

Social Infrastructure

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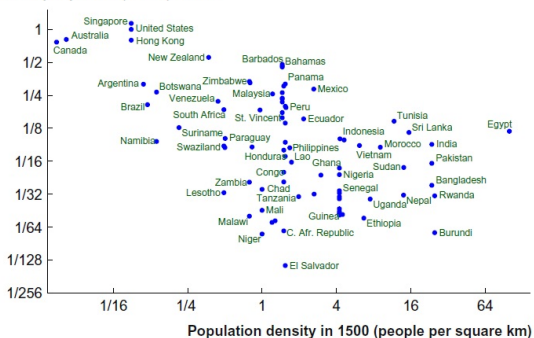
Crecimiento Económico / Growth Theory

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- Saving rates and investment in skills are key determinants of long run output per worker.
- Our models take these parameters as exogenous.
- Here we will discuss which institutions may lead to more favorable investment environments.

Is it all pre-determined?

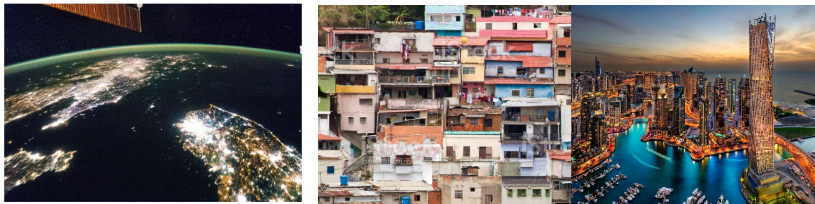
GDP per person (US = 1) in 2011



Source: [Acemoglu et al. \(2002\)](#)

You may be inclined to think that geography and culture explain a lot. However, the wealth of nations changes drastically over time.

Is it all pre-determined? II



Left: picture at night from South and North Korea. Right: a slum in Caracas and the skyline of Dubai.

Moreover, in statistical analysis, culture and geography cannot explain major differences. Instead similar situated countries have very different income per person levels, i.e., institutions matter.

An analytical framework

An investment problem

Households will be willing to save until the marginal product of capital, its benefit, is equal to its costs, F_K :

$$MPK - \delta = F_K. \quad (1)$$

Similarly, households will be willing to invest into skills until the marginal product of human capital is equal to its costs:

$$MPH = F_H. \quad (2)$$

The costs of physical investment

Governments impose a variety of costs when firms engage in new investment:

- Permits needed to start the business.
- Bribes needed to receive permissions.
- The quality of capital markets determine the costs of loaning funds.

The World Bank's [doing business indicator](#) measures for different countries the costs of setting up a medium size firm, and the time it takes to receive all permits.

The benefits of physical investment

Returns will be high when

- business income taxes are low.
- labor cannot extract large rents or influence corporate policy.
- extortion by criminal organizations is minimal.
- markets are large. This may include export markets, i.e., the openness of an economy.

The costs of human capital investment

The quality and costs of the education system can be thought of a form of cost into investing into skills:

- In the U.S. a Bachelor degree costs often more than 30,000 Dollar. Attending business, law, or medical school more than 100,000. In Europe, university education is almost free.
- In many developing countries, schooling has a very low quality and even after finishing compulsory schooling, students cannot read or write.

The benefits of human capital investment

The main benefit from human capital investment are the returns:

- The average physician in the U.S. earns \$316,000, \$57,000 in Spain, and \$12,000 in Mexico.
- Taxes on high-income people vary substantially across countries.

The role of courts

- Crucial for business investments is a functioning legal system.
- A good legal system provides clarity about rights to reduce disputes between parties. Firms will only engage with providers of goods and services when each side's obligations are well defined and contracts are enforceable.
- While laws are usually passed by legislators, and regulations are promulgated by the executive, it is up to courts to interpret these laws and regulations in case of any controversies between parties.
- This includes controversies between private parties and the government, e.g., eminent domain, making the impartiality of courts important.
- The idea of well-defined and enforceable laws is sometimes called the rule of law.

Interpretation by courts

Without proper judicial enforcement, laws are just empty words. An example from the North Korean constitution:

Citizens have the freedom of speech, the press, assembly, demonstration and association (Article 67), freedom of religious belief (Article 68), right to submit complaints and petitions (Article 69), right to work (Article 70), right to relaxation (Article 71), right to free medical care (Article 72), right to free education (Article 73), freedom in scientific, literary and artistic pursuits (Article 74), **freedom of residence and travel** (Article 75) and inviolability of the person and home and privacy of correspondence (Article 79).

What gives us proper judicial enforcement? Avoiding the concentration of power through the [structure](#) of the constitution.

Interpretation by courts II

Laws are often vague and require judgment giving courts an important role in shaping institutions:

- In many European countries, dismissal is only possible (absent misbehavior) when the company has a *justified* business reason. These words, however, mean something very different in German and Italian courts.
- An example from the U.S.: Do service advisers receive overtime payments ([Encino Motorcars, LLC v. Navarro](#)):
“The FLSA exempts from the overtime-pay requirement any salesman, partsman, or mechanic primarily engaged in selling or servicing automobiles”

Even when the law is clearly established, it is of little use when rights cannot be rectified because processes take too long:

- In Spain, the median duration of a civil case is in excess of 3 years.
- In Italy, the median duration is even 8 years.
- A firm may decide not to provide credit to one of its customers as it becomes almost impossible to enforce the payment.

Irreversibility of investment

One aspect of these investment decisions that is crucial is that they are often irreversible

- Once a factory is build, it is difficult to move it to another place.
- Once people learn computer coding, the government outlawing computers will make these skills obsolete.
- Hence, private parties will only undertake them when they expect governments not to change course and extract the benefits in the future. Extreme examples are revolutions but also electoral changes in democratic governments can have these effects.

Social infrastructure and economic outcomes

Measuring social infrastructure

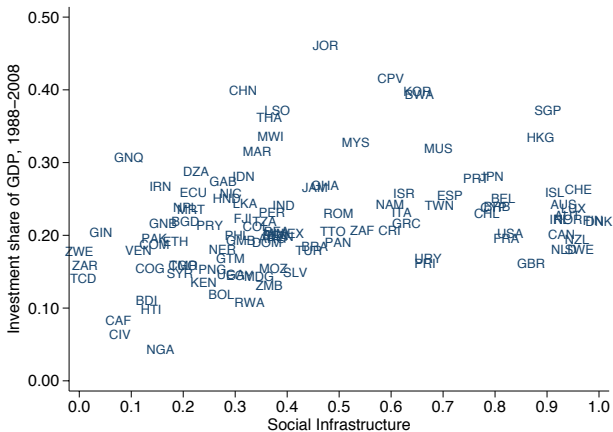
Measuring these different aspects of the social infrastructure is difficult, and one has to decide how to weigh each component. The World Bank's [Governance indicator project](#) provides indexes of

- Accountability of politicians
- Political stability
- Government effectiveness
- Regulatory quality
- Rule of law
- Control of corruption

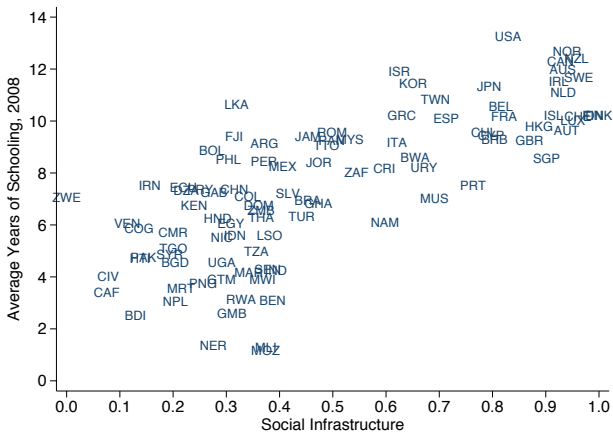
and we will take a simple average of these.

Social infrastructure is positively related to...

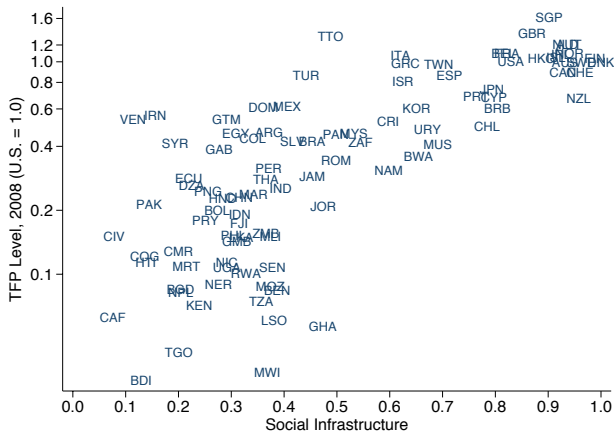
investment rates



Social infrastructure is positively related to... education



Social infrastructure is positively related to... productivity



Can we establish causality?

A question of causality

These are just correlations, and we might suffer from reverse causality: Countries with a higher savings rate are richer and can afford to invest more into a social infrastructure.

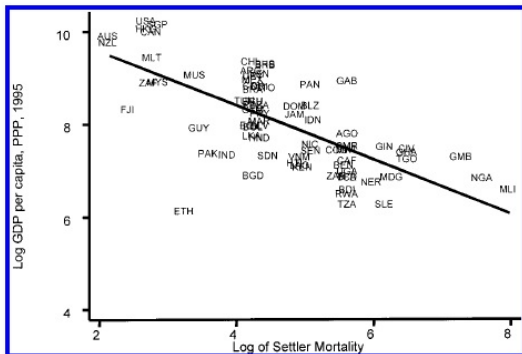
To tell in which direction causality flows, we need exogenous variation in the data.

Why countries have different social infrastructures?

Acemoglu et al. (2001) use the probability of sickness for European colonization:

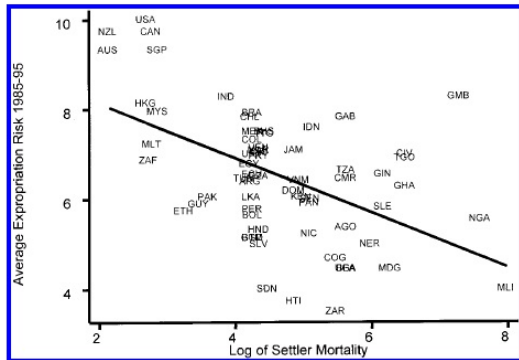
- In regions where settling was difficult because of sickness, Europeans created extractive states.
- In regions where sickness was less an issue, Europeans settled and brought institutions from Europe with them.
- These institutional differences persist until today! (minute 21)

Settler mortality correlates with income differences today



Source: Acemoglu et al. (2001)

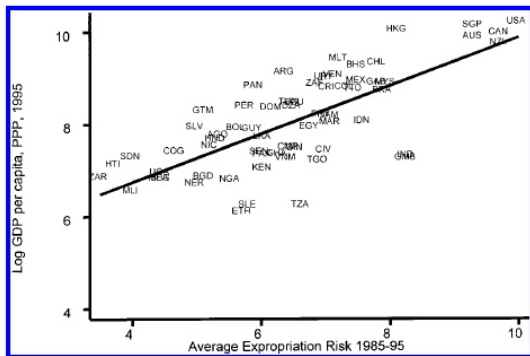
A two-stage identification: Settler mortality predicts institutions today



Source: Acemoglu et al. (2001)

A two-stage identification:

Institutions today predict income differences today



Source: [Acemoglu et al. \(2001\)](#)

The persistence of extractive institutions

At the heart of [Acemoglu et al. \(2001\)](#) is the idea that institutions leading to diversion of resources to the elite are very persistent. This observation was also made by [North \(1981\)](#), another [Nobel price winner](#):

“From the redistributive societies of ancient Egypt dynasties throughout the slavery systems of the Greek and Roman world to the medieval manor, there was a persistent tension between the ownership structure which maximized the rents to the ruler (and his group) and an efficient system that reduced transaction costs and encouraged economic growth.”

Why do extractive institutions persist?

Extractive institutions leave large potential rents on the table, and economics would suggest two solutions to such a problem:

- 1 The ruling elite takes a smaller slice of a greater pie and is still better off.
- 2 The ruled pay-off the elite to step aside and make place for better institutions.

Why do extractive institutions persist? II

Robinson and Acemoglu (2012) identify limited commitment as the core problem:

- 1 The ruling elite cannot commit to take a smaller slice of the pie once people have done the investments.
- 2 The ruled cannot commit to pay the elite once it has stepped down from power.

Are institutions everything?

- Economists are convinced that good institutions matter.
- It is, however, hard to quantify how much of cross-sectional differences in income per person are due to institutions.
- Countries with similar institutions still make very different **policy choices** that matter for outcomes.

Misallocation of factor inputs

So far, we have focused on aggregate investment rates. [Hsieh and Klenow \(2009\)](#) show that the allocation of the aggregate capital stock also matters. The idea is:

- In an economy where all firms face the same frictions, firms should employ capital and labor until marginal products are equalized across firms.
- More productive firms will be bigger but the marginal worker (unit of capital) is just as productive as in a less productive firm.
- If this is not the case, aggregate output can be increased by reallocating the factors of production.

Measuring misallocation

To measure misallocation, consider the following firm problem:

$$\max \left\{ \pi_i = P_i z_i K_i^\alpha L_i^{1-\alpha} - r(1 + \tau_i^K) K_i - w(1 + \tau_i^L) L_i \right\}, \quad (3)$$

where r is the aggregate interest rate, and w is the aggregate wage rate. τ_i are firm-specific price distortions. The optimal capital choice is:

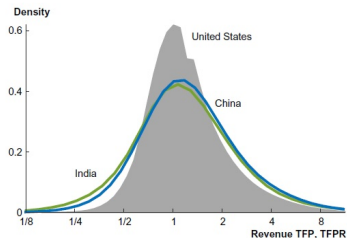
$$\alpha P_i z_i K_i^{\alpha-1} L_i^{1-\alpha} = r(1 + \tau_i^K) \quad (4)$$

$$\alpha P_i Y_i = r(1 + \tau_i^K) K_i \quad (5)$$

$$\frac{rK_i}{P_i Y_i} = \frac{\alpha}{(1 + \tau_i^K)}. \quad (6)$$

And analogously for labor. The left-hand-side can be measured in balance-sheet data, and within narrow industries we would expect that α is constant. Hence, differences across firms must come from τ_i^K .

Misallocation in the U.S., China, and India



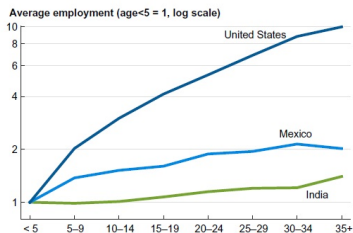
- Even in the U.S., we measure significant factor misallocation. This may be due to measurement error or true frictions.
- Misallocation is much larger in China and India. Reducing the level to the U.S. level would increase output in China and India by 40 and 50%, respectively.
- [Bartelsman et al. \(2013\)](#) show that the correlation between size and productivity is also lower in Europe.

A story behind misallocation

In China, we have good anecdotal evidence for forces behind misallocation:

- Firms owned by the state face cheaper input factors than privately owned firms.
- Even among privately owned firms, fortunes depend heavily on how well one is connected to the local and federal government.

A story behind misallocation II



In follow-up work, [Hsieh and Klenow \(2014\)](#) show that plant's life cycle is an important contributor to less allocation of resources to the most productive plants. The idea is that in countries like Mexico and India, regulatory costs increase in plant size leading to productive plants choosing to stay smaller.

A story behind misallocation III

Hsieh et al. (2019) find that reducing talent misallocation in the U.S. from the 1960s level contributed 20 to 40% of output growth in the U.S.:

- The talents of women were mostly wasted in the 1960s.
- The talents of minorities were mostly wasted in the 1960s.
- In 1960, 94 percent of doctors and lawyers were white men. By 2010, the fraction was just 62 percent.

What have we learned for developing countries

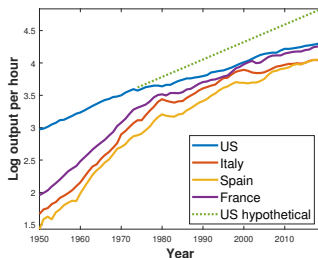
- Institutions promoting property rights and avoiding extraction from elites are important.
- In the 1990s, the Washington Consensus emerged leading the World Bank to push for protecting property rights, limited government, and free market reforms. This has been a very controversial approach.
- **Nobel winning** economist Micheal Spence surveyed the 13 biggest successes over the last decades and finds some common **denominators**:
 - Openness to trade that leads to technological adoption.
 - High savings rates.
 - Governments investing large shares of spending in infrastructure and education.
- **Just spending** on education is not enough, students actually need to learn **something**.

What have we learned for developing countries II

- **Good financial** institutions are needed to reduce misallocation.
- We have some evidence that a growth model like China has limits due to factor misallocation.
- The Chinese political system may suggest that autocratic regimes are more successful than democratic institutions to get growth starting, yet, there are many **counter examples**.
- **Foreign aid** is not particularly effective. One issue is that conditional aid is not working very well.

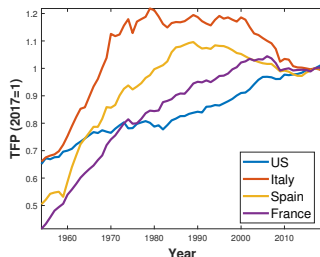
The growth slowdown

The growth slowdown in the 1970s



- In the developed world, output per hour started slow down in the 1970s.
- In the US, output per hour would be 40% higher if the old growth trajectory was intact.
- The slowdown was particularly strong in European countries. Italy today is not significantly richer than 20 years ago!

The problem is slower TFP growth

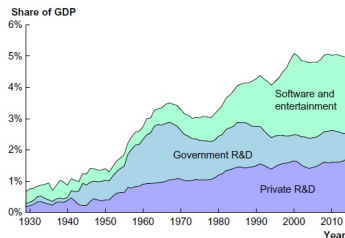


- In all countries, TFP growth slowed down.
- In many European countries, TFP today is lower than in 2000.
- The development is particularly poor in southern Europe.

Is it all mismeasurement?

- As discussed at the beginning of the course, GDP is a measure designed to measure physical output. Measuring service output is much more difficult and the economy has shifted to services.
- For example, the internet 2.0 is mostly missing from GDP though people appear to value it highly.
- In the 1960s and 1970s, the average U.S. household acquired a dish washer, a laundry machine, and a car.
- During the 2000s and 2010s, the average U.S. household acquired a cell phone.
- **We were promised flying cars** and all we got is 140 characters.

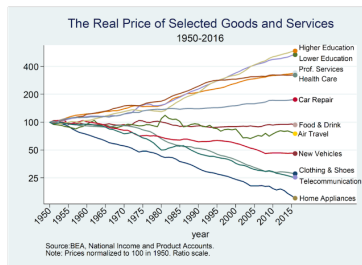
The changing nature of research



Source: Jones (2016)

- Overall spending on research as share of GDP is increasing over time.
- Government spending as a share of GDP had its height in the 1960s with the space program.
- Recent growth comes mostly from computer codes and entertainment.
- Some economists argue that government R&D may have more favorable spillover effects as it is more fundamental.

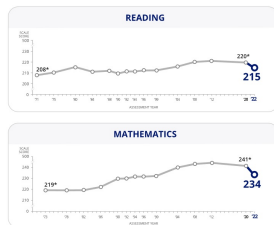
Sectorial shifts



Source: Marginal Revolution

- Our consumption has shifted over time away from manufacturing goods and towards services.
- [Jorgenson and Stiroh \(2000\)](#) shows that manufacturing industries have on average higher productivity growth.
- Government enterprises has the worst productivity growth yet, for example, health and education are rapidly increasing in [importance](#).

Problems with improving education



Source: National Center for Education Statistics

- Many new technologies complement high-skilled labor and substitute low-skilled labor (automation).
- K-12 education spending per pupil has increased in real terms by 280 percent since 1960.
- However, standardized test scores have changed little over time.

Institutions may have become worse

- Approving the largest wind farm in the U.S. took **18 years**. In part, due to **long environmental impact evaluations**.
- Building a high-speed rail in California began in 2015 and was projected to finish in 2028. In 2021, the projection moved to 2033.

Now compare this to...

Institutions may have become worse II

- The Apollo Program took 6 years to send humans to the moon.
- The Hoover Dam was build in 5 years. 96 workers died during construction.

Institutions may have become worse III

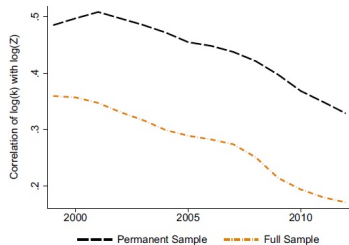
The Manhattan Project build the atomic bomb in 2 years:

- 1945, *Little Boy* with 12-18 kt of TNT.
- 1945, *Fat Man* with 18-23 kt of TNT.
- 1951, *George* with 225 kt of TNT.
- 1952, *Ivy Mike* with 10400 kt of TNT.
- 1954, *Castle bravo* with 15000 kt of TNT.
- 1961, *Tsar Bomba* with 50000 kt of TNT.

Why has it become more difficult to get things done?

- The regulation of the economy is constantly **growing** over time driven by **vested interests**.
- As society has become richer, we may value security more making us more **complacent**.
- Today's society may value more consensus instead of **individual success**.

A story behind misallocation IV



Gopinath et al. (2017) find that Spanish (and southern European) capital allocations has worsened after the introduction of the Euro. The latter decreased real interest rates leading to capital inflows. The financial system channeled too much of the additional capital to relatively inefficient firms.

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