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CAPP 30239: Data Visualization
Project 2: Analyzing Existing Data Visualizations
10-24-2022

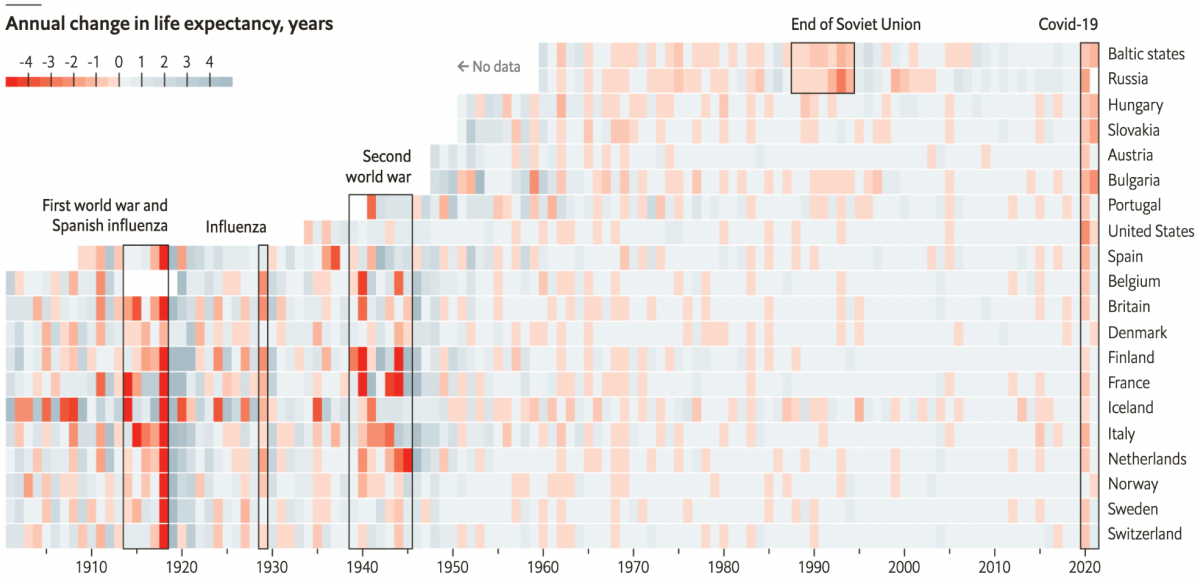
Introduction

For my analysis of existing data visualization, I decided to examine a trio of visualizations recently published by the same source: the Economist, a weekly news magazine with a reputation for well crafted data journalism. Analyzing visualizations from a single media organization, with a consistent design guide, allows us to narrow in on the fundamental elements of narrative, visualization type and data, instead of getting bogged down by minor stylistic differences.

All three are taken from the Graphic Detail section of the magazine, which centers articles on the visualizations themselves and supports them with text, an inversion of the typical relationship in the rest of publication where visualizations are subordinated to the written word. Each Graphic Detail article features a primary visualization, which is often given a double page spread, and a handful of supporting visualizations. This allows designers to create visualizations that are far more detailed than would be otherwise legible. It's a format particularly suited to complex data and narratives.

In America and eastern Europe, covid-19 got worse in 2021

Oct 20th 2022



https://www.economist.com/graphic-detail/2022/10/20/in-america-and-eastern-europe-covid-19-got-worse-in-2021

1. What data does it use?

This graphic detail is based on data taken from a recent study led by Jonas Schöley of the Max Planck Institute, and published in the scientific journal *Nature Human Behavior.* The paper compiles the death rates by age group in 28 (mostly European) countries, and calculates the number of years a newborn would be expected to live. It also features data on vaccination rates.

2. What is the purpose of visualization?

The purpose of the visualization is to demonstrate the effects of the COVID-19 pandemic on life expectancies, primarily in developed or Western countries. A special emphasis is placed on the elderly, and disparities in life expectancies correlated with region, or vaccination rate.

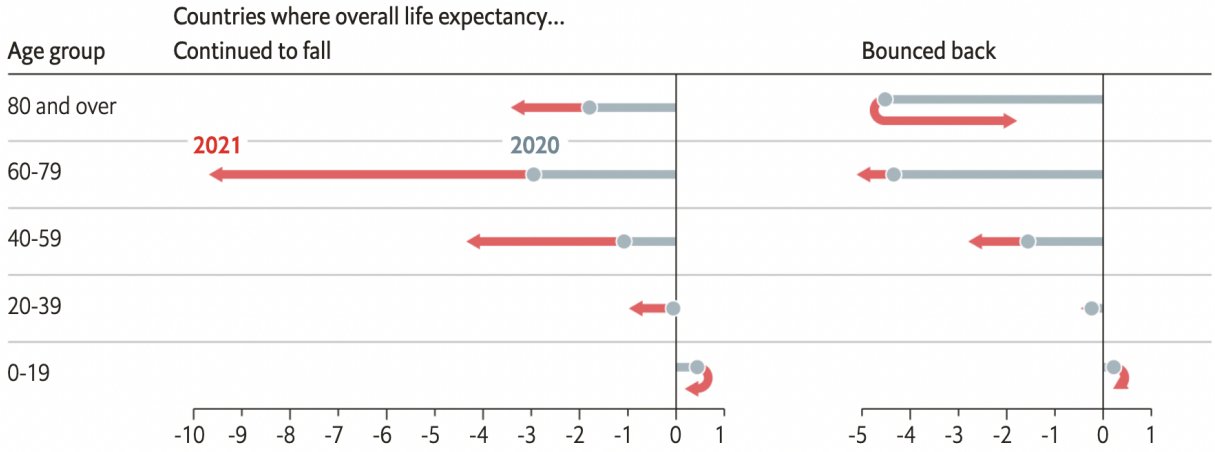
3. How is the visualization composed? What charts are used?

This Graphic Detail article contains three distinct visualizations. The primary visualization makes use of a chart type that I have not previously encountered. For want of its official name, I will dub it a “grid” chart. The chart consists of 20 horizontal bars, each corresponding to a country (except for the three Baltic States are grouped together). The x-axis lists the years from 1900 to 2020. At each year position, the 20 country bars are given a color that corresponds to

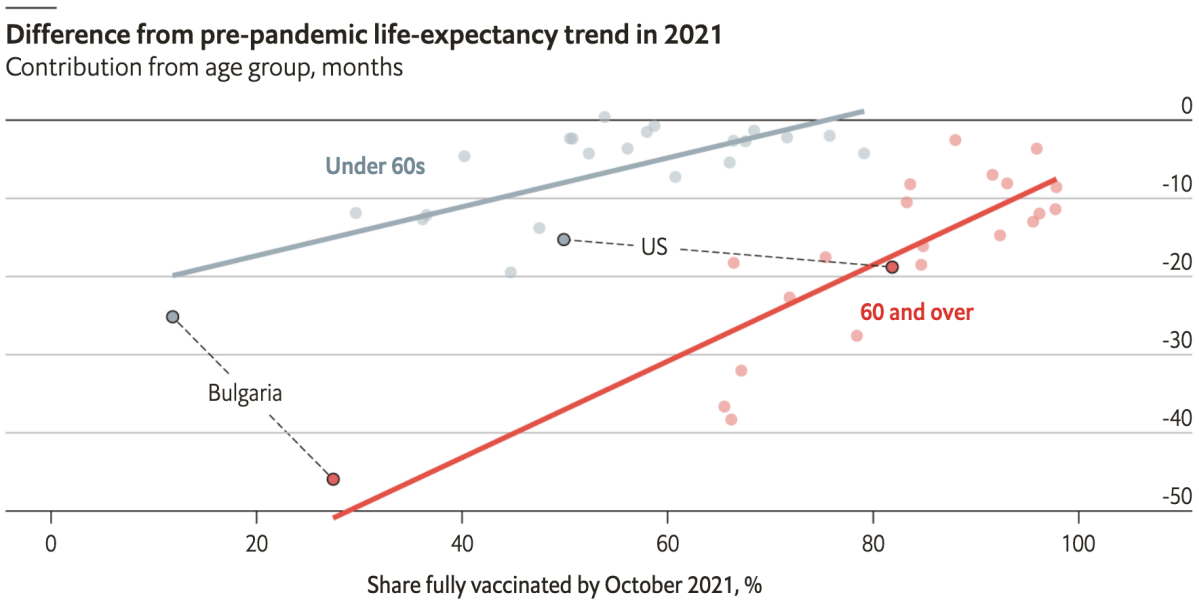
their annual change in life expectancy, in years. Periods of particular turmoil, filled with red grid squares, are highlighted with boxes with a black stroke. The events responsible for the wide-ranging declines in life expectancy—wars, prior pandemics, political upheaval—are labeled.

The primary data visualization is supported by two additional charts. The first is a bar chart, which shows the average change in life expectancy among countries where life expectancy continued to decline after 2020, and among countries where it "bounced back." All countries experienced a life expectancy decline in 2020, but in 2021 they bifurcated, some partially recovering and other falling further still.

Change in life expectancy from 2019, contribution from age group, months



The second supporting chart is a scatter, which plots the share of the national population that is vaccinated versus the overall decline in life expectancy since the beginning of the pandemic. However, instead of representing each country as a single point, the chart depicts each country twice, dividing national populations into those under the age of 60 and those 60 and above. This produces two distinct clusters, each of which has a correlation line fitted to it. To highlight the fact that countries appear twice, dashed lines are used to link the two dots of certain nations (specifically Bulgaria and the United States).



4. Does the visualization have a clear message? Who is the intended audience?

Each visualization brings a distinct message. The primary grid chart makes a case for the historical significance of the COVID-19 pandemic. It argues that the death rates of the virus were so great that it caused a simultaneous decline in life expectancy across the Western world. And that this decline—while small compared to the drops that accompanied the world wars—is striking in a modern context. The accompanying text claims that COVID-19 "disrupted [a] trend of ever-longer lifespans."

The supporting charts come with a more specific, and explicit narrative. Instead of just noting the magnitude and universality of the pandemic, both charts divide the population into more specific demographic categories, and highlight the fact that the pandemic has not had an even identical effect across all countries and age groups. In particular, the designers tease out the relationship between declines in life expectancy and vaccination, and argue that countries that have been less effective at vaccinating their populations have suffered worse health outcomes. The charts highlight that fact that individuals aged 60-79 have seen greater declines in life expectancy than those 80 and older, which the article attributes to the fact that vaccination rates are near universal among the latter group, but not the former.

The Economist is a liberal magazine, and has been since its founding. Liberal in the "classical" or "global" sense, instead of the American definition in which liberal is synonymous with left. Because of its opposition to many forms of economic and particularly social government intervention, the Economist has shifted back and forth on the pandemic response. While supporting most lockdowns and vaccine mandates, the paper has expressed skepticism at how

governments have implemented them. This Graphic Detail can be read as part of this internal debate (among both the Economist and its readers), and an argument in favor of a stiff pandemic response, particularly with regards to widespread vaccination.

5. Is the visualization effective? Why/why not?

The element of the Graphic Detail that I found most effective was the stark use of color, particularly red, in the two supporting visualizations. Red is used to signify a separation in both visualizations. To separate 2020 from 2021 in the first supporting visualization, and to separate under 60 from 60 and over in the second.

By contrast, I did not find the use of coloration in the primary chart, the grid chart, to be as effective. The business and complexity of the visualization makes it difficult for the color to make any particular detail pop.

6. How would you change the visualization to strengthen the message?

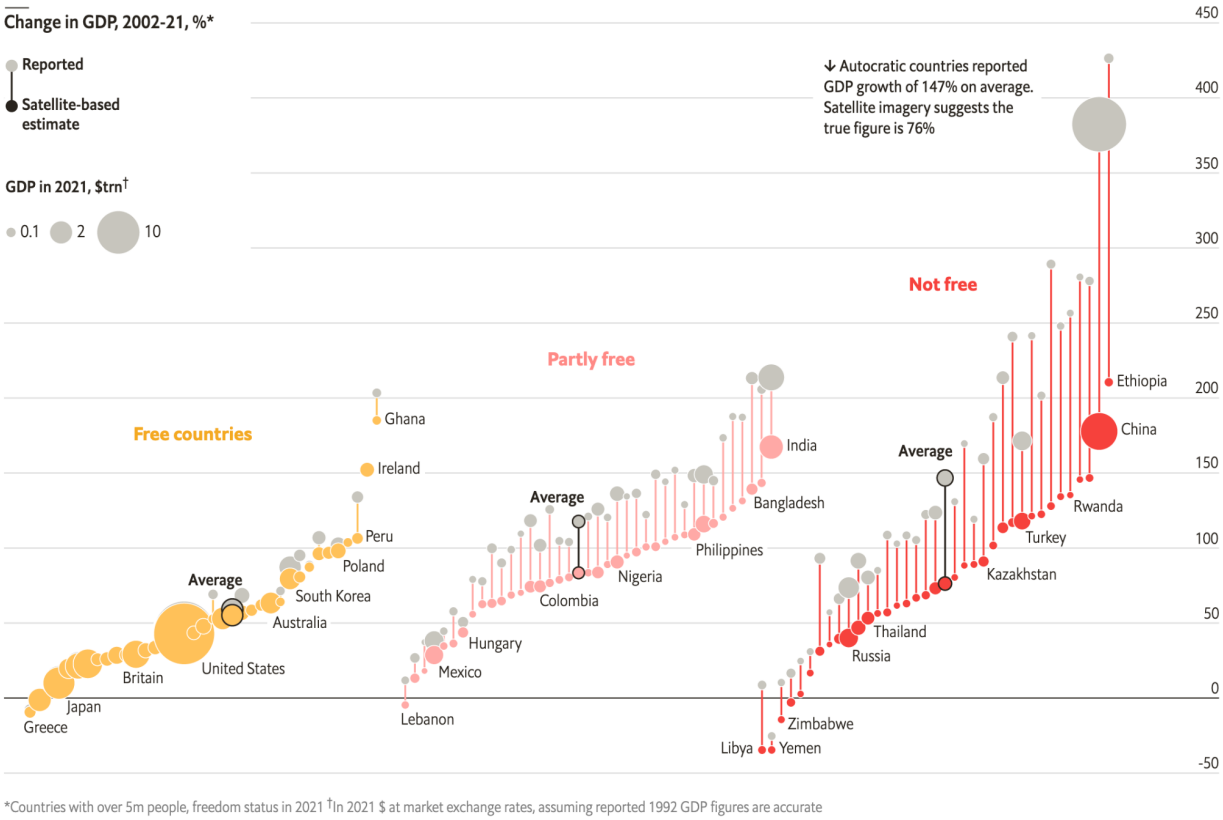
As mentioned in the previous section, I am not particularly fond of the grid chart. A normalized line chart of some kind may have been more effective at displaying the same data and conveying the same narrative. Perhaps the clustering of life expectancies made a conventional line chart infeasible.

Additionally, while I loved the use of color in the two supporting charts individually, I don't think they do a good job supporting each other. The Economist claims that individuals aged 60 to 79 have seen the largest life expectancy decline because their vaccination rate is lower than that of people aged 80 and above. However, while the first supporting chart places 80+ and 60-79 into separate categories, the second supporting chart—the only chart to display vaccination rates—groups them together.

A bigger issue is the fact that a significant part of the narrative in the article explaining the Graphic Detail doesn't actually appear in the charts themselves. The article spends substantial time explaining the regional variations in vaccination rate and life expectancy decline as a consequence of the pandemic. It highlights that declines in life expectancy were smaller in northern and western European countries (which have high vaccination rates) but larger in the US and Eastern Europe (which have low vaccination rates). However, these regional disparities are not highlighted at all in the visualizations themselves, leaving a gap in the visual narrative.

A study of lights at night suggests dictators lie about economic growth

Sep 29th 2022



*Countries with over 5m people, freedom status in 2021 †In 2021 $ at market exchange rates, assuming reported 1992 GDP figures are accurate

https://www.economist.com/graphic-detail/2022/09/29/a-study-of-lights-at-night-suggests-dictators-lie-about-economic-growth

1. What data does it use?

This graphic detail takes data from a forthcoming paper by Luis Martinez, an economist. The paper uses a measure of visible artificial light at night to estimate economic activity, and compares it with both the official GDP statistics of a country, and its level of political freedom.

2. What is the purpose of visualization?

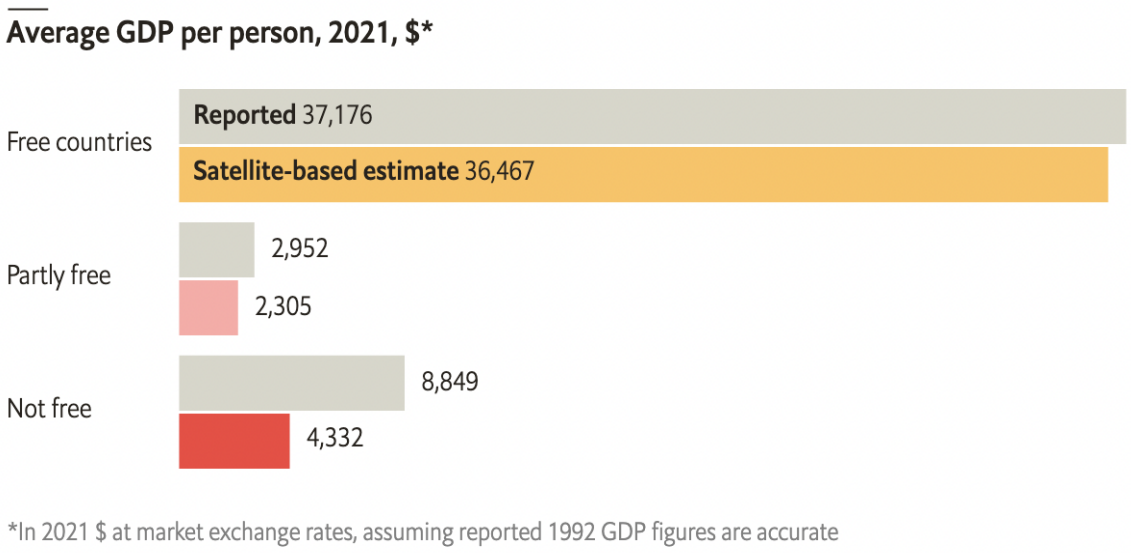
The purpose of the visualization is to depict the gaps between countries' self-reported economic statistics, and their actual level of economic development. Much of the data used to calculate widely repeated metrics like GDP and human development (which in turn impact things like international aid and foreign investment) are created by national governments. Without sufficient transparency, this creates incentives for rulers to falsify their data, as a means of

self-aggrandizement or legitimization. The gaps between estimated actual economic development and self-reported growth are nearly 100% in the average authoritarian regime, but close to 0% in democracies.

3. How is the visualization composed? What charts are used?

The primary visualization of this Graphic Detail article appears to be a variation on the waterfall chart. Each vertical bar corresponds to a country. The y-axis scale shows economic growth percentage over the study period. The height of each bar corresponds to the difference between each country's self-reported GDP growth from 2002 to 2021 and the true scale of their economic expansion estimated by the researchers. At the bottom of each bar, a bubble shows the satellite estimated size of each country's economy. At the top, another bubble shows the self-reported size. There is no scale on the x-axis. The designer has instead clustered the countries by whether they are deemed "Free," "Partly Free," or "Unfree" by Freedom House. Within these clusters, countries are organized left to right by the estimate of their true economic growth.

There is a single supporting chart: a horizontal bar chart, that displays the average real and self-reported GDPs of free, partly free and unfree countries.



4. Does the visualization have a clear message? Who is the intended audience?

The visualization has a simple message: that authoritarian countries falsify their economic statistics. In our age of rising authoritarianism, this is a particularly vital story to tell. Dictators the world over are attempting to weave a narrative of authoritarian competence, which states that an iron fist is required to drag a country into prosperity. As seen above, much of that authoritarian prosperity is a mirage.

As noted previously, the Economist is a liberal publication (in the global, not American, sense). Combatting authoritarianism, and promoting democracy, free trade, and economic transparency have been among the paper's missions since its founding in the 1800s. The Economist and its readers share concerns about the rise of global authoritarians over the course of the past two decades. This Graphic Detail strikes a blow against those authoritarians, and reassures readers of the vigors of democracy.

5. Is the visualization effective? Why/why not?

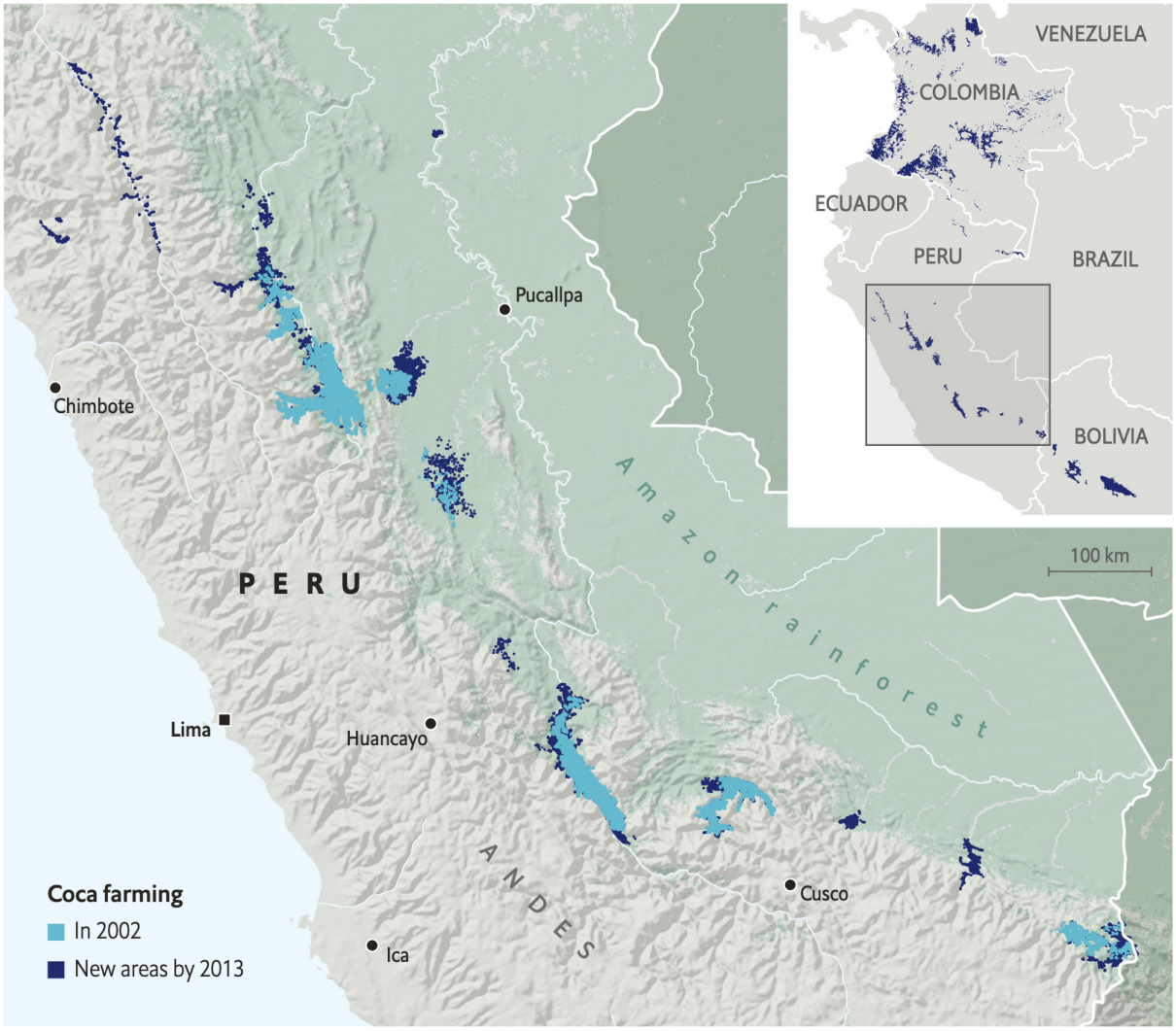
Of the three Graphic Details I've included in this report, this is perhaps my favore. The effect of the trio of boldly colored waterfall graphs is incredibly striking, and conveys the central narrative (that authoritarian regimes falsify their statistics, but democracies do not) effectively. The supporting bar chart provides a useful summary statistic. The use of the same color scheme for free/partly free/unfree countries across the three charts provides a degree of visual cohesion, and reinforces the centrality of the distinction between them.

6. How would you change the visualization to strengthen the message?

Freedom House is not the only NGO that publishes classifications of political freedom. In fact, the Economist itself publishes a measure called the Democracy Index. Unlike Freedom House's scheme, which organizes countries into discrete categories, the Democracy Index is continuous. The choice to organize the countries on the chart into three clusters is visually striking, and highlights the fact that there is a fundamentally different relationship between reported and real/estimated GDP among democracies versus authoritarian regimes. However, using the Democracy Index instead of Freedom House would have allowed for a proper y-axis, and exposed readers to a more granular relationship between political freedom and economic transparency.

Demand for drugs caused a surge in child labour in Peru

Oct 13th 2022



https://www.economist.com/graphic-detail/2022/10/13/demand-for-drugs-caused-a-surge-in-child-labour-in-peru

1. What data does it use?

This graphic detail is based on data taken from a paper published by Maria Micaela Sviatschi of Princeton University. The paper compiles statistics on coca leaf production and child labor markets.

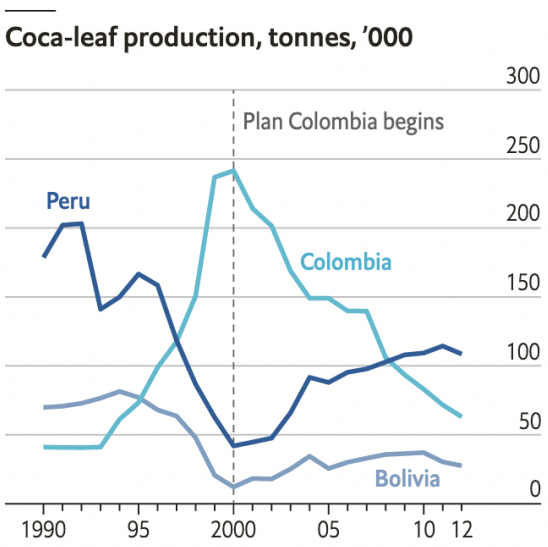
2. What is the purpose of visualization?

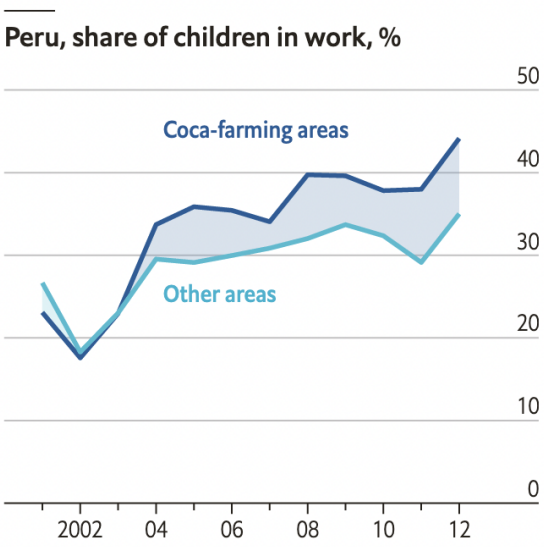
The purpose of the visualization is to relate the prevelance of child labor and the cocain industry. While people in the West encounter certain signs and symptoms of the drug trade—overdose deaths, gang violence—much of the cost of the industry is confined to the regions that produce the illicit substances, not the wealthier places driving demand. Rural land use and child agricultural labor are two of the effects that drug consumers are blind to.

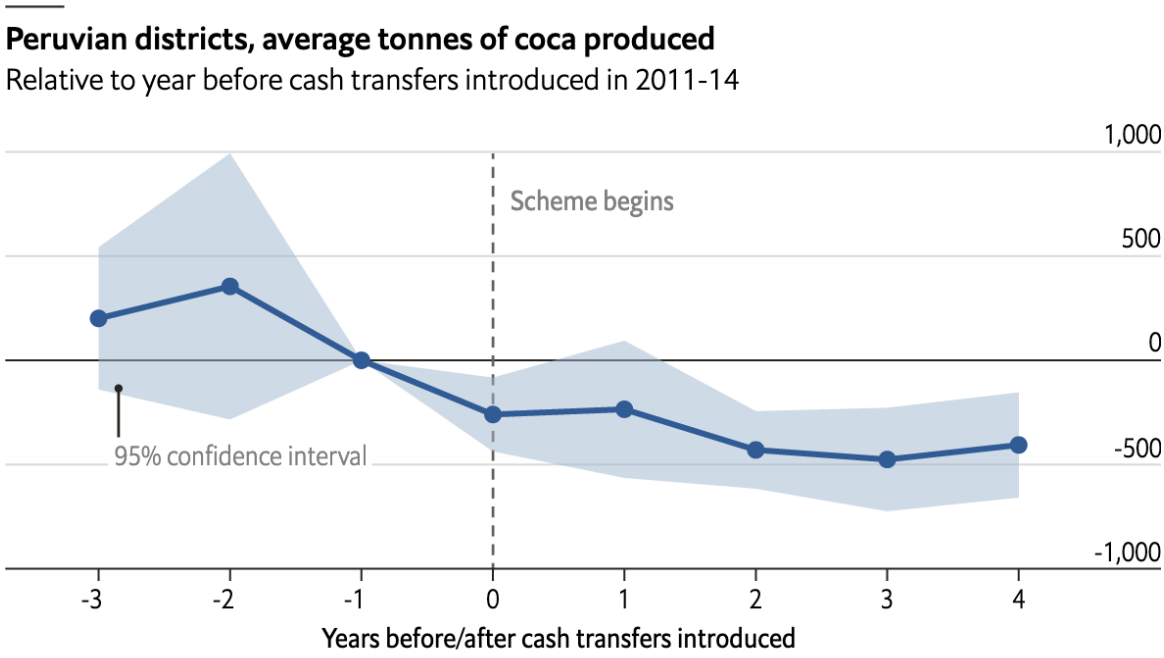
3. How is the visualization composed? What charts are used?

I decided to conclude this report with this Graphic Detail because its visualizations are the most "conventional" of the three. The primary visualization is "just" a map. Specifically, a map of the spread of cocoa leaf farming from 2002 and 2013. Coca leaf is the raw material used to make cocaine.

This article features the most supporting charts: three in total. The first is a line chart, which depicts total coca-leaf production in 1000s of tons, in three countries: Peru, Colombia, and Bolivia. The second supporting chart is a area chart, which highlights the difference in the child labor rate between the regions of Peru with high levels of coca farming and those with lower levels.







4. Does the visualization have a clear message? Who is the intended audience?

Taken in concert, the visualizations tell a sequenced narrative. In the late 1990s, Colombia was the center of the Latin American coca industry. Following a crackdown in 2000, production shifted to Bolivia and Peru. In turn, this increased the ecological footprint of the drug trade in Peru, and increased the number of child laborers in the country. Children are too young to be prosecuted, and therefore make ideal workers for the illicit drug trade. The accompanying article claims that these children are less likely to remain in school, and more likely to end up arrested for drug related offenses later in life. A $30 monthly cash transfer to families that keep their children in school reduces the economic incentive to send their kids into the drug trade, and results in a decline in cocoa production.

As mentioned previously, the Economist is a liberal paper. The magazine has a long history of supporting drug legalization, including the legalization of "hard" drugs like cocaine. In a separate article in the same edition, the Economist argues that beyond all the harm that the drug war and illicit drug trade has done in the developed countries—the primary customers for drugs—the illegal industry has had a far more deleterious effect on producing countries like Peru. The Economist has a readership that is predominantly western, urban and English speaking, and therefore likely has little grasp on the effects that the illegal drug trade has overseas, particularly in remote rural areas like the Peruvian highlands. Legalization, the Economist argues, will eliminate these effects by bringing the industry within the confines of regulation and the conventional financial system.

5. Is the visualization effective? Why/why not?

I found the set of visualizations in this Graphic Detail to be the most effective (of the three articles featured in this report) at acting in concert. Though all informative, the visualizations of this article are individually much less striking than those in the first two Graphic Details. However, their simplicity shifts the focus onto their collective message. Each chart provides an additional step in the narrative progression, which ranges from historical background to policy solutions.

6. How would you change the visualization to strengthen the message?

While there's much to be admired in the careful composition of a series of simple visualizations, the other Graphic Details in this report demonstrate how the proper use of coloration can add an additional dimension of information without adding an additional element to the charts.