	Q2	-	Aug	Jun	-	Jul
Japan	Jun	Jul	Jul	Aug	Aug	Jan	Q2	Sep	Aug	Jul	-	Jul
Korea	Aug	Aug	Aug	Aug	Aug	Jul	Q2	Sep	Aug	May	-	Jun
Netherlands	Aug	Aug	Mar	Jul	Jul	Jun	Q2	Sep	Aug	Jun	-	Jul
Spain	Aug	Aug	Jun	Jul	Jul	Jul	Q2	Aug	Aug	Jun	-	Jun
UK	Aug	Aug	Jun	Jul	Jul	Jul	Q2	Sep	Aug	Jun	-	Jun
US	Aug	Aug	Aug	Jul	Jul	Aug	Q2	Sep	Aug	Aug	-	Aug
<b>Emerging Markets:</b>												
Argentina	-	-	Mar	Jul	Jul	Jul	Q2	Aug	Aug	Jun	May	-
Brazil	Aug	Aug	Apr	Aug	Aug	Jul	Q2	Sep	Aug	Jun	May	-
China	Aug	May	Jun	Aug	Aug	Jul	Q2	Sep	Aug	Jun	May	-
India	Feb	-	-	Jul	Jul	Jul	Q2	Sep	Aug	May	-	-
Indonesia	Mar	Jul	-	Aug	Aug	Jun	Q2	Sep	Aug	-	-	-
Mexico	Jul	Jul	Mar	Jul	Jul	Jul	Q2	Sep	July	Jun	May	-
Russia	Aug	-	-	Jul	Jul	Jul	Q2	Aug	Aug	Jun	May	-
South Africa	Jun	Jun	Jun	Jul	Jun	Jun	Q2	Aug	June	Jun	May	-
Turkey	Aug	Aug	Mar	Aug	Aug	Jul	Q2	Aug	Aug	Jun	May	-

Note: TED Spread data, not country specific, ranges from January 2003 through September 2014.

### 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 and begin on January 2003 and end in the specified month of 2014.

	Business Confidence	Consumer Confidence	Employment	Exports	Imports	Industrial Production	GDP Growth	Equity Markets	Market Capitalization	Credit Growth	Emerging Bond Spreads	Unemployment Rate
Greece	Aug	Aug	-	Jul	Jul	Jul	Q2	Sep	Aug	Jun	-	Jun
Ireland	-	Aug	-	Jul	Jul	Jul	Q2	Sep	Aug	Jun	-	Jul
Portugal	Aug	Aug	-	Jul	Jul	Jun	Q2	Sep	Jun	Jun	-	Jul

### 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.

	Business Confidence	Consumer Confidence	Employment	Exports	Imports	Industrial Production	GDP Growth	Equity Markets	Market Capitalization	Credit Growth	Emerging Bond Spreads	Unemployment Rate
Greece	x	x	-	-	-	x	x	x	-	x	-	x
Ireland	-	-	-	x	x	x	x	x	x	x	-	x
Portugal	x	x	-	x	x	x	x	x	-	x	-	x