Manual on the V-Dem Graphing Tools

The V-Dem Graphing Tools is a new platform for making data visualization intuitive, accessible and easy to use. They allow users to analyze 450+ indicators and indices of democracy on all the countries in the world from 1900 to the present day. The reliable, precise nature of the indicators as well as their lengthy historical coverage should be useful not only to scholars studying democracy, but also to governments, practitioners and NGOs. In this document you can find tips on how to use 8 different Graphing Tools.

Featured Tools

We recommend that you start exploring data with the variable and country graphs, interactive maps and motion chart. These simple and user-friendly interfaces allow you to explore 450 aspects of democracy for all countries in the world over the last 100 years.

1. **Variable Graph**: multiple countries for one index or one variable at a time
2. **Country Graph**: multiple variables and/or indices for one country over time
3. **Interactive Maps**: generates maps for any V-Dem indicator for any year
4. **Motion Charts**: visualizes how the relationship between two variables changes over time

Charts

These brand-new tools make it possible to create even more detailed and nuanced charts, complex graphics and heat maps, thematic and regional comparisons.

5. **Variable Radar Chart**: multiple variables and/or indices for one country over time
6. **Country Radar Chart**: multiple countries for one indicator/index
7. **Scatter Chart**: plots one indicator/index
8. **Heat Map**: plots one indicator/index

Tip! The V-Dem database contains a large number of indicators. In order to identify indicators within a certain theme/area of interest: open the V-Dem Codebook, enter search mode and search on keywords/concepts you wish to explore. The search will take you to the relevant indicators. Keep the codebook open in a separate window while using the online tools; this will make it easier to navigate among the V-Dem indicators. You find the codebook on the following link: [https://v-dem.net/en/reference/](https://v-dem.net/en/reference/)

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**Design & Programming.** The V-Dem Graphing Tools were originally designed by the Center for Research Computing (CRC) at the University of Notre Dame 2011-2013, followed by an additional support from the independent company Imaginary Landscape in a process directed from Natalia Stepanova at the V-Dem Institute. During 2016-2018 Dr. Steven Wilson upgraded the existing tools and designed a set of new tools.

**Funding.** The analysis tools were made possible by generous support from different funders. For more information, please visit: [https://www.v-dem.net/en/v-dem-institute/funders/](https://www.v-dem.net/en/v-dem-institute/funders/).
1. Variable Graph

This tool compares multiple countries for one indicator/or index. Select one indicator and multiple countries/regions. The data are aggregated by year. To generate a graph please follow these steps:

1. Select ONE indicator, these are listed by:
   - Indicators, this is the lowest level of aggregation.
   - V-Dem Indices, which are top-level aggregations and the main principles of democracy.
   - Components, which are meso-level aggregations that are made up by combinations of indicators.
2. Choose ONE or SEVERAL countries or regions.
3. Select your parameters:
   - Scale: Relative or Original
   - Tick the box “Confidence Rating” to display the confidence levels.
   - Tick the box “Mouseover” if you want to see scores at one year by placing a mouse over the graph line
   - Adjust date range.
4. The graph is automatically generated

Tips!
- Check “Selected Indicators” to see the question details, click to expand.
- If you selected an index, double-click on the line to drill-down to the underlying indicators and components.
- The menu can be moved to the side via the arrow in the top right corner.
- The symbols right below the “How-to” button makes it possible to either save or print a graph. You can also export the data to a csv file. The csv file includes the original scaled numbers regardless of whether original or relative is selected.
- For more information, press the ‘How-to’ button in the top-right corner for a more information about the single variable tool.
Relative and Original Scales
When multiple indicators are combined in the same line graph their values cannot be plotted in a strictly comparable manner due to the fact that indicators have different scales. In order to make it possible to display multiple indicators in the same graph, we transform them so that the area between the gridline below the maximum and the gridline above the minimum are all in the same range. This does not make these values comparable in any but a very rough sense. A relatively high value on one variable may have the same transformed score as a relatively low value on a different value. Ultimately, whether these scores are “relatively democratic” or “relatively undemocratic” depends on the meaning of those scores.

The data can be plotted in ‘relative’ or ‘original scale’. When using the default setting of ‘relative scale’ option, all indicators are rescaled allowing for comparisons, even if their initial scale is different. Indicators on their original scales can be viewed using the ‘original scale’ option.

Tip! When viewing many indicators in the ‘relative option’, you can view the original scale for one indicator at a time simply by ticking the box next to the indicator.

Confidence Intervals
V-Dem data are based on the scores of multiple coders, who sometimes diverge in their ratings. In order to deal with such divergences, we provide confidence intervals about the estimated values of each index.

Confidence intervals are only available for indicators coded by multiple coders (Country Expert coding). The bounds demarcate points lying one standard deviation (a) above and (b) below the estimated best guess for a particular country-year by the V-Dem measurement model. The more expert ratings obtained, the more they were in agreement, and the more historical variation there was for that question for that particular country, the narrower the confidence intervals are. Thus, a wider range indicates higher uncertainty.

The confidence is illustrated by colored shadows around the lines. Larger intervals indicate greater uncertainty about the estimate.

Tip! For more information about the measurement model and methodology, please refer to the V-Dem Codebook and Methodology documents.

Variable Graphs - Gridlines
When only one variable is graphed, the scores are displayed relative to the values in the original indicator. For example, the scale for percentages is 0-20-40-60-80-100 and the scale for a multiple-choice question could be 0-1-2-3-4. However, these numbers refer to the range of values between the gridlines, not the gridlines themselves. In other words, the gridlines demarcate the boundaries between 0 and 1, 1 and 2, and so on. A line below the gridline separating 1 and 2 is more likely to have a true value of 1; a value above that line is more likely to be a 2; and so on for other ranges.

For ordinal indicators, these lines are not evenly spaced because the actual distances between scores are not the same. In the example below, on the dimension of Freedom from torture, it is easier to move from the range of 1 to the range of 3 than to move from the range of 2 to the range of 4, as the range of values consistent with a 3 is very wide. The distances between categories are calculated with the V-Dem measurement model by taking into account coders’ relative thresholds, which becomes observable when coders move from one category to another.
2. Country Graph

This tool compares multiple variables/indices for one country/region. Select one country/region and multiple indicators/indices. The data are aggregated by year.

1. Select **ONE** country or region. These are listed in alphabetical order, it is also possible to use ‘search’ function.
2. Choose **ONE or SEVERAL** indicators, these are listed by:
   - Indicators, this is the lowest level of aggregation.
   - V-Dem Indices, which are top-level aggregations and the main principles of democracy.
   - Components, which are meso-level aggregations that are made up by combinations of indicators.
3. Select your parameters:
   - Scale: Relative or Original
   - Tick the box “Confidence Rating” to display the confidence levels.
   - Tick the box “Mouseover” if you want to see scores at one year by placing a mouse over the graph line
   - Adjust date range.
4. Graph will be generated automatically

**Tips!**
- Check “Selected Indicators” to see the question details, click to expand.
- If you selected an index, double-click on the line to drill-down to the underlying indicators and components.
- The menu can be moved to the side via the arrow in the top right corner.
- The symbols right below the “How-to” button makes it possible to either save or print a graph. You can also export the data to a csv file. The csv file includes the original scaled numbers regardless of whether original or relative is selected.
- For more information, press the ‘How-to’ button in the top-right corner for a more information about the single variable tool.
Drill-Down Feature for Variable and Country Graphs

The graphing tools include a drill-down feature that makes it possible to interactively explore the individual indicators included in an index while keeping the index in view. Users can explore how specific aspects of democracy interplay (e.g. electoral, liberal democracy etc.).

**Tip!** In the V-Dem codebook you find the table ‘Indicators and Components Included in Indices’, which displays how indicators, components and indices relate. This makes it easier to understand the structure and relations between a given set of indicators and indices, which is especially relevant when exploring indices and the drill-down feature.

The example illustrates the Liberal Democracy Index in Indonesia (blue line). To activate the drill-down, just click the line of the index-line in the graph.

The graphing tool will then draw all the different components of the liberal democracy index. The index line in blue stays on the graph while the component lines are drawn in other colors.

You can continue drilling-down the indices. You cannot drill-down an indicator as it is the lowest option in the aggregation scheme. The tool allows you to select and unselect which of the components you want to display on the graph by clicking on the text labels below the graph.
3. Interactive Maps

This tool visualizes data by creating a color-coded map to view the distribution of scores for an indicator around the world.

Generating a Map
1. Select an indicator.
2. Adjust the year range.

Interpreting a Map
A map shows the distribution of scores around the world for one indicator in one year. You can zoom in “+” and zoom out “-” to learn more about regions and countries. Details about selected indicators and indices are available in the "Selected Indicators" box at the bottom of the page.

Saving a Map
Save a graph by clicking on the download sign (three-line sign) at the upper right-hand side of the graph, then select your preferred format (png, jpeg, pdf, svg).

Freedom of domestic movement for women (2017)
4. Motion Charts

The motion chart allows users to watch the development of a country or a region over time. Choose your preferred parameters (region/country and indicator), then click “play” in the bottom-left-hand corner and watch the developments unfold. Motion charts can be paused and a specific year can be selected in the time line.

If the chart does not display in your browser, please make sure Flash is enabled (tool requires Adobe Flash Player). Consult your browser settings on how to enable flash. The chart does not yet work in Safari.

Generating a Chart
1. Select an indicator for both the Y-axis and X-axis variables.
2. Select the Country Focus: one or several countries/regions.
3. Press ‘Generate Graph’
4. Press the play button to see changes over time.

Chart Options

Color: The color of the bubble is set by choices in the dropdown menu under "color". By default, colors are differentiated by region.

Size: The size of the bubble is set by options in the dropdown menu under "size".

Countries: Selecting countries under the "select" list will highlight them on the chart by lowering the opacity of the other country bubbles. Opacity can be set by clicking on the wrench icon in the lower right-hand corner. Countries are greyed out in the list if there is no charted data for those countries for the selected variables. Hovering over the bubbles will display the country name and x and y data values.

Trails: Checking the "trails" box will add a line to the selected countries that will trail that country's progress over time, connecting the points.

Bubbles vs. Lines: The tabs on the upper right-hand side of the chart offer different ways of viewing the data in both vertical and horizontal linear format.

Lin vs. Log: By default, the chart is set to linear scale. Data can also be viewed in a logarithmic scale by selecting the "lin" button on the upper left-hand side and switching to "log".
Tip! The V-Dem Codebook includes the appendix ‘Structure of Aggregations – All Indices and Indicators’, which illustrates how indicators, components and indices are constructed and related.

You can hide the menu for the selection of countries and indicators by pressing the arrow in the top right corner of the box. Details about selected indicators and indices are available in the "Selected Indicators" box at the bottom of the page.

To increase the size of the motion chart, hit ctrl-+ or cmd-+ in your browser a few times. This makes it possible to see all the elements easily, including a full list of the available regions and countries, and to choose which ones to highlight and track as the animation plays.
5. Variable Radar Chart

This tool displays multiple variables and/or indices for one country over time in a radar chart.

**Generating a Graph**
1. Select an indicator.
2. Select multiple countries (3 or more)
3. Select two years to be compared.

**Interpreting Graphs**
A radar chart compares multiple variables across two years, the two years are color coded. To see the ratings, mouseover one of the colored lines. Details about selected indicators and indices are available in the "Selected Indicators" box at the bottom of the page.

**Saving a Graph**
Save a graph by clicking on the download sign (three-line sign) at the upper right-hand side of the graph, then select your preferred format (png, jpeg, pdf, svg).

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6. Country Radar Chart

This tool displays multiple countries for one indicator/index in a radar chart.

**Generating a Graph**
1. Select a country or a region.
2. Select multiple variables (3 or more).
3. Adjust the year range to select 2 year to be compared.

**Interpreting Graphs**
A radar chart compares multiple variables across two years in a selected country/region, the two years are color coded. To see the exact ratings, mouseover one of the colored lines. Details about selected indicators and indices are available in the "Selected Indicators" box at the bottom of the page.

**Saving a Graph**
Save a graph by clicking on the download sign (three-line sign) at the upper right-hand side of the graph, then select your preferred format (png, jpeg, pdf, svg).
7. Scatter Chart
This tool displays one indicator/index in a scatter plot.

Generating a Graph
1. Select an indicator.
2. Select a region.
3. Adjust the year range.

Interpreting Graphs
The graph plots country scores (vertical axis) across the selected time period (horizontal axis). Each color represents one country in the selected region. Mouseover a dot to see the name of the country, year and a score. Details about selected indicators and indices are available in the "Selected Indicators" box at the bottom of the page.

Saving a Graph
Save a graph by clicking on the download sign (three-line sign) at the upper right-hand side of the graph, then select your preferred format (png, jpeg, pdf, svg).

8. Heat Map
This tool displays one indicator/index on a heat map - a graphical representation of data where values are represented by colors.

Generating a Graph
1. Select an indicator.
2. Select a region.
3. Adjust the year range.

Interpreting Graphs
The graph plots indicator scores (vertical axis) across the selected time period (horizontal axis). The coloring indicates the distribution of country scores across the scale. We added labeling - low, medium, and high - to make interpretation of the scale easier. The gradient legend is available to the right of the graph. Mouseover a colored area on the graph to see how many countries got a particular rating at a certain point of time. Details about selected indicators and indices are available in the "Selected Indicators" box at the bottom of the page.

Saving a Graph
Save a graph by clicking on the download sign (three-line sign) at the upper right-hand side of the graph, then select your preferred format (png, jpeg, pdf, svg).