MACROECONOMICS 2 : ASSIGNMENT 1

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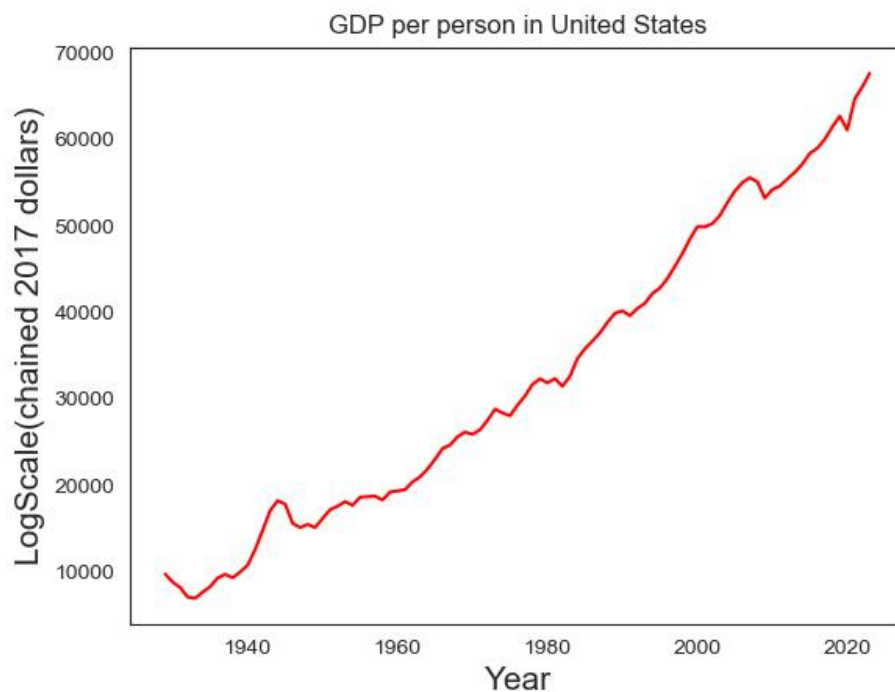## The Facts of Economic Growth: Graph replication

Figure 1: GDP per person in the US economy has increased at a surprisingly consistent average pace of about 2 % per year for about 150 years. Beginning at about $ 3,000 in 1870, per capita GDP increased by about 17 times to more than $ 50,000 by 2020.
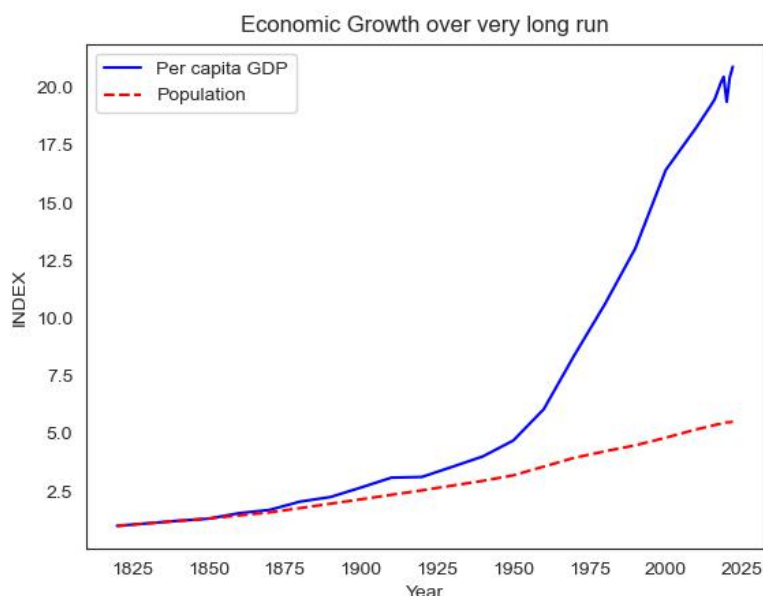
Figure 2: Shows sustained exponential growth in living standards is an incredibly recent phenomenon as for thousands and thousands of years, life was, in the evocative language of Thomas Hobbes, "nasty, brutish, and short." Only in the last two centuries has this changed, but in this relatively brief time, the change has been dramatic.
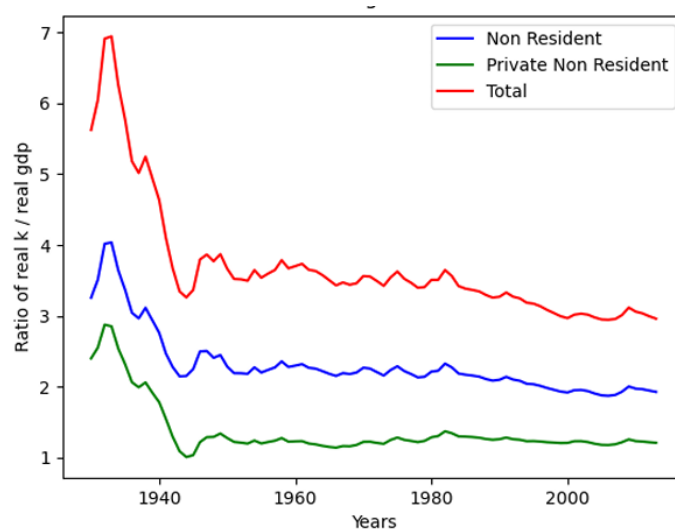

Figure 3: The contribution of the capital-output ratio was modest in the growth accounting decomposition suggests that the capital-output ratio is relatively constant over time. The broadest concept of physical capital (Total), including both public and private capital as well as both residential and non-residential capital, has a ratio of 3 to real GDP. Focusing on nonresidential capital brings this ratio down to 2, and further restricting to private non-residential capital leads a ratio of just over 1.
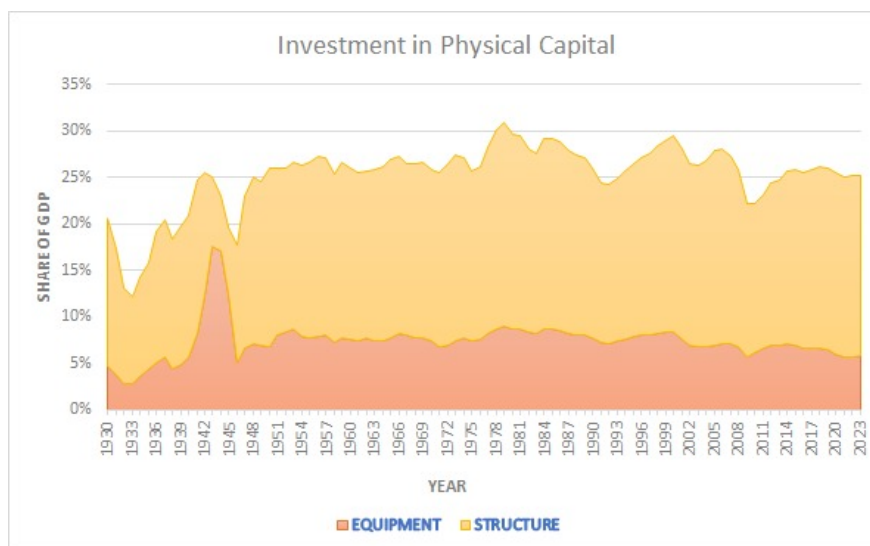
Figure 4: Shows nominal spending on investment as a share of GDP back to 1929. The share is relatively stable for much of the period, with a notable decline during the last twenty years.
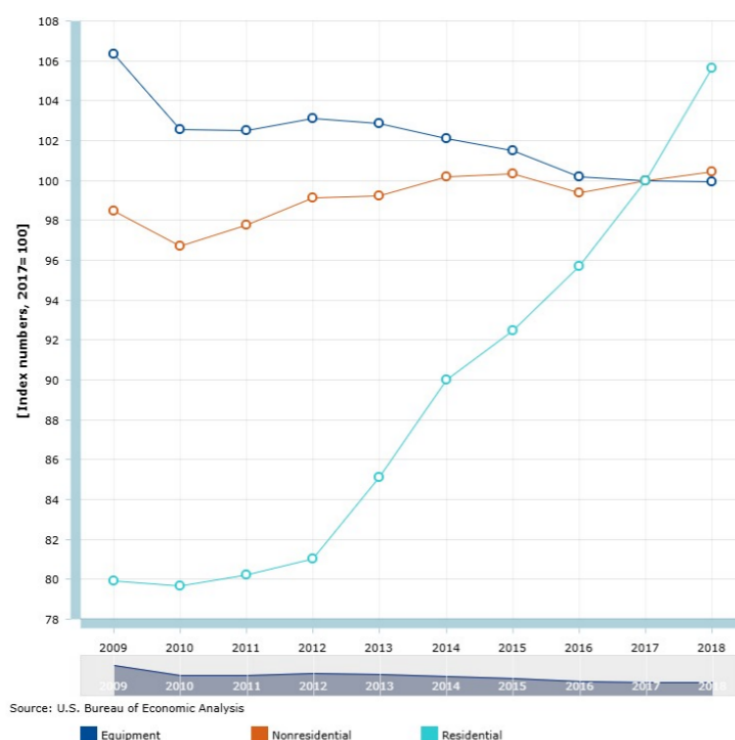

Figure 5: Figure 5 displays the cost of several investment categories in relative to the GDP deflector. Two stylised facts stand out: the relative price of buildings(structures) has increased since 1929 by a factor of 2 (for residential) or 3 (nonresidential) and the relative price of equipment has declined at higher rate since 1960 by more than a factor of 3 (for nonresidential).
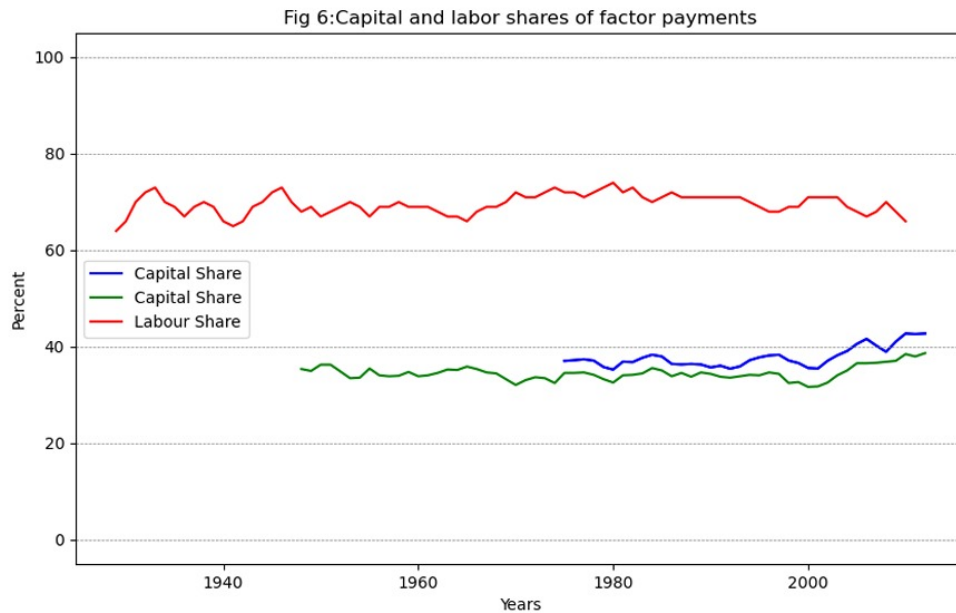
Figure 6: Shows shares of GDP to capital and labor using two different data sets. First, between 1948 and 2000, the factor shares were indeed quite stable. Second, since 2000 or so, there has been a marked decline in the labor share and a corresponding rise in the capital share.
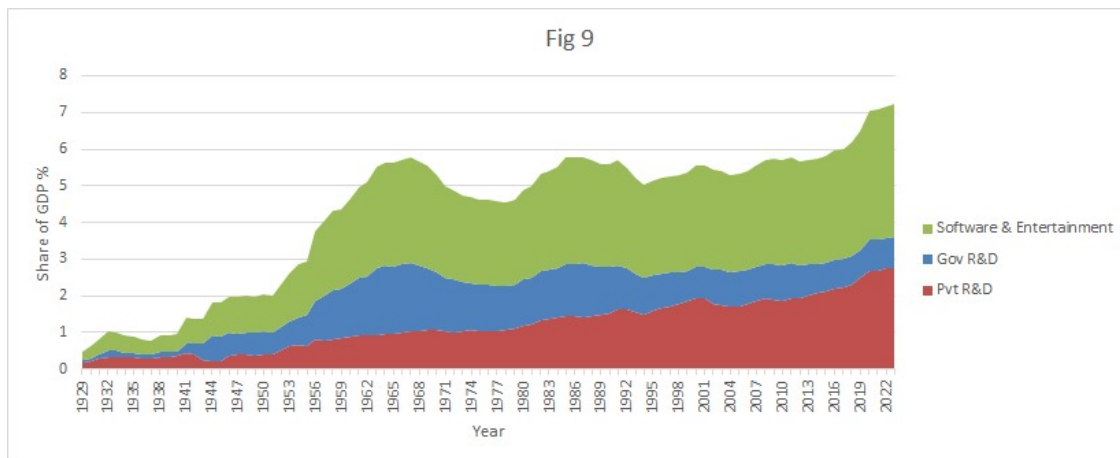

Figure 9: Shows spending on research and development, as a share of GDP, for the United States.First, total spending on investment in intellectual property products has risen from less than 1% of GDP in 1929 to nearly 5% of GDP in recent years. This overall increase reflects a large rise in private research and development and a large rise in software and entertainment investment, especially during the last 25 years. Finally, government spending on research and development has been shrinking as a share of GDP since peaking in the 1960s with the space program
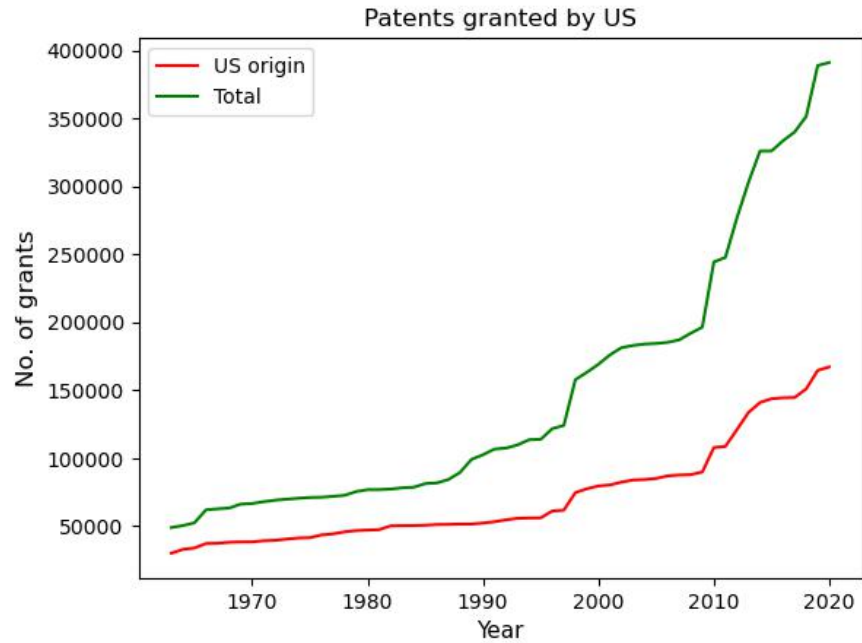
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Figure 11: The number of patents granted to US inventors in 1915, 1950, and 1985 was approximately the same.
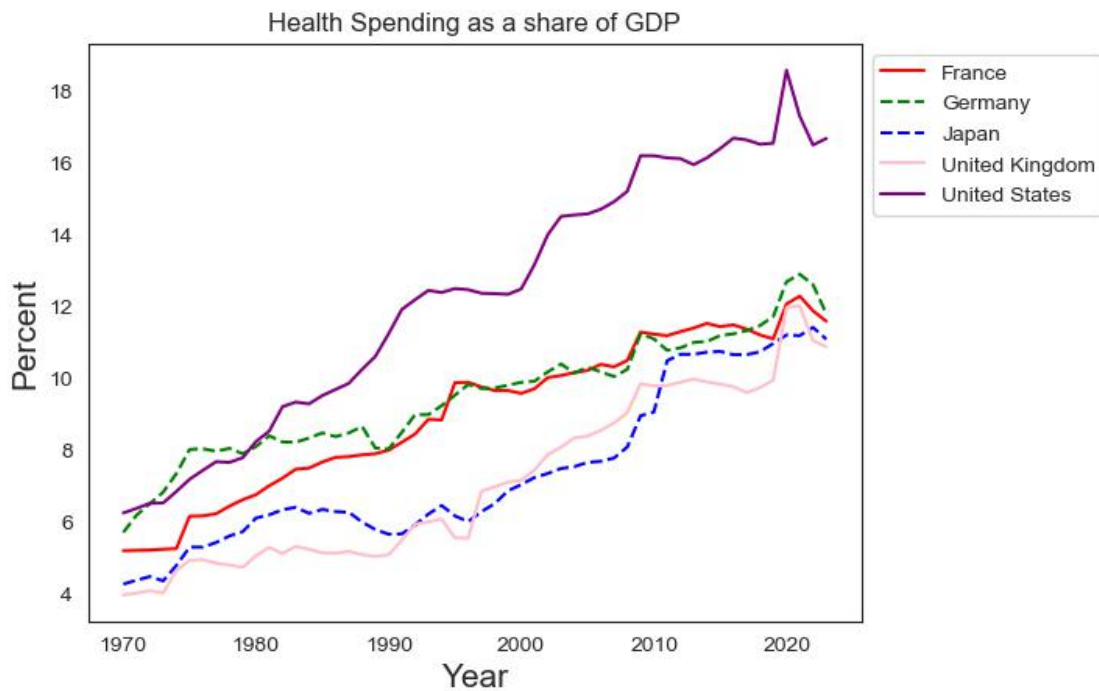

Figure 13: Shows that a different structural transformation has been predominant during the last 60 years: the rise of health spending as a share of GDP. In the United States, the health share more than tripled since 1960, rising from 5% in 1960 to 17% in recent years and also Large trends are present in other countries as well.
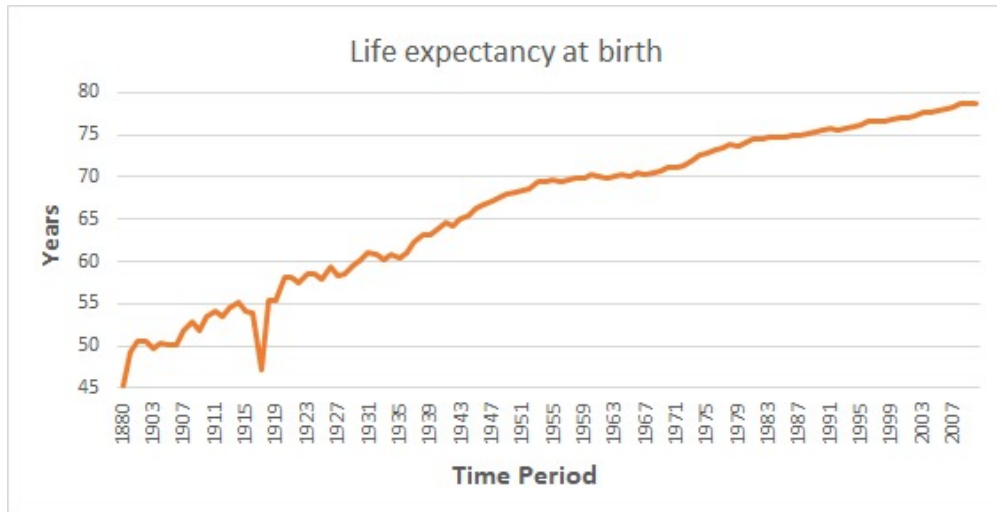
Figure 14: suggests that Life expectancy at birth increased rapidly in the first half of the 20th century, due to improvements in public health and large declines in infant mortality. Since 1950, the rate of improvement has been more modest, around 1.8 years per decade and also shows that the rise in life expectancy occurs at old ages. Life expectancy conditional on reaching age 65 has risen by just under 1 year per decade since 1950
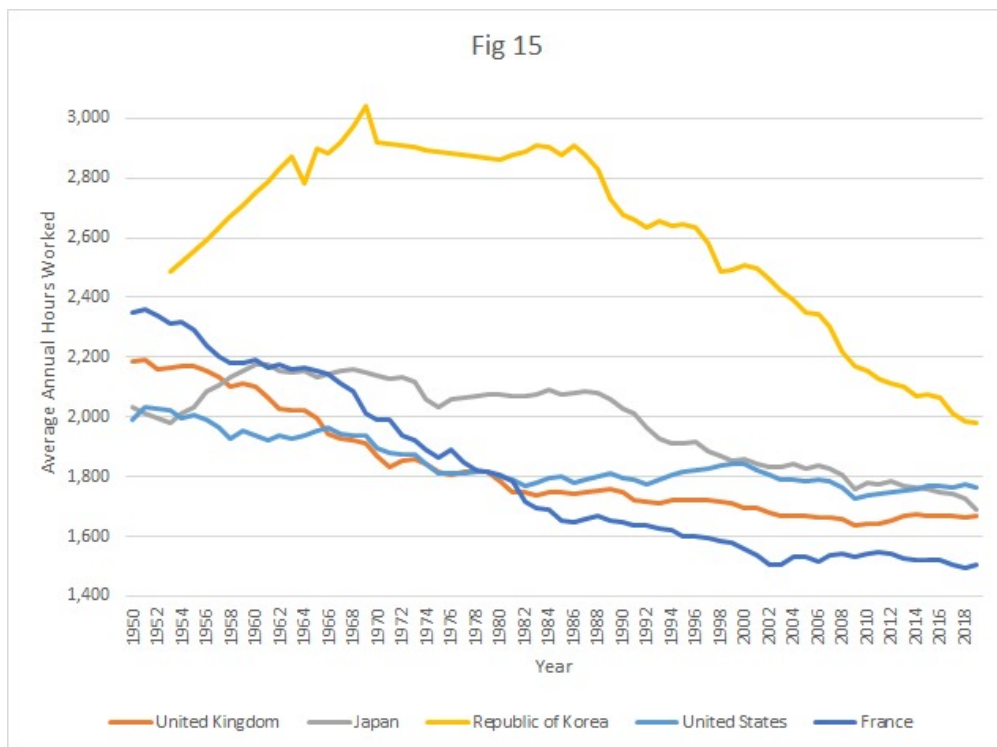

Figure 15: annual hours worked has fallen significantly since 1950 among ad vanced countries. Average hours worked in the United States, for example, fell from 1909 in 1950 to 1704 in 2011. In France, the decline is even more dramatic, from 2159 to 1476. The decline starts slightly later in Japan after their recovery from World War II, with hours falling from 2222 in 1960 to 1706 in 2011.
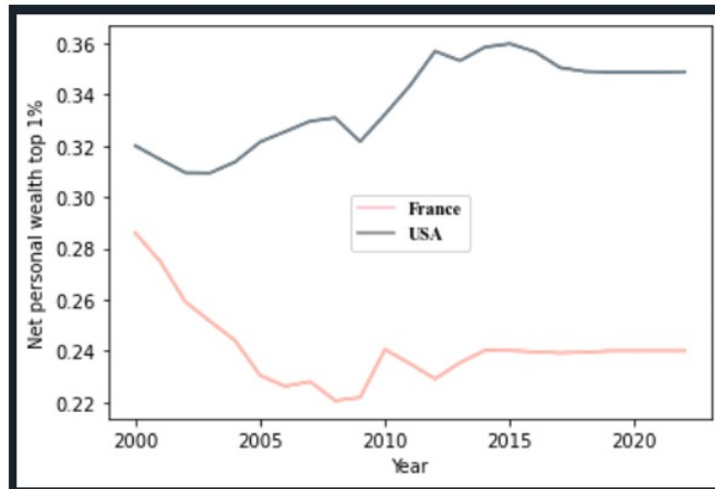
Figure 18: This figure suggests that a very large difference emerged post 1980s,with top income shares rising in the United States to essentially the same level as in 1920 while the share in France remains relatively low. Post 2015 , it remains relatively stable.
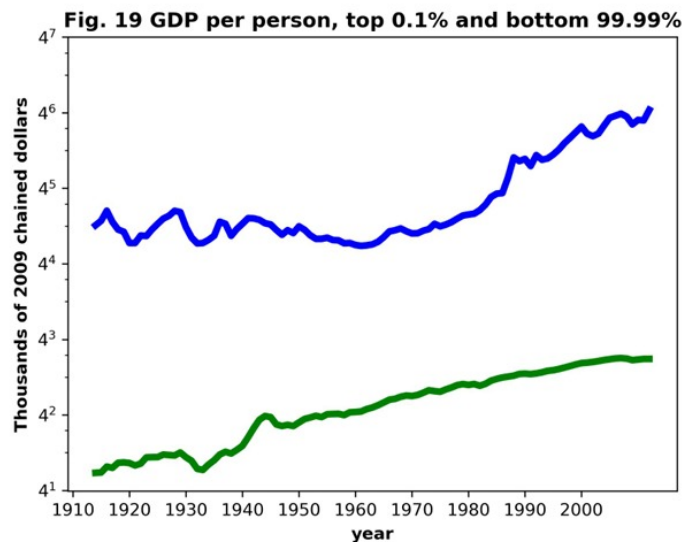

Figure 19: The figure applies the Piketty–Saez inequality shares to average GDP per person to produce an estimate of GDP per person for the top 0.1% and the bottom 99.9.Until recently, there is surprisingly little growth in average GDP per person at the top: the value in 1977 is actually lower than the value in 1913. Instead, all the growth until around 1960 occurs in the bottom 99.9%.This pattern changed in recent decades. For example, average growth in GDP per person for the bottom 99.9% declined from2.3% between 1950 and 1980 to only 1.8% between 1980 and 2007.
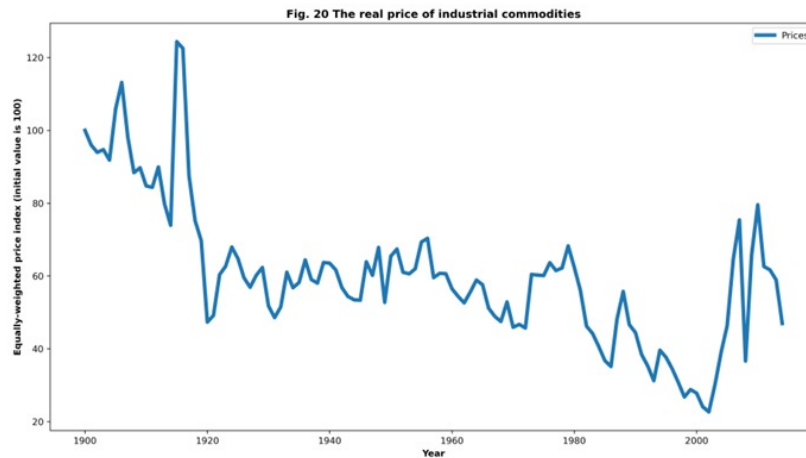
Figure 20: During the 20th century, world demand for these industrial commodities exploded with the rise of the automobile, electrification, urbanization, and the general industrialization that occurred in the United States and around the world.The real price of these commodities declined over the 20th century
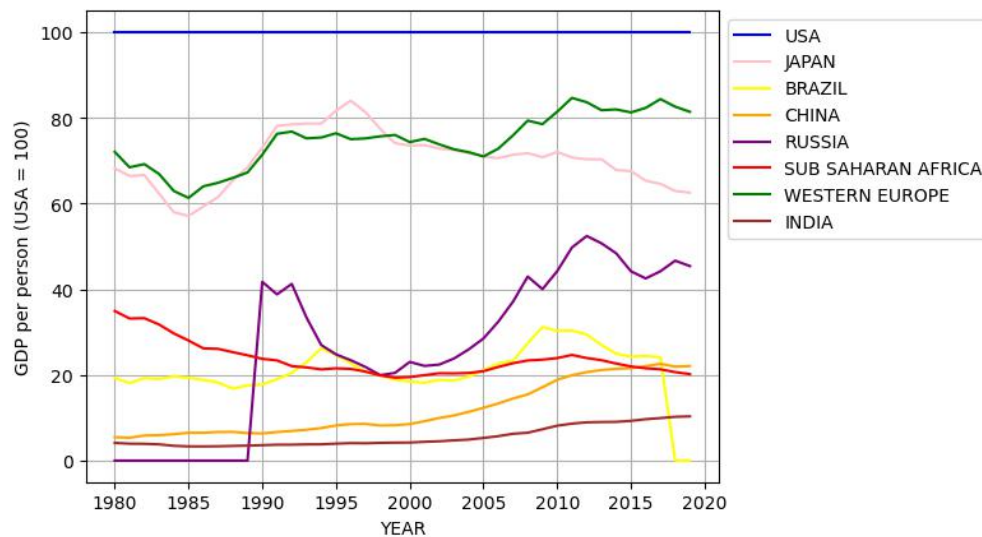

Figure 23: Japan peaked at an income relative to the United States of 85% in 1995 and then Since 1995, Japan has fallen back to around 75% of the US level. The rapid growth of China since 1980 and India since around 1990 are also evident in this figure. The contrast with sub-Saharan Africa is particularly striking, as that region as a whole falls from 7.5% of US income in 1980 to just 3.3% by 2000. Since 2000, many of the countries and regions shown in Fig. 23 exhibit catch-up to the United States
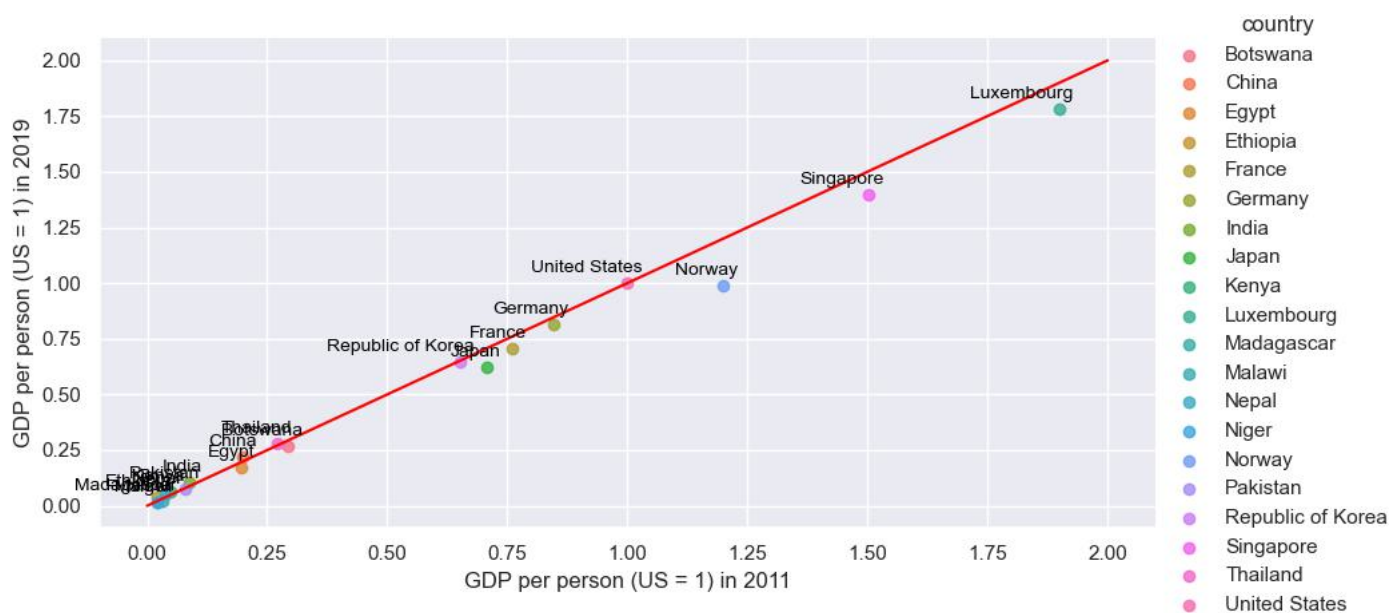
Figure 24: Fig shows GDP per person relative to the United States in 2011 and 2019.There are more middle-income countries above the 45-degree line than below.Countries in the middle of the distribution seemed more likely to move closer to the United States than to fall further behind. In contrast, for low income countries are on average more systematically below the 45-degree line rather than above.
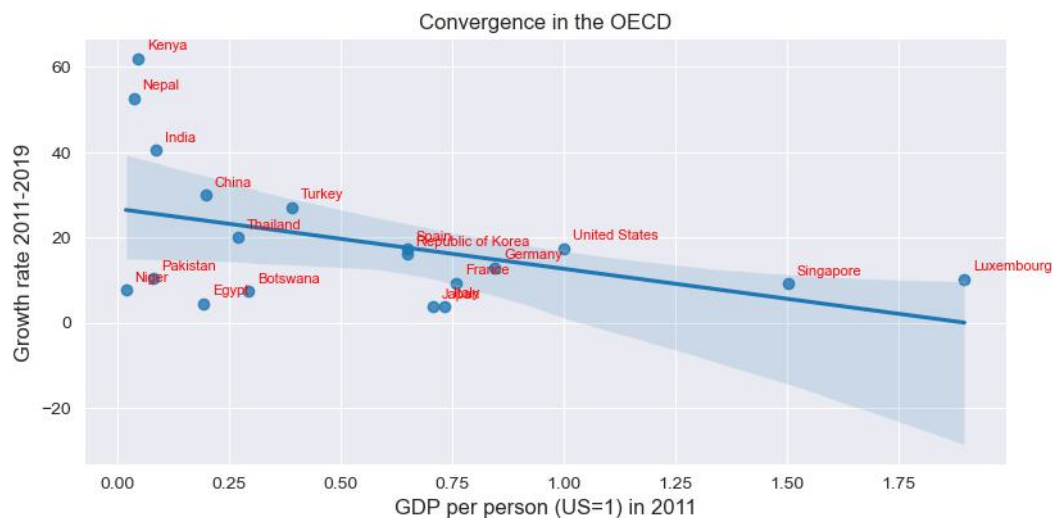

Figure 25: Figure 25 illustrates that the "catch-up" behaviour of OECD countries since 1960. Among OECD countries, those that were relatively poor in 1960—like Japan, Portugal, and Greece—grew rapidly, while those that were relatively rich in 1960—like Switzerland, Norway, and the United States—grew more slowly.
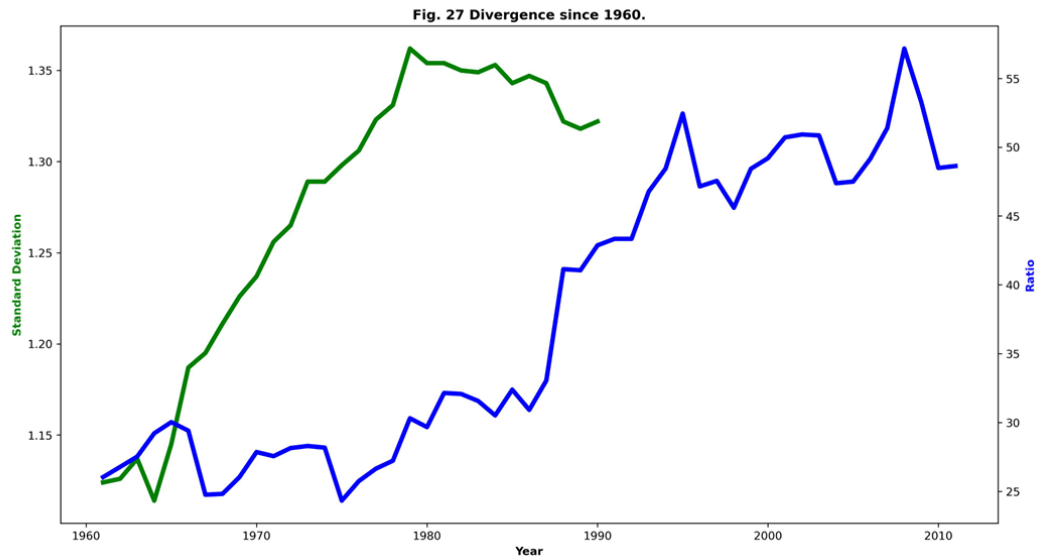
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Fig. 27 Divergence since 1960.

Figure 27: This graph depicts a time series of the cross-sectional standard devi ation of log GDP per person for this stable 100-country sample and it also shows the ratio of GDP per person between the 5th richest and 5th poorest countries in the sample.Both indicators highlight a widening global income disparity from 1960 to the late 1990s, with each country as a unit of analysis. However, in recent years, this trend appears to have leveled off, suggesting stabilization.
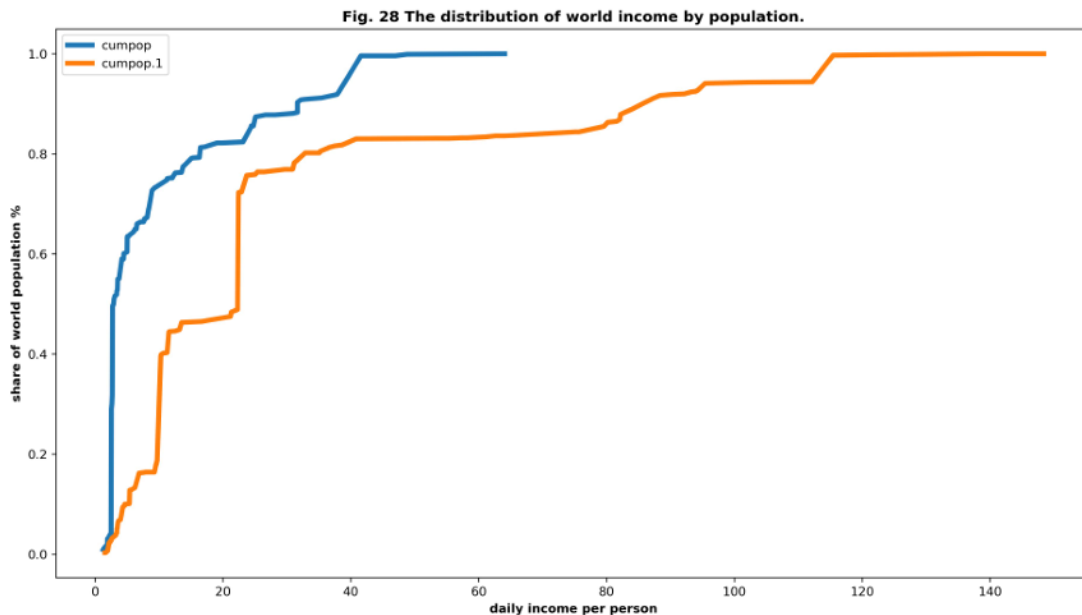

Fig. 28 The distribution of world income by population.

Figure 28: Analyzes individual-level data. In 1960, over half of the world's population lived on less than 3$ per day, but by 2011, less than 5% did. The transformation is mainly due to China and India, where average incomes rose significantly which highlights how economic growth has lifted many people out of poverty over the past 50 years.
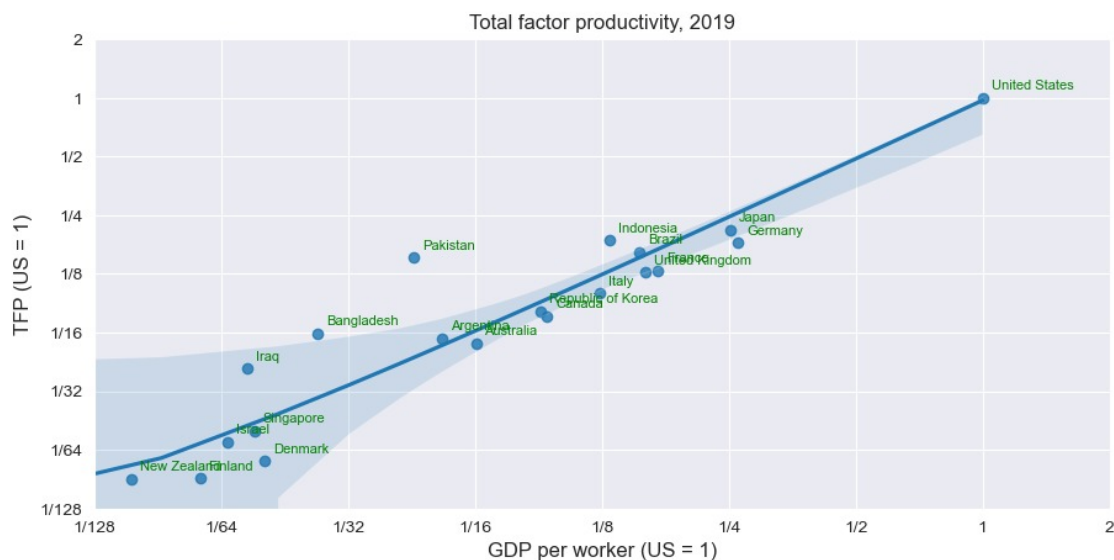
Figure 29: It highlights the levels of Total Factor Productivity (TFP) plotted against GDP per worker for 20 countries in 2010 highlight a strong correlation of 0.96. The two series are highly correlated. The differences in TFP across countries are substantial: the Central African Republic is about 64 times poorer than the United States, and its TFP is about 32 times lower than the US level.
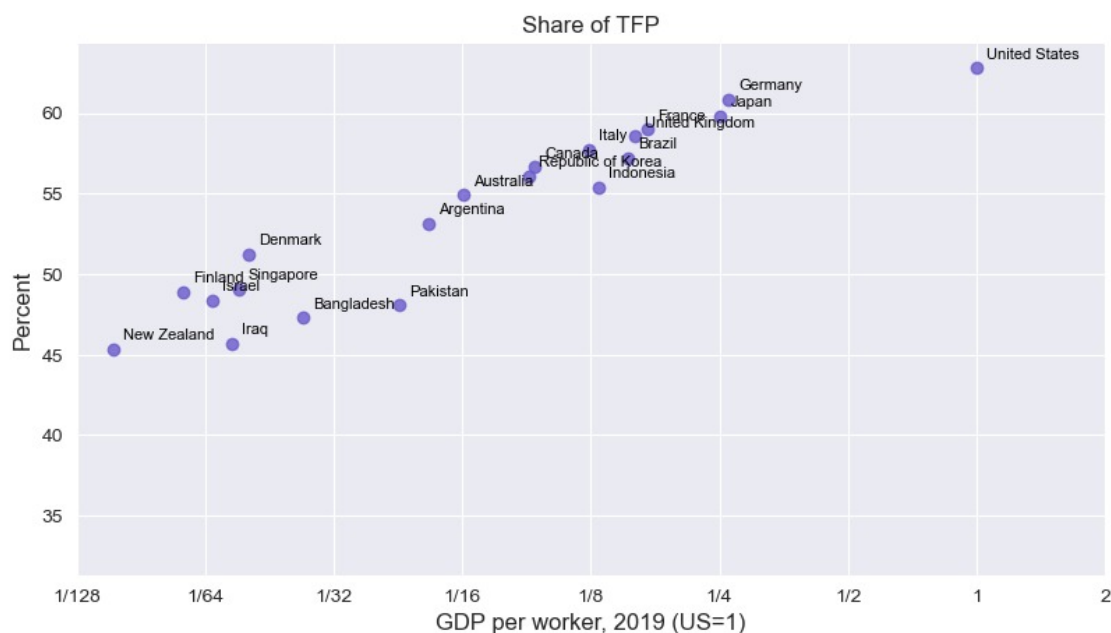

Figure 30: In the elegant portrayal of Figure 30, a systematic pattern unveils itself across all 20 countries. Within the realm of the world's most impoverished nations, well over 80% of the divergence in GDP per worker compared to the United States stems from disparities in Total Factor Productivity (TFP). As we traverse through the graph towards more affluent nations, the prominence of TFP gradually wanes. Finally, in the zenith of opulence represented by the richest countries, TFP contributes approximately 50% to the observed disparities.
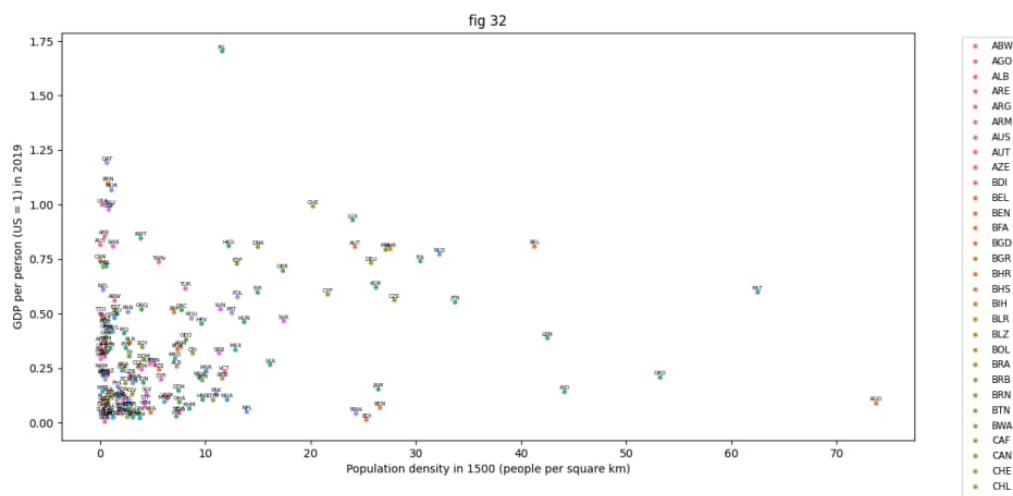
Figure 32: This figure tells that there is an inverse relation between population density in the 15th century and GDP per capita in 2019 at US=1.

Figure 33: Government's total revenue share has seen a steep rise whereas growth rate of GDP per person has been quite almost at the same level.
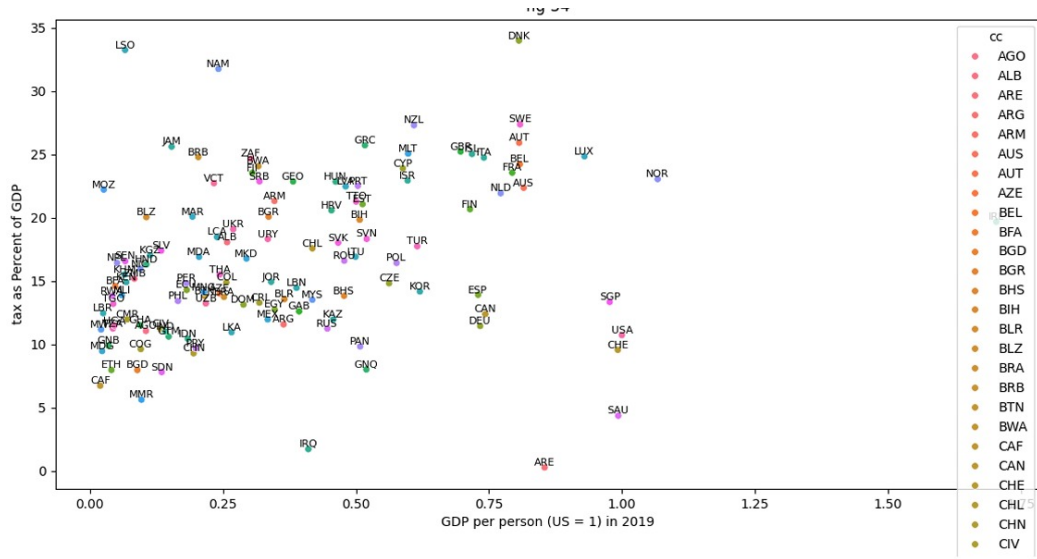
Figure 34: This figure shows the ratio between tas as percent of gdp and gdp per capita of various countries , using USA as a numeraire for the year 2019. Looking across countries globally, a surprising correlation emerges: tax revenues as a share of GDP are positively associated with economic success, not negatively. However, causality is complex. Tax revenue typically funds essential government services like education and healthcare. Alternatively, it could be that only wealthy nations can afford large governments.

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