

Lecture 4b:

Factor content of trade

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C181 – International Trade

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2- Heckscher-Ohlin Model in the data

(Continuation of chapter 4)

HO model in the data?

- Leontief paradox
 - When is a factor “abundant” or “scarce” when there are many countries and many factors?
 - Do countries export in industries that are intensive the factors that are abundant in these countries?
- Testable extensions of H-O model and “sign test”:
“**Heckscher-Ohlin-Vanek** Model”

2- Heckscher-Ohlin Model in the data

How to test the HO model?

Leontief (1953) computes the labor and capital requirements (based on US data) corresponding to US trade in 1947:

Exports:

Capital: \$2.5M Labor: 182
→ Capital / labor ratio of **\$13,900**

Imports:

Capital: \$3.1M Labor: 170
→ Capital / labor ratio of **\$18,200**

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Leontief Paradox

Leontief (1953):

Finds that US exports are less Capital-intensive than US imports?

How to explain that?

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Clicker question

What explains Leontief Paradox? Your guess:

- a) US and foreign technologies are not the same
(Different productivities of labor)
- b) Only Capital and Labor / Land is ignored
And Labor should be disaggregated by skills
- c) Unusual data for 1947 (end of war/trade balance?)
- d) No free trade, large transport costs
- e) We should examine bilateral trade flows rather than
multilateral trade

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Criticisms to Leontief Paradox:

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Criticisms to Leontief Paradox:

- All of these are valid concerns
- Leamer (1980) later found that 1947 data are too unbalanced (end of war) and explain weird results
→ **answer c) in clicker question**
- Trefler (1993) pointed out again that puzzle still remains if we conduct other tests
- Differences in Technology are the main culprit:
→ **answer a) in clicker question**

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How to determine whether a country is abundant in Capital or Labor?

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How to determine whether a country is abundant in Capital or Labor?

- With just two countries:

Home country is abundant in K if $K/L > K^*/L^*$

- How to generalize with more than two countries?

Compare the share of capital in the country (relative to K in the world) to the share s_c of GDP relative the world.

- If its share of a factor exceeds (resp. not **exceeds**) its share of world GDP, then we say that the country is ***“abundant in that factor”*** (resp. **“scarce”**)

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“Factor content” of trade

- To examine the predictions of the HO model, we usually examine the “net factor content of trade”
- Idea: When Home exports computers and imports shoes, it's *as if* Home exports capital and imports labor.

Definition:

The **net factor content of trade** for a factor (K, L) equals how much of that factor has been used to produce exports minus how much has been used to produce imports.

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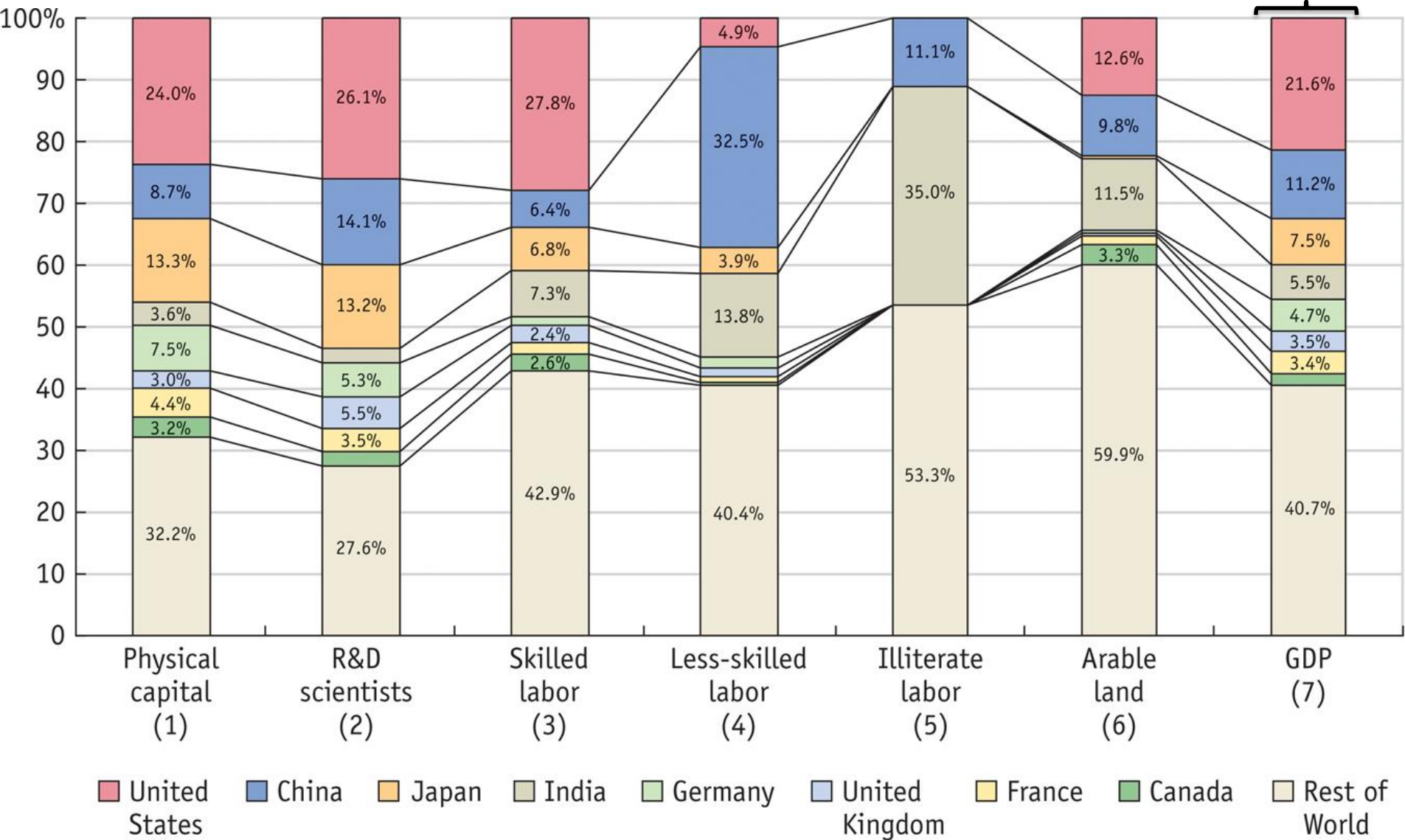
HO Model prediction (a.k.a. “**Sign Test**”):

Theorem:

If a country’s share of a factor exceeds its share of world GDP, i.e. if it is “**abundant in that factor**”, then the net content of trade in that factor should be positive.

- **Example:** if a country has 10% world GDP and more than 10% of world labor, it is abundant in labor.
- In that case, it should have a “**positive net labor content of trade**”: the amount of labor used to produce exports should exceed the amount of labor used by other countries to produce its imports.

Factor Endowment shares, 2000



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Empirical test:

Results of the sign test

(from Bowen, Leamer and Sveikauskas 87, Trefler 93)

Q: when a country is abundant in a factor (e.g. K,L), does it have a positive net content of trade in that factor?

In the data:

The sign test is verified in **50% of the cases**

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Results of the sign test

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In the data:

The sign test is verified in **50% of the cases**

→ Not better than a coin toss!!!!

2- Heckscher-Ohlin Model in the data

Differing Productivities across Countries

Back to Leontief paradox:

- One explanation would be that labor is highly productive in the United States and less productive in the rest of the world.

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Differing Productivities across Countries

Measuring Factor Abundance Once Again

To allow for differences in productivity, we define:

$$\text{Effective factor endowment} = \text{Actual factor endowment} \cdot \text{Factor productivity}$$

2- Heckscher-Ohlin Model in the data

Differing Productivities across Countries

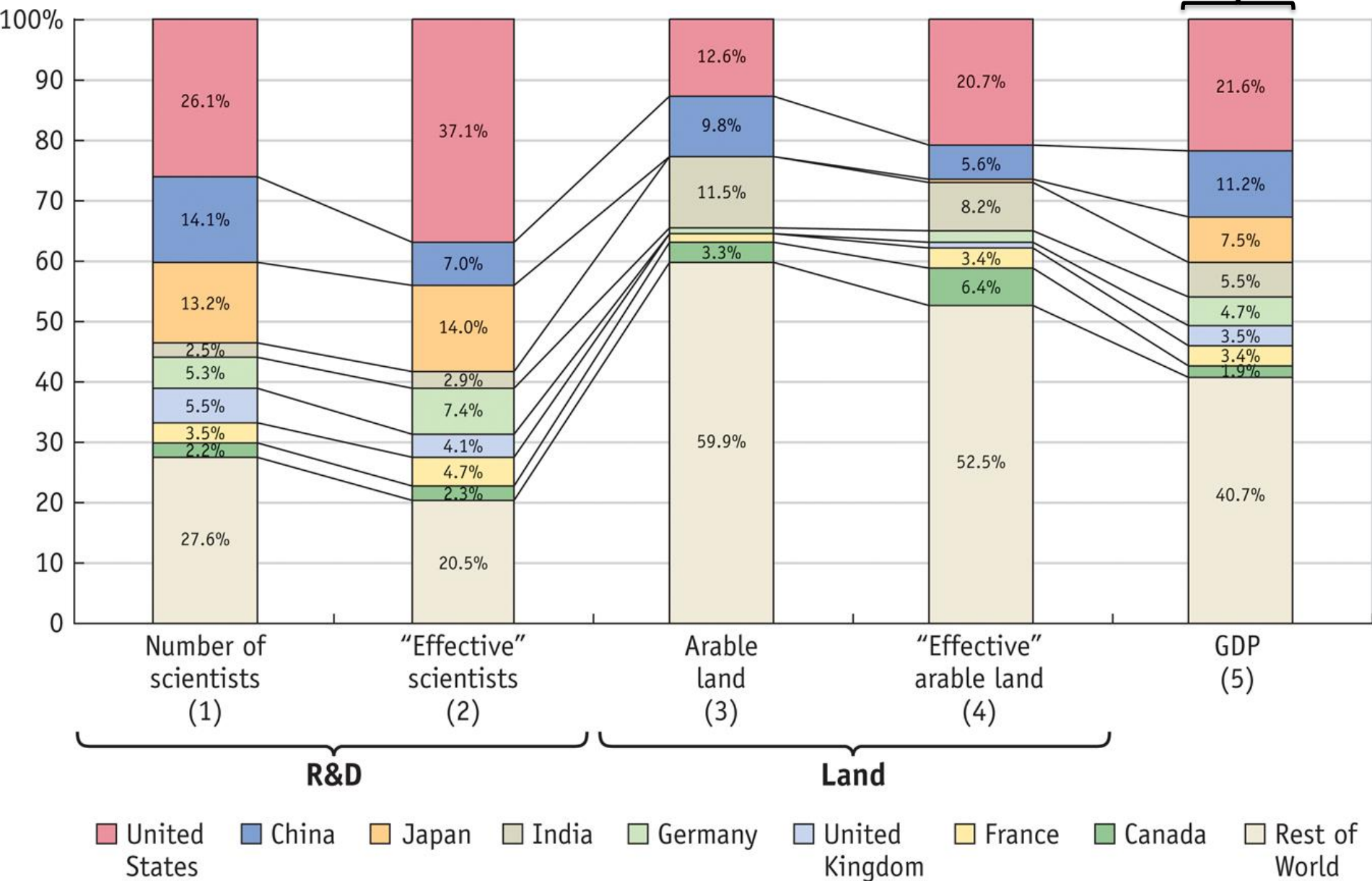
Measuring Factor Abundance Once Again

To allow for differences in productivity, we define:

$$\text{Effective factor endowment} = \text{Actual factor endowment} \cdot \text{Factor productivity}$$

→ To determine whether a country is abundant in a certain factor, we compare the country's share of that *effective* factor with its share of world GDP.

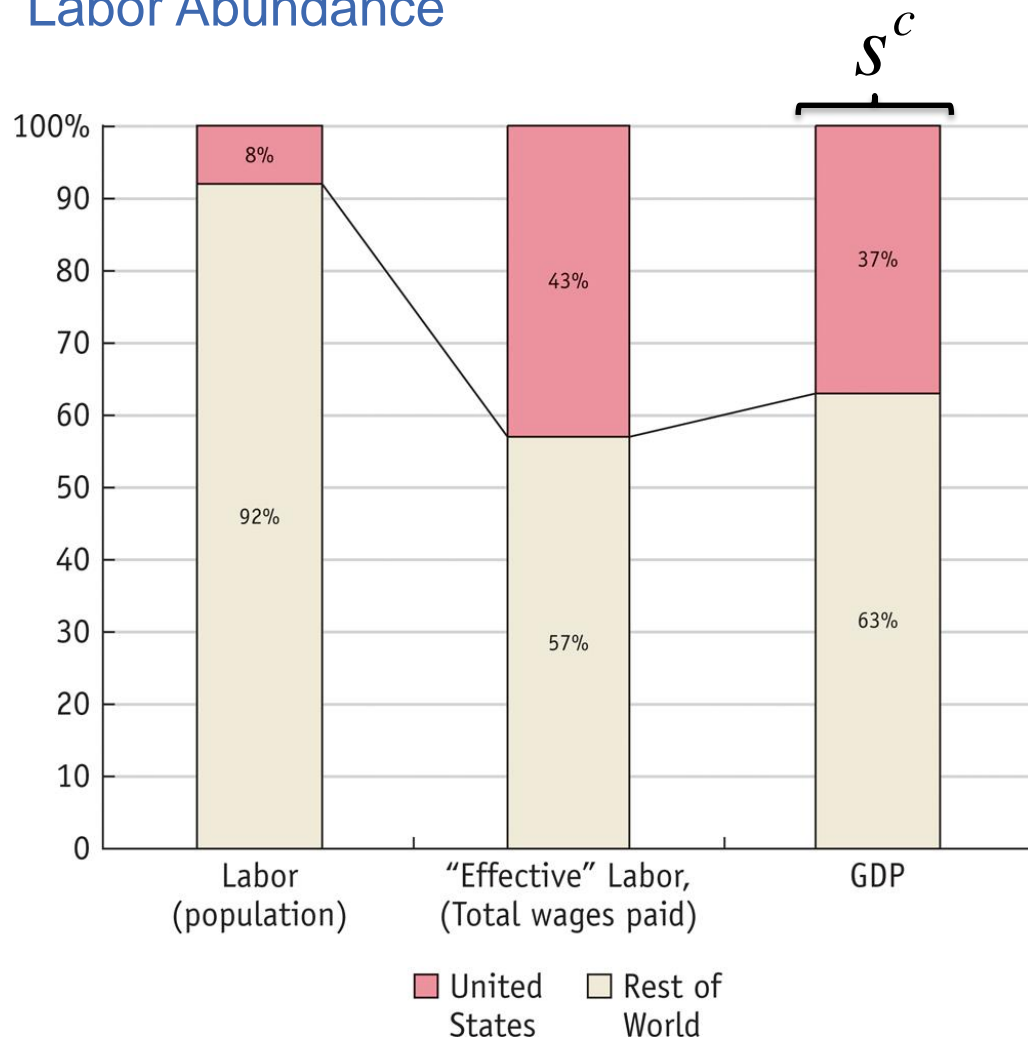
“Effective” Factor Endowments, 2000



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Leontief's Paradox Once Again

Labor Abundance



In 1947, the US had only 8% of the world's population, but 37% of the world's GDP, so it was *very scarce in labor*.

But when we measure effective labor by the total wages paid in each country, then the United States had 43% of the world's effective labor as compared to 37% of GDP, so it was *abundant in effective labor*.

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Empirical test:

RESULTS of the SIGN test:

→ The sign test is verified in 2/3rd of the cases once we allow for cross-country differences in productivity

Country Group	GDP per Capita (% of U.S. GDP)	Number of Factors Passing Sign Test	Number of Factors Failing Sign Test
Lowest GDP per capita	4–33	5.9	3.1
Middle GDP per capita	33–66	5.7	3.3
Highest GDP per capita	66–100	5.3	3.7
All countries	4–100	5.6	3.4

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Empirical test:

How can we improve the results on the sign test?
By accounting for:

- Differences in input requirements:
→ Sign test verified in 83% of the cases
- Trade costs + differences in input requirements:
→ Sign test verified in 89% of the cases

(source: Davis and Weinstein 2001)

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Conclusion

- The main prediction of Heckscher-Ohlin model does not seem to fit well with the data
- But slight modifications of HO work well, in particular once we account for differences in productivity across countries.
- In the next lectures, we will see other applications of HO:
 - Understanding the effect of trade on inequality
 - Understanding the effect of FDI and migration