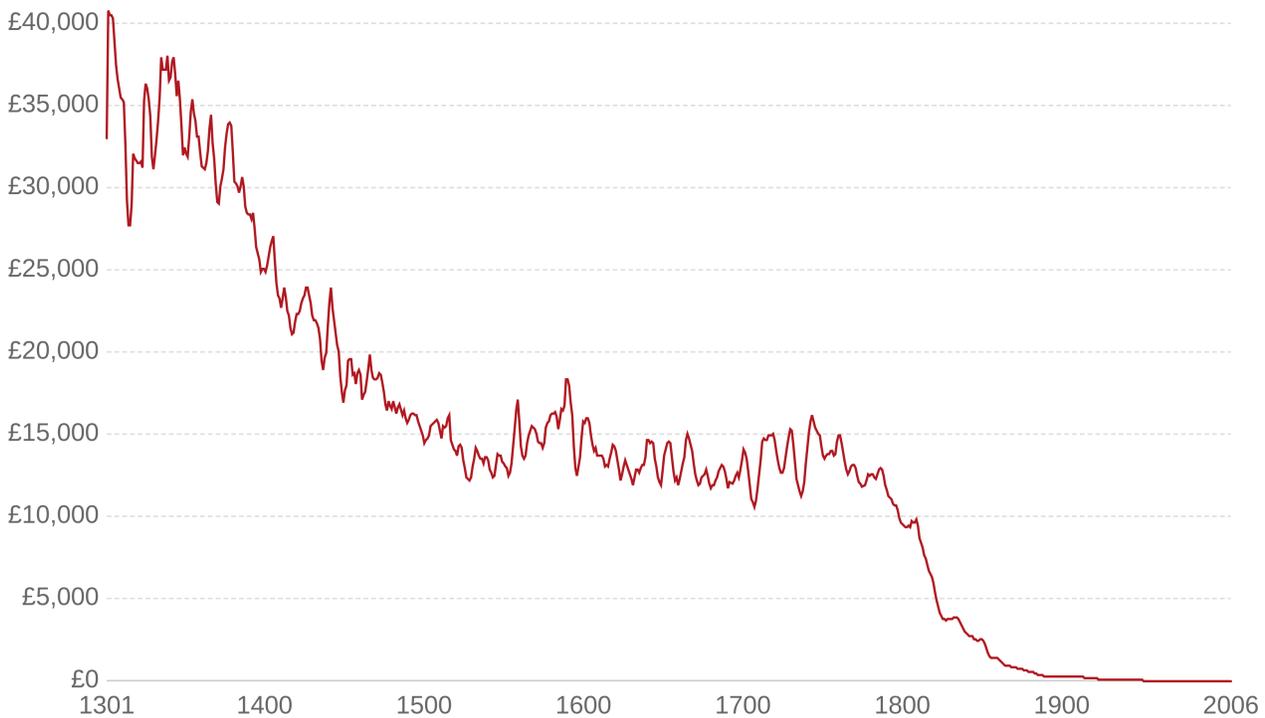


- **Question I:** What has happened to the value of human time over the past 1,000 years? Why?

See: <https://ourworldindata.org/>

### The Price for Lighting (per million lumen-hours) in the UK in British Pound

1 lumen hour is equal to the luminous energy emitted in 1 hour by a light source emitting a luminous flux of 1 lumen. For comparison: a standard 100W incandescent light bulb emits  $\pm 1700$  lumen.



Source: Fouquet and Pearson (2012)

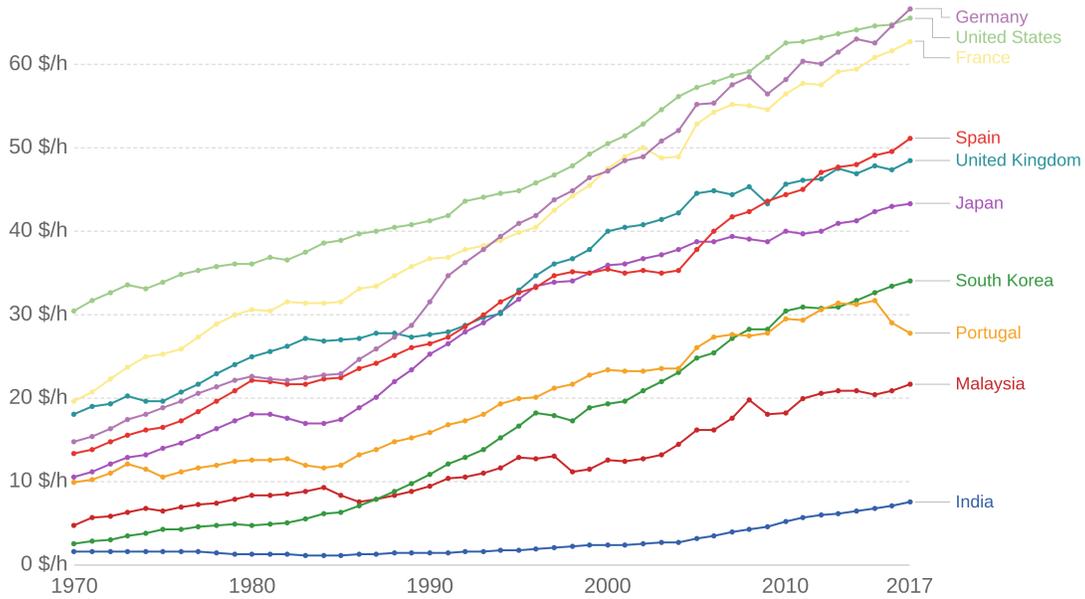
OurWorldInData.org/light/ • CC BY

Note: The price is adjusted for inflation and expressed in prices for the year 2000. Shown is a 5-year moving average.

## Productivity per hour worked

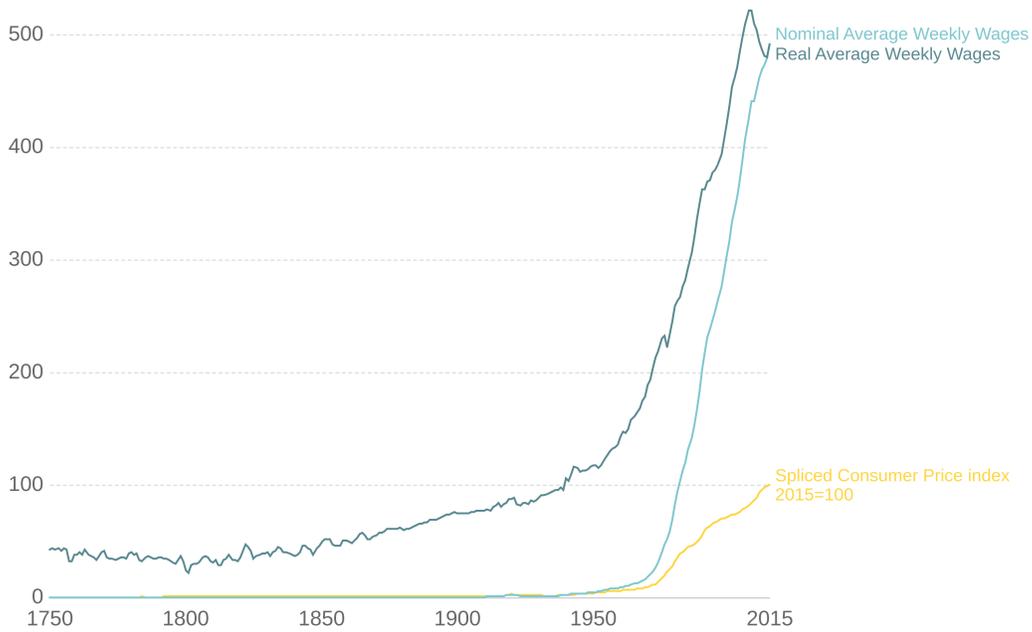
Labor productivity per hour is measured as gross domestic product (GDP) per hour of work. GDP is measured in international-\$, which means it is adjusted for price differences between countries (PPP adjustment) and for price changes over time (inflation)

Our World  
in Data



## Nominal wages, consumer prices, and real wages in the UK, United Kingdom

Our World  
in Data



Value of human time has risen. Real purchasing power in terms of goods and services has risen. Especially in the past 200 hundred years, with the industrial revolution and the growing utilization of energy across the world.

- **Question II:** The earth is finite. There is a fixed mass to earth. The supply of all materials in it is finite. How can we reconcile that with the claim that the only scarce resource is human time, or that resources are infinite.

Earth's diameter: 12,742km

The deepest hole in the deepest mine in the world: 3.84km

The deepest hole we have dug in earth is 0.03% of the earth's depth.

The availability of resources is not the limiting factor to the production of anything. In the same way that availability of stones on earth is not a limiting factor to the size of your house. The only limit is the amount of time we dedicate to utilizing that resource.

Julian Simon: "Because we As economists or as consumers we are interested, not in the resources themselves, but in the particular services that resources yield."

What we really value are not resources, but economic goods made out of resources. That's what requires time, and that's what's scarce. That is the only scarcity that matters. The raw material is everywhere around us, but the time to produce economic goods from it is scarce.

Julian Simon: "It is all-important to recognize that discoveries of improved methods and of substitute products are not just luck. They happen in response to an increase in scarcity—a rise in cost. Even after a discovery is made, there is a good chance that it will not be put into operation until there is need for it due to rising cost. This is important: **Scarcity and technological advance are not two unrelated competitors in a Malthusian race; rather, each influences the other.**"

As consumption of oil increases, production increases, and proven reserves increase as well.

- **Question III:** I had not come across Julian Simon's arguments before reading The Bitcoin Standard. In your opinion why are his arguments about natural resource scarcity not more widely known and accepted? What are the best counterarguments to his position?
- **Question IV:** Prices of helium keep going up because helium is running out. Supposedly at this rate of usage we'll run out of helium in 10 years. I wonder if this resource will differ economically from all those metals since it's a gas.

<https://www.popularmechanics.com/science/health/a4046/why-is-there-a-helium-shortage-10031229/>

