The Governance Report 2018

Methodological Paper

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This technical appendix provides additional information on data and methods employed in Chapter 1: Ten Years After: The Global Financial and Economic Crisis—Impact and Implications by Helmut K. Anheier, Sonja Kaufmann, and Sebastian Ziaja, in *The Governance Report 2018* (Hertie School of Governance, published by Oxford University Press as part of the Hertie Governance Report series).

Data

To measure economic crisis, we employ three indicators of economic stress that can be 'observed' and three indicators that represent 'perceived' stress. Observed economic stress indicators employed here are inspired by a 'misery index' proposed by Hernandez and Kriesi (2016): changes in gross domestic product (GDP) per capita in terms of purchasing power parity (PPP), changes in the unemployment rate, and changes in the government debt-to-GDP ratio. The source for GDP and debt indicators is the World Economic Outlook published by the International Monetary Fund (IMF 2018). For the unemployment rate, the source is the World Development Indicators (WDI) published by the World Bank (2017); the WDI indicator covers more countries than the corresponding IMF indicator. Change in GDP per capita is log-modulus transformed (logarithm of the absolute value plus 1, then reset to the original sign) to rope in extreme outliers for both positive and negative values.

Perceived economic stress indicators are taken from Gallup World Poll surveys and selected to roughly tap into the same dimensions that the observed economic stress indicators cover. For GDP per capita, we employ perceptions of the standard of living. The question asked reads: 'Right now, do you feel your standard of living is getting better or getting worse?' We consider the percentage of respondents who answered 'better', excluding those who answered 'Don't know / refused to answer'. Corresponding to the observed unemployment rate, we draw on perceptions of the local job market. The question reads: 'Thinking about the job situation in the city or area where you live today, would you say that it is now a good time or a bad time to find a job?' We consider the percentage of respondents who answered 'Bad time', excluding those who answered 'Don't know / refused to answer'. A perception-based indicator that corresponds to the debt-to-GDP ratio is harder to find, as no global survey with sufficient coverage asks directly about national debt. We thus proxy debt levels with confidence in national government, aware of the possibility that many citizens are not well-informed about or particularly averse to government debt. The question for this indicator reads: 'In this country, do you have confidence in each of the following, or not? How about national government?' We consider the percentage of respondents who answered 'No', excluding those who answered 'Don't know / refused to answer'.

Note that we employ negative perceptions for employment and debt, since the corresponding observed indicators also have a negative alignment (high unemployment is negative, and high

debt is also negative). For GDP-per-capita growth, it would be counter-intuitive to reverse the scale, and it thus remains positive, complemented with a positive perception question about life satisfaction.

The sample we employ in this exercise are all OECD and G20 member countries over the period 2007 to 2017. Table 1 lists these countries.

Table 1: List of countries included in the sample

Argentina	Greece	Norway
Australia	Hungary	Poland
Austria	Iceland	Portugal
Belgium	India	Russian Federation
Brazil	Indonesia	Saudi Arabia
Canada	Ireland	Slovakia
Chile	Israel	Slovenia
China	Italy	South Africa
Czech Republic	Japan	South Korea
Denmark	Latvia	Spain
Estonia	Luxembourg	Sweden
Finland	Mexico	Switzerland
France	Netherlands	Turkey
Germany	New Zealand	UK
		USA

Clustering country years by crisis type

Considering the joint distributions of the three crisis indicators by country years (see figures 1 to 3), we note four typical constellations which we label (1) growth crisis, (2) unemployment crisis, (3) debt crisis, and (4) non-crisis. Note that in the following figures, all indicators are log-modulus transformed to emphasise changes around zero; in other words, direction shall matter more than size of a change. As increasing unemployment or debt at very low levels usually do not constitute symptoms of severe crisis, we also introduce level thresholds for unemployment and debt. Below these thresholds, we consider the situation unproblematic, i.e. not a crisis.

Growth crisis situations are coloured red in the following figures and defined by negative per capita growth (see upper left quadrant in figure 1). They also almost always come with increasing unemployment (see figure 1), and increasing debt (figure 2).

Unemployment crisis situations are coloured in light red and defined by increasing unemployment at levels above an assumed natural unemployment rate of 6 percent, and by positive growth (see upper right quadrant in figure 1). Figure 3 shows that in the majority of unemployment crisis situations, debt-to-GDP ratios also increase.

Debt crises are coloured in light blue and defined by increasing debt-to-GDP ratios above levels of 60 percent (as defined by the convergence criteria of the European Economic and Monetary Union) despite positive growth (upper right quadrant in figure 2) and mostly decreasing unemployment rates (lower right quadrant in figure 3).

Non-crises are coloured in dark blue and constitute all remaining situations, i.e., situations with positive growth, unemployment declining or below 6 percent, and debt-to-GDP ratio declining or below 60 percent.
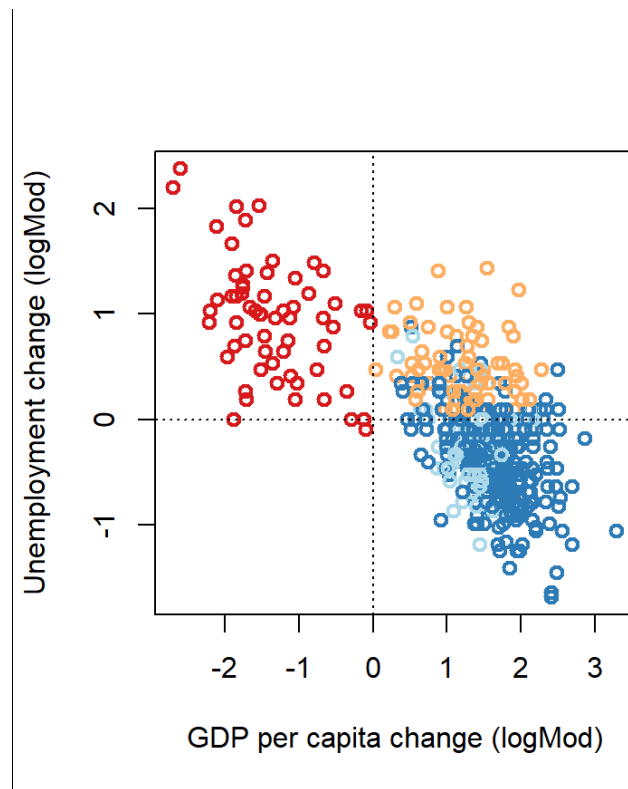

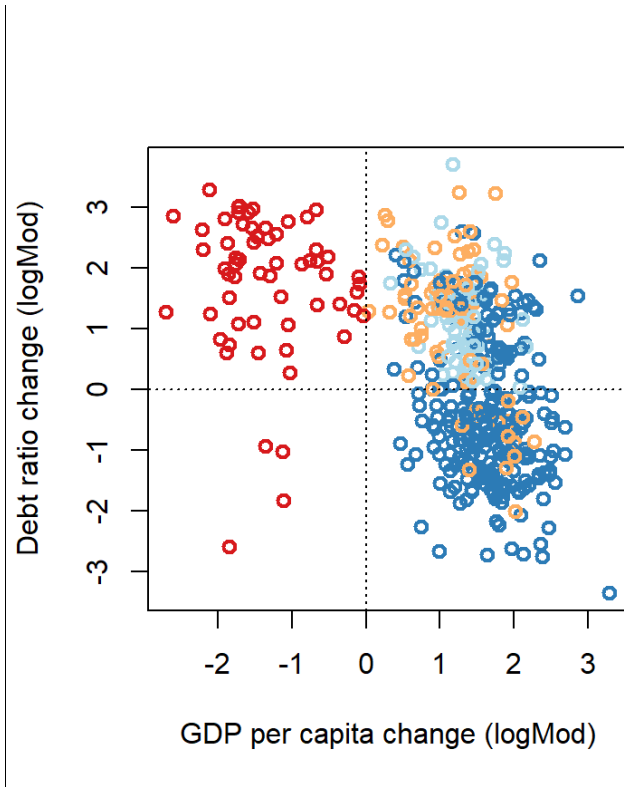**Figure 1: Crisis types scatterplot, GDP and unemployment, country-years 2007-2017**

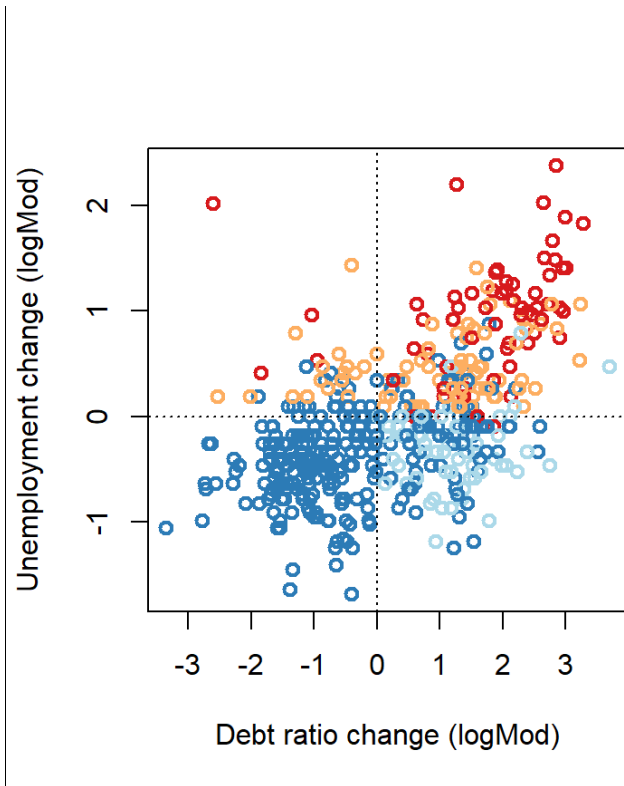**Figure 2: Crisis types scatterplot, GDP and debt, country-years 2007-2017**

Figure 3: Crisis types scatterplot, debt and unemployment, country-years 2007-2017

Clustering countries by crisis trajectory

Did countries experience different similar trajectories over time? In figure 4, we present the temporal patterns experienced by all countries in our sample. It shows that countries can be grouped, as most countries experienced crisis trajectories that resemble those of several other countries. We obtained the initial clustering by applying hierarchical clustering across countries and then adapting the results manually to increase the face-validity of the resulting groups. The groups are described in detail in Chapter 1 of *The Governance Report 2018* and are used for analysis in subsequent chapters, especially Chapter 3.
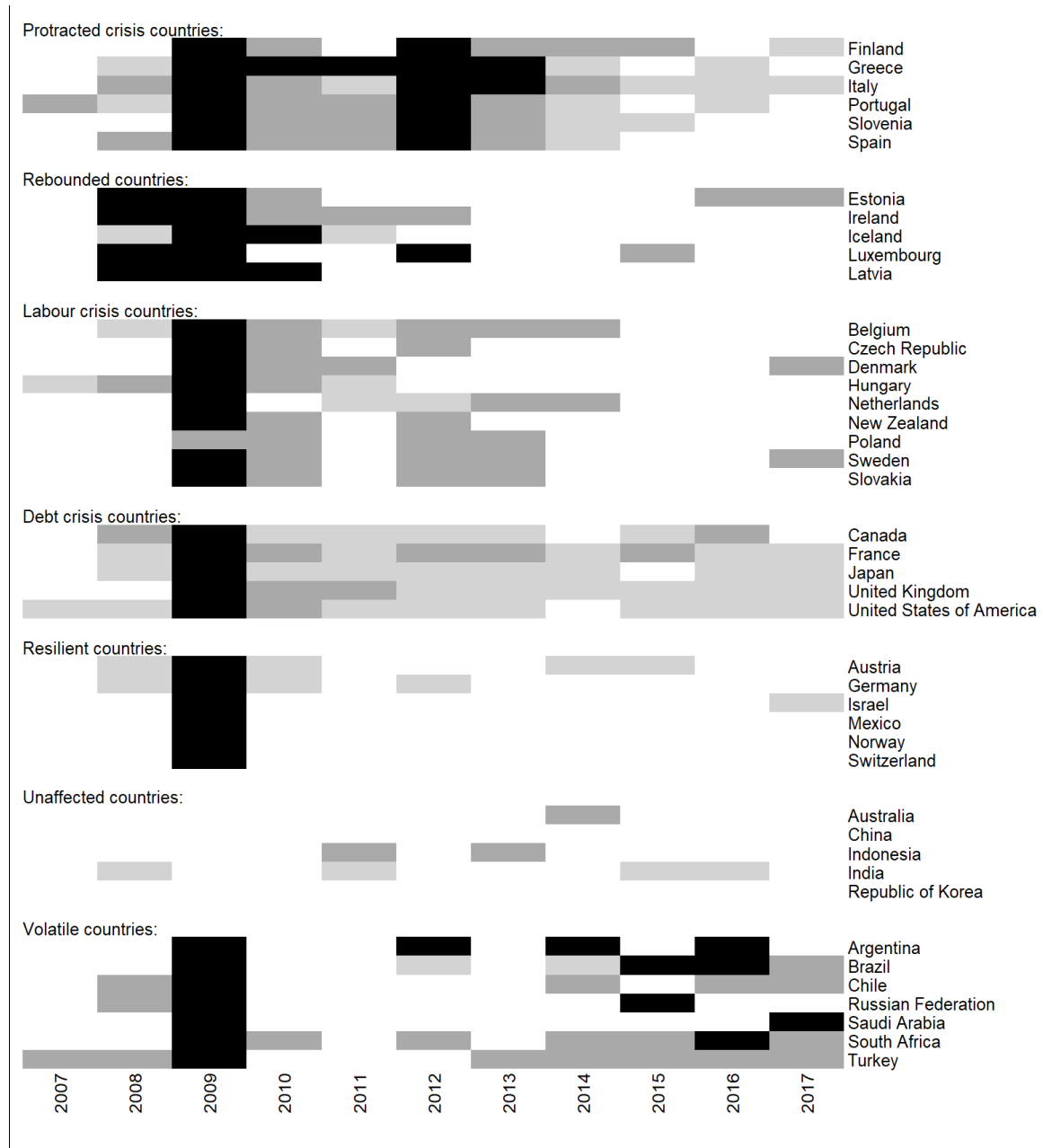

Figure 4: Crisis type trajectories (black = growth crisis; dark grey = unemployment crisis; light grey = debt crisis; white = non-crisis)

Aggregating stress indices

To generate measures of overall crisis severity for both observed and perceived indicators, we develop indices based on factor analysis: the Economic Crisis Intensity Index (ECII) and the Economic Crisis Perceptions Index (ECPI). We use the `fa()` function from the `psych` package and choose ÷principal factor solutionsø as our estimation method. For this exercise, we expand the temporal sample and employ data from 1995 to 2017. This helps stabilize estimation results and thus yields more reliable factor scores.
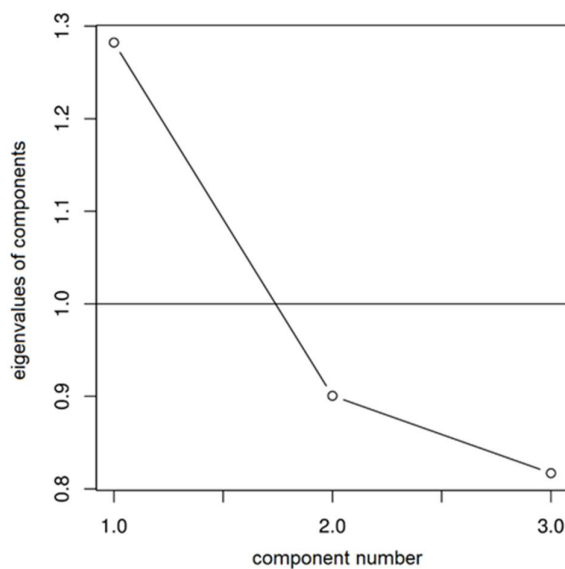

Figure 5: Scree plot of factor analysis for the ECII

Figure 5 shows the scree plot for the ECII, which guides us on how many components, i.e. latent indices generated from the input data, are required to represent the variance contained in our constituting indicators. Only the first component obtains an eigenvalue larger than one, lending credibility to our attempt to condense all information in one component. We choose this first component as our ECII. Table 2 provides the factor loadings for the components of the ECII. Change in GDP per capita has a negative loading, aligning the indicator with the overall index, where high scores represent crisis.

Table 2: Factor loadings for the ECII

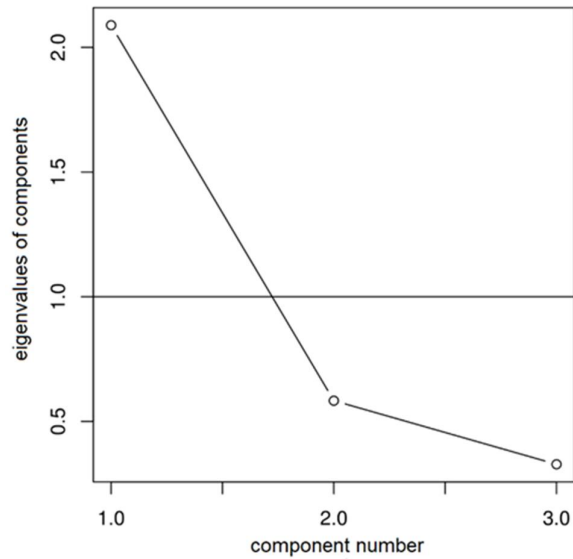| Indicator	Loading
Change in GDP per capita	-0.33
Unemployment rate	0.50
Debt-to-GDP ratio	0.31

Figure 6: Scree plot of factor analysis for the ECPI

Figure 6 shows the scree plot for the ECPI. A one-factor solution again receives empirical support. Table 3 provides the factor loadings of the resulting first factor that is used as ECPI.

Table 3: Factor loadings for the ECPI

Indicator	Loading
Standard of living getting better	-0.79
Local job market ═bad₵	0.86
No confidence in national government	0.31

Literature

Hernandez, E., and Kriesi, H. (2016). ═The Electoral Consequences of the Financial and Economic Crisis in Europe₵ European Journal of Political Research, 55(2): 203ó24.

IMF (International Monetary Fund) (2018). World Economic Outlook Database. Retrieved from https://www.imf.org/external/pubs/ft/weo/2018/01/weodata/index.aspx (accessed 28 June 2018).

World Bank (2017). World Development Indicators. Retrieved from http://databank.worldbank.org/data/download/WDI_csv.zip aspx (accessed 13 February 2018).