

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.

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

Economic Indicators

Real Activity Indicators

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

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, Equity Markets, Credit Growth, Ted Spread¹

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

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

Confidence Index – Business Confidence and 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 | International Labor Organization; Official statistics |
| Exports | Percent | 12-month growth rate of 3 month moving average. Seasonally Adjusted, Volume, USD | World Bank, Global Economic Monitor |
| 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 | World Bank, Global Economic Monitor and Yahoo Finance |
| 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 | World Bank, Global Economic Monitor and US Dept of Treasury |

¹ The TED Spread is the difference between the interest rates on interbank loans and short-term U.S. government debt; by construction, it 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 |
|--------------------------|---------------------|---------------------|------------|---------|---------|-----------------------|------------|----------------|-----------------------|---------------|-----------------------|
| 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 | - |
| Germany | X | X | X | X | X | X | X | X | X | X | - |
| Italy | X | X | - | X | X | X | X | - | X | X | - |
| Japan | 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 | - |
| Spain | X | X | - | X | X | X | X | X | X | X | - |
| UK | X | X | - | X | X | X | X | X | X | X | - |
| US | X | X | X | X | X | X | X | X | X | X | - |
| Emerging Markets: | | | | | | | | | | | |
| Argentina | - | - | - | X | X | X | X | X | X | X | X |
| Brazil | X | X | - | X | X | X | X | X | X | X | X |
| China | 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 |
| Russia | - | - | - | X | 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 |

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 2012.

| | Business Confidence | Consumer Confidence | Employment | Exports | Imports | Industrial Production | GDP Growth | Equity Markets | Market Capitalization | Credit Growth | Emerging Bond Spreads |
|--------------------------|---------------------|---------------------|------------|---------|---------|-----------------------|------------|----------------|-----------------------|---------------|-----------------------|
| Advanced: | | | | | | | | | | | |
| Australia | Nov '11 | Feb | Feb | Dec '11 | Dec '11 | Dec '11 | Q4 '11 | April | Mar | Jan | - |
| Canada | - | Feb | Mar | Jan | Jan | Dec '11 | Q4 '11 | April | - | - | - |
| France | Feb | Feb | - | Dec '11 | Dec '11 | Jan | Q4 '11 | April | - | Jan | - |
| Germany | Feb | Feb | Feb | Nov '11 | Jan | Feb | Q4 '11 | April | Mar | Jan | - |
| Italy | Feb | Feb | - | Jan | Jan | Jan | Q4 '11 | - | Mar | Jan | - |
| Japan | Dec '11 | Dec '11 | Feb | Jan | Jan | Jan | Q4 '11 | April | Mar | Feb | - |
| Korea | Feb | Feb | Feb | Dec '11 | Jan | Feb | Q4 '11 | April | Mar | Dec '11 | - |
| Netherlands | Feb | Feb | - | Jan | Jan | Dec '11 | Q4 '11 | April | Mar | Jan | - |
| Spain | Feb | Feb | - | Jan | Jan | Jan | Q4 '11 | April | Mar | Jan | - |
| UK | Feb | Feb | - | Dec '11 | Dec '11 | Dec '11 | Q4 '11 | April | Mar | Jan | - |
| US | Feb | Feb | Mar | Jan | Jan | Feb | Q4 '11 | April | Mar | Feb | - |
| Emerging Markets: | | | | | | | | | | | |
| Argentina | - | - | - | Dec '11 | Dec '11 | Feb | Q4 '11 | April | Mar | Jan | April |
| Brazil | Feb | Jan | - | Dec '11 | Jan | Feb | Q4 '11 | April | Mar | Dec '11 | April |
| China | Dec '11 | Dec '11 | - | Dec '11 | Dec '11 | Feb | Q4 '11 | April | Mar | Dec '11 | April |
| India | - | - | - | Dec '11 | Dec '11 | Jan | Q4 '11 | April | Mar | Dec '11 | - |
| Indonesia | - | - | - | Dec '11 | Dec '11 | Jan | Q4 '11 | April | Mar | - | - |
| Mexico | Jan | Jan | - | Jan | Jan | Jan | Q4 '11 | April | Mar | Jan | April |
| Russia | - | - | - | Dec '11 | Dec '11 | Feb | Q4 '11 | April | Mar | Jan | April |
| South Africa | Dec '11 | Dec '11 | - | Dec '11 | Dec '11 | Jan | Q4 '11 | April | Mar | Jan | April |
| Turkey | Feb | - | - | Jan | Jan | Jan | Q4 '11 | April | Mar | Jan | - |

Note: TED Spread data, not country specific, ranges from January 2003 through April 2012.