# Lecture 8: Leontief Paradox [1]

Debasmita Das

Purdue University

Summer 2018

[1] Reference: Feenstra and Taylor, International Economics, 2008

# Testing the Heckscher-Ohlin Theorem:

- The first test of the HO theorem was performed by Wassily Leontief in 1953
- Leontief used the 1947 data for the United States
- He measured the amount of K and L required to produce $1 million worth of U. S. exports and $1 million worth of U. S. imports

Figure: Leontief's Test

| Amount of capital and labor needed to produce $1 million worth of goods | | |
|---|---|---|
| | Exports | Imports |
| Capital($ millions) | 2.55 | 3.1 |
| Labor (person-years) | 182 | 170 |
| Capital/labor ($/person) | 14000 | 18200 |

# What Leontief Found:

1. The US is believed to be **K - abundant** in 1947
2. HO theorem predicts:
   the US would export K-intensive goods and import L-intensive goods
3. However, Leontief found:
   K/L in export production ($14,000 per worker) $<$ K/L in imports production ($18,200 per worker)
4. the U.S. imports were K-intensive and U. S. exports were L-intensive.

# Explanations to Leontief Paradox

1. U.S. and foreign technologies are not the same, in contrast to what H-O model and Leontief assumes.
2. Leontief ignored other factors of production, such as land, in which the United States may have been abundant.
3. Data from 1947 can be unusual since WWII just ended in 1945
4. Leontief did not distinguished between skilled and unskilled labor- maybe U.S. export is intensive in skilled labor
5. In 1947, the US was not completely open trade.

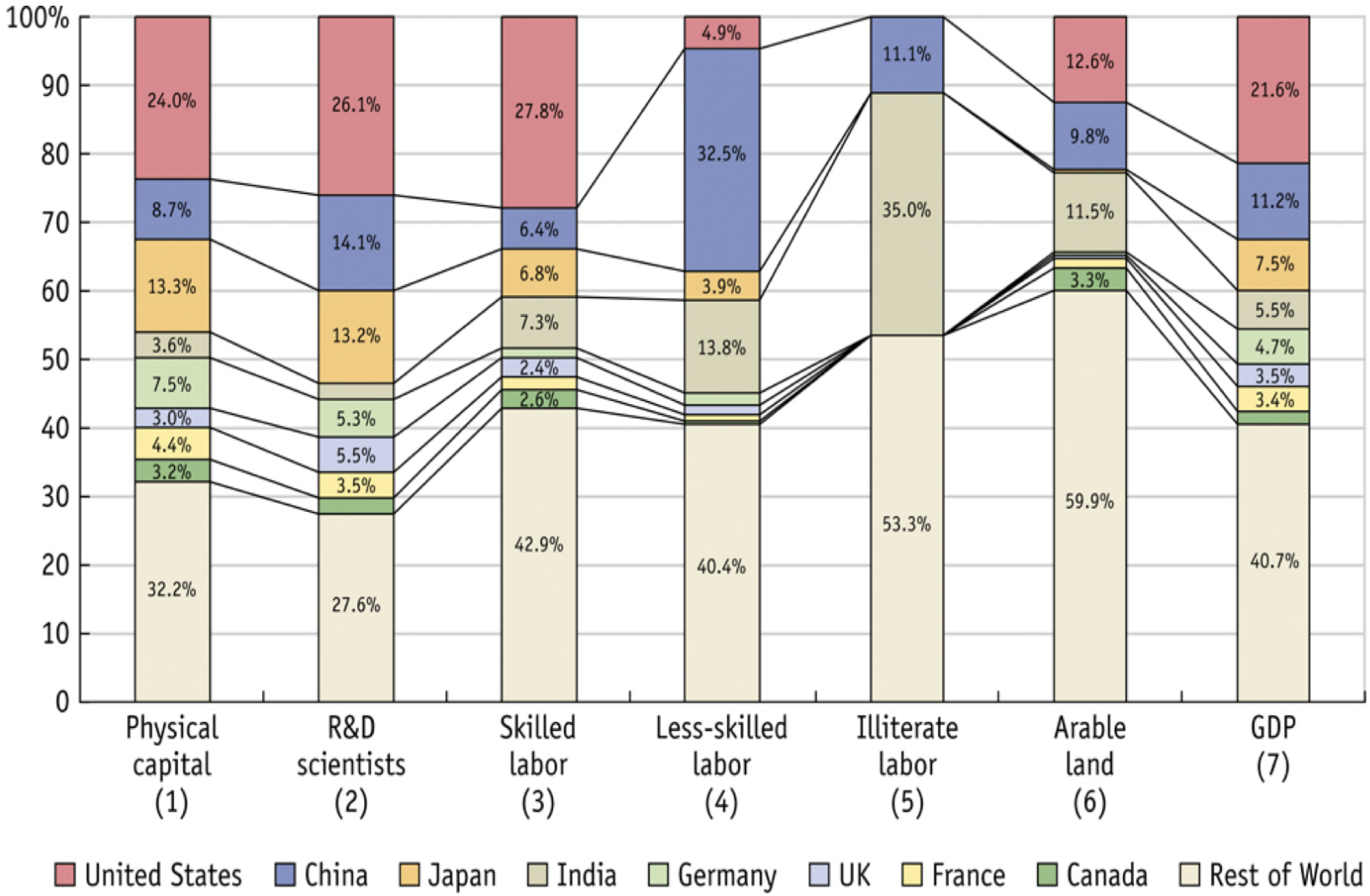
### Redefine Factor Abundance

1. **Factor abundance** is given by the country's share of that factor as compared with its share of the world
2. A country is **abundant** in a factor if :
   the country's share of that factor $>$ share of world GDP
3. A country is **scarce** in a factor if :
   the country's share of that factor $<$ share of world GDP

**NOTE:** Country abundance in a factor does not necessarily mean it has a larger volume of that factor!

# Redefine Factor Abundance

Figure: Country Factor Endowments: 2000



# Redefine Factor Abundance

For the US:

1. share of a physical K (17.1 %) $<$ share of world GDP (19.1 %)
   $\Longrightarrow$ The US is Physical K abundant
2. Find out the same for other factors

Also, find out the same for other countries.
Check!

1. United States is actually scarce in arable land!
2. China is actually abundant in RD scientists
3. India is abundant in less-skilled labor.

# Different Productivities across Countries

We are now relaxing the assumption of identical technologies across nations.

1. Recall that Leontief Found:
   The US was exporting L-int goods even though it was K-abundant country at that time.
2. One explanation: L was highly productive in the US compared to the rest of the world
   $\Longrightarrow$ **Effective L force** in the US was much larger compared to the rest of the world

# Effective Factor Endowment

## Measuring Factor Abundance Once Again

1. Effective Factor Endowment = Actual factor endowment * Factor productivity
2. Effective Labor Force = Actual L Force * Productivity of that L force
3. Effective Arable Land = Actual Arable Land * Productivity in Agriculture
4. Effective RD Scientists = Actual count of RD Scientists * RD spending per scientist

**Note:** We are now making corrections by accounting for the factor's differing productivity across countries.

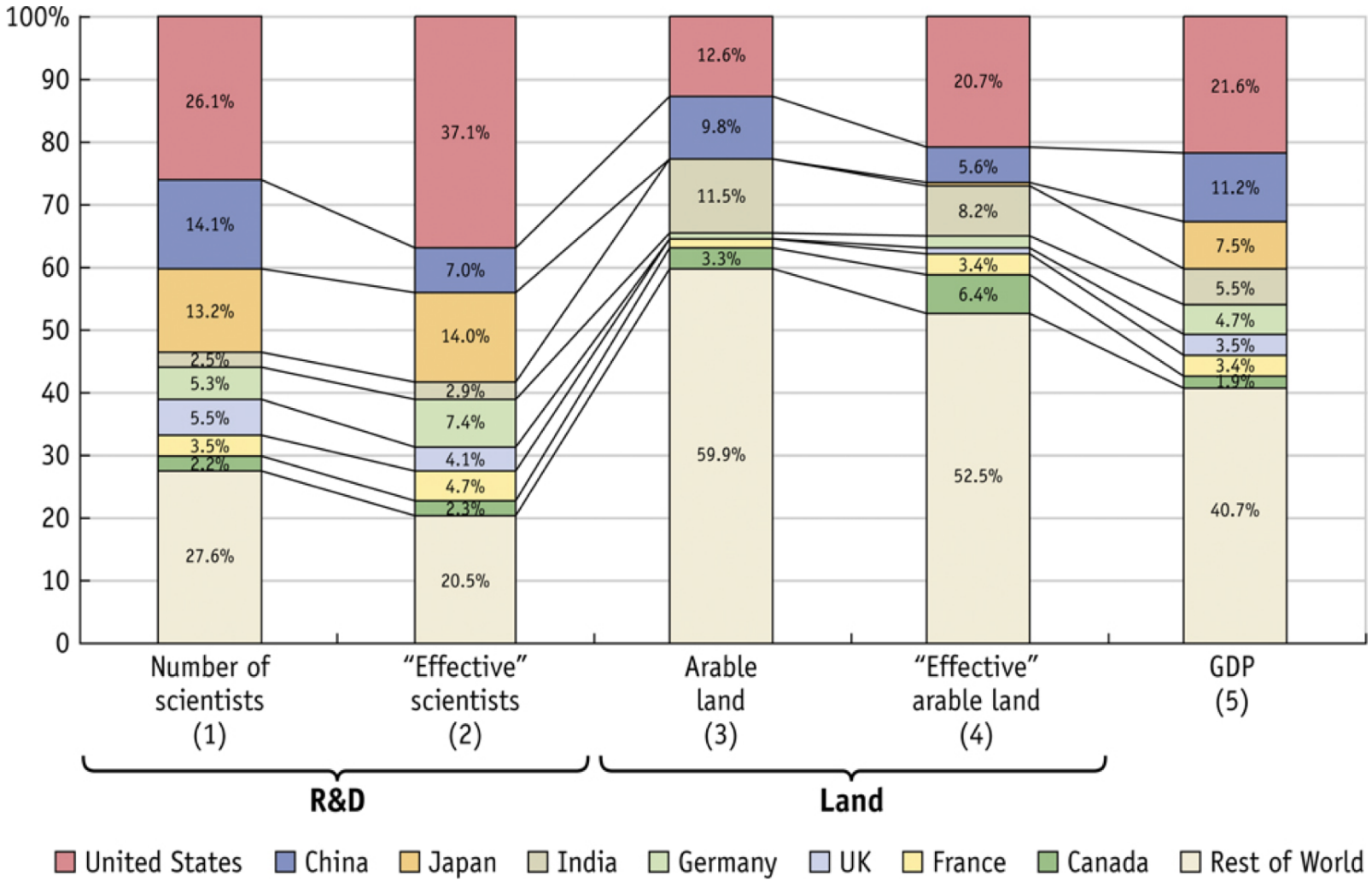
## Effective Factor Endowment

To measure whether a country is abundant in that effective factor or scarce in that effective factor:
we now compare its share of the effective factor endowment with its share of world GDP.

1. A country is **abundant in a effective factor** if :
   the country's share of that effective factor $>$ share of world GDP
2. A country is **scarce in a effective factor** if :
   the country's share of that effective factor $<$ share of world GDP

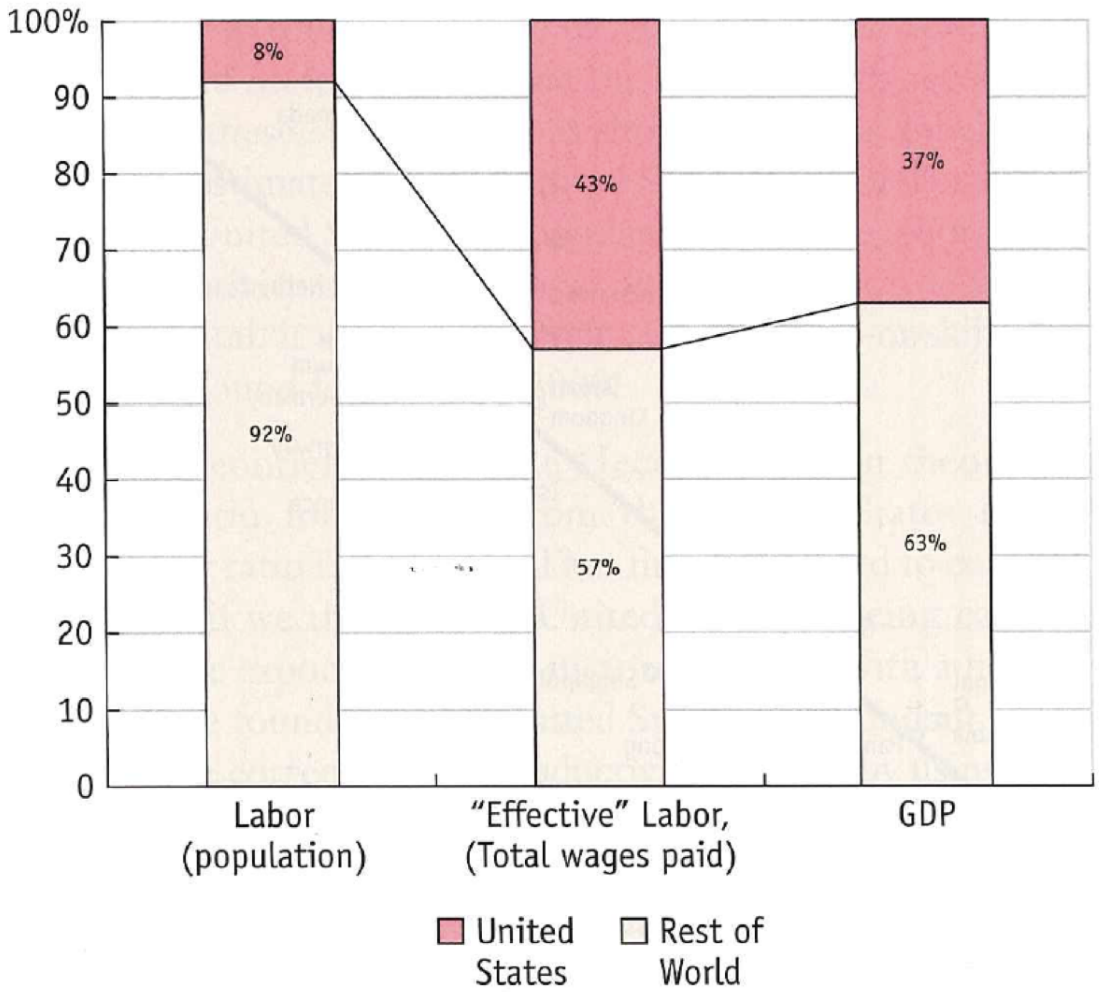
# Effective Factor Abundance

Figure: Effective Factor Endowments: 2000



# Reexamine Leontief's Paradox

Figure: Effective L Endowments: 1947



# Main Take Away Point

1. Once we take into account the differences in productivity of factors across countries, there is no paradox afterall, at least in the data for 1947!