International Trade: Theory and Evidence

"... the Prebisch-Singer Thesis is now incorporated, both implicitly and explicitly, in the advice given by the Bretton Woods Institutions to developing countries." Hans Singer (1998)

Fall 2010

Growth of World Trade

- Growth in world exports:

1960–68	7.3%
1968–73	9.7%
1973–80	3.3%
1980–85	2.3%
1985–90	4.5%
1990–07	6.0%

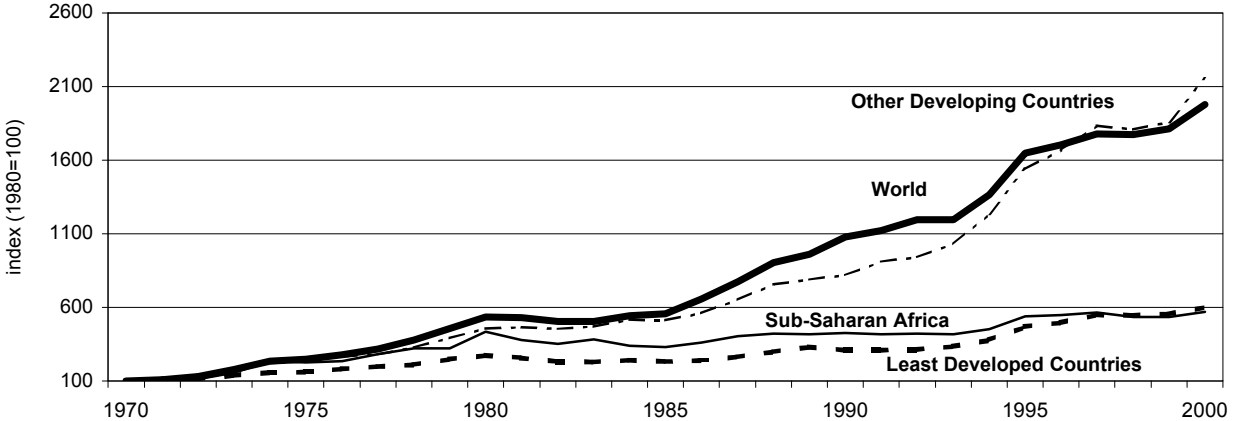
- LDC export growth:

↪ rapid in Asia

↪ highly variable in Latin America

↪ slow in Africa.

Figure 1. Growth of Merchandise Exports, 1970-2000[1]



Source: IMF World Economic Outlook (WEO).

[1] Excluding oil exports.

Shares and Composition

- Developing countries' share of world trade:

↪ 20% in 1980

↪ 30% in 2005.

↪ BUT decline in share of sub–saharan Africa (1% → 0.5%)

- Composition of LDC exports has shifted towards manufacturing

↪ now about 70% of total exports

↪ mostly due to East Asia (esp. China)

↪ a result of deliberate policies ?

Table I.6

World merchandise exports by region and selected economy, 1948, 1953, 1963, 1973, 1983, 1993, 2003 and 2007

(Billion dollars and percentage)

	1948	1953	1963	1973	1983	1993	2003	2007
	Value							
World	59	84	157	579	1838	3675	7375	13619
	Share							
World	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
North America	28.1	24.8	19.9	17.3	16.8	18.0	15.8	13.6
United States	21.7	18.8	14.9	12.3	11.2	12.6	9.8	8.5
Canada	5.5	5.2	4.3	4.6	4.2	4.0	3.7	3.1
Mexico	0.9	0.7	0.6	0.4	1.4	1.4	2.2	2.0
South and Central America	11.3	9.7	6.4	4.3	4.4	3.0	3.0	3.7
Brazil	2.0	1.8	0.9	1.1	1.2	1.0	1.0	1.2
Argentina	2.8	1.3	0.9	0.6	0.4	0.4	0.4	0.4
Europe	35.1	39.4	47.8	50.9	43.5	45.4	45.9	42.4
Germany a	1.4	5.3	9.3	11.6	9.2	10.3	10.2	9.7
France	3.4	4.8	5.2	6.3	5.2	6.0	5.3	4.1
Italy	11.3	9.0	7.8	5.1	4.0	4.6	4.1	3.6
United Kingdom	1.8	1.8	3.2	3.8	5.0	4.9	4.1	3.2
Commonwealth of Independent States (CIS) b	-	-	-	-	-	1.5	2.6	3.7
Africa	7.3	6.5	5.7	4.8	4.5	2.5	2.4	3.1
South Africa c	2.0	1.6	1.5	1.0	1.0	0.7	0.5	0.5
Middle East	2.0	2.7	3.2	4.1	6.8	3.5	4.1	5.6
Asia	14.0	13.4	12.5	14.9	19.1	26.1	26.2	27.9
China	0.9	1.2	1.3	1.0	1.2	2.5	5.9	8.9
Japan	0.4	1.5	3.5	6.4	8.0	9.9	6.4	5.2
India	2.2	1.3	1.0	0.5	0.5	0.6	0.8	1.1
Australia and New Zealand	3.7	3.2	2.4	2.1	1.4	1.4	1.2	1.2
Six East Asian traders	3.4	3.0	2.4	3.4	5.8	9.7	9.6	9.3
Memorandum item:								
EU d	-	-	27.5	38.6	38.6	38.6	42.7	39.1
USSR, former	2.2	3.5	4.6	3.7	5.0	-	-	-
GATT/WTO Members e	62.8	69.6	75.0	84.1	78.4	89.4	94.3	94.1

a Figures refer to the Fed. Rep. of Germany from 1948 through 1983.

b Figures are significantly affected by i) changes in the country composition of the region and major adjustment in trade conversion factors between 1983 and 1993; and ii) including the mutual trade flows of the Baltic States and the CIS between 1993 and 2003.

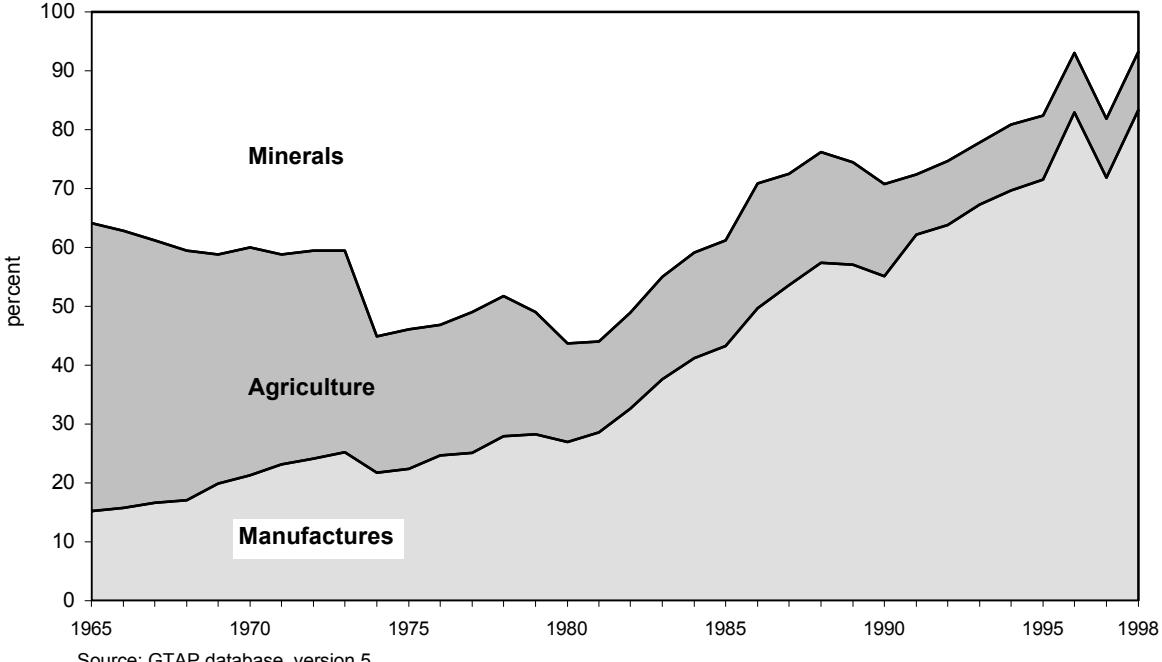
c Beginning with 1998, figures refer to South Africa only and no longer to the Southern African Customs Union.

d Figures refer to the EEC(6) in 1963, EC(9) in 1973, EC(10) in 1983, EU(12) in 1993, and EU(25) in 2003 and 2006.

e Membership as of the year stated.

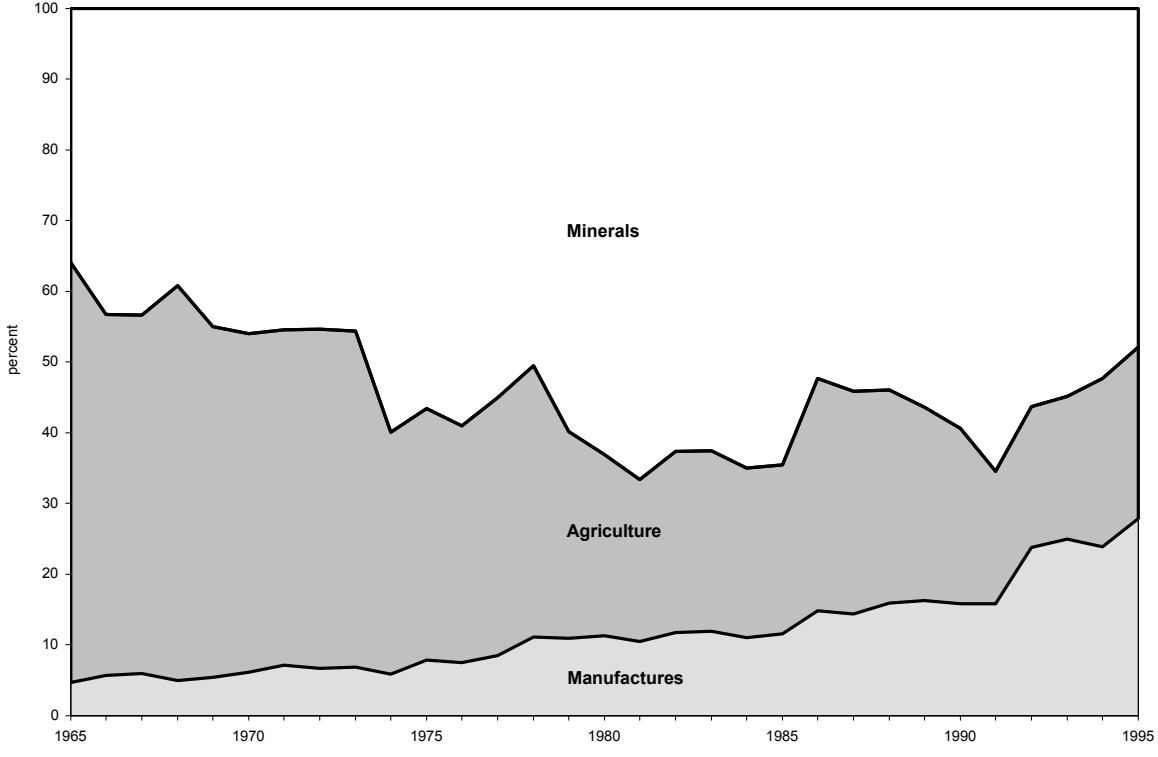
Note: Between 1973 and 1983 and between 1993 and 2003 export shares were significantly influenced by oil price developments.

Figure 4. Developing Countries: Composition of Merchandise Exports, 1965-98



Source: GTAP database, version 5.

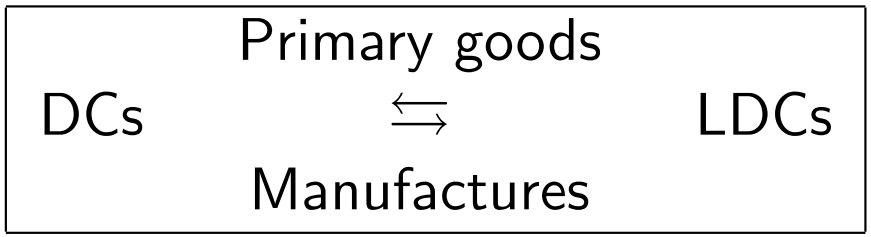
Figure 6. Sub-Saharan Africa: Composition of Merchandise Exports, 1965-95



Source: GTAP database, version 5.

Inter-regional Trade Flows

- Standard hypothesis of trade patterns:



↪ LDCs export proportionately more primary goods

↪ BUT developed countries **do not** import proportionately more primary goods

- Why ?

↪ large fraction of DC trade is within DCs and is in manufactured goods

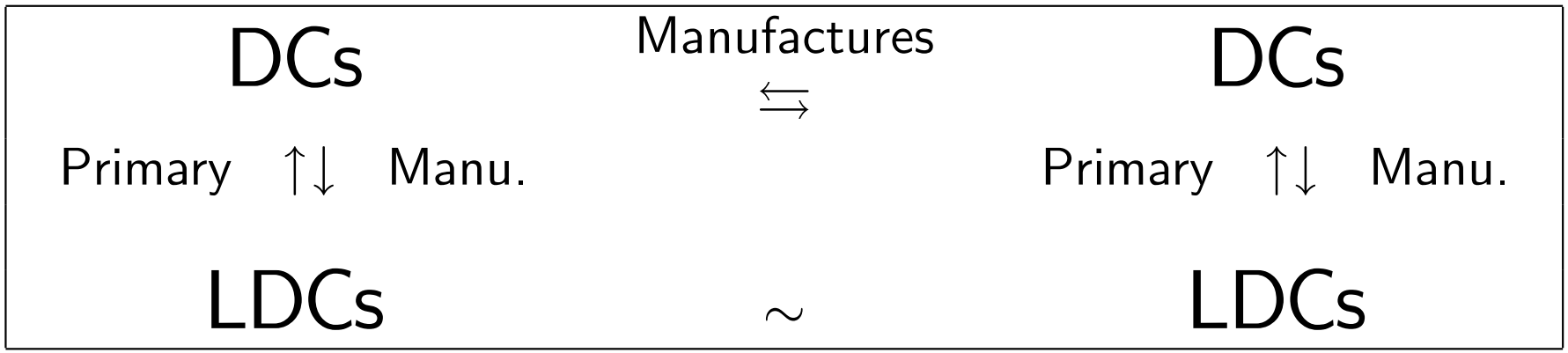
Table I.4

Intra- and inter-regional merchandise trade, 2007

(Billion dollars and percentage)

	Destination							
Origin	North America	South and Central America	Europe	CIS	Africa	Middle East	Asia	World
Value								
World	2517	451	5956	397	355	483	3294	13619
North America	951.2	130.7	328.7	12.4	27.3	50.1	352.1	1853.5
South and Central America	151.3	122.0	105.6	6.4	13.7	9.1	80.2	499.2
Europe	458.5	80.4	4243.6	189.0	147.7	152.9	433.7	5772.2
Commonwealth of Independent States (CIS)	23.6	6.3	287.5	103.2	6.9	16.2	59.6	510.3
Africa	91.9	14.6	167.5	0.9	40.5	10.5	80.9	424.1
Middle East	83.9	4.4	108.3	4.8	27.5	93.4	397.3	759.9
Asia	756.4	92.3	714.6	79.8	91.4	150.4	1889.8	3799.7
Share of regional trade flows in each region's total merchandise exports								
World	18.5	3.3	43.7	2.9	2.6	3.5	24.2	100.0
North America	51.3	7.0	17.7	0.7	1.5	2.7	19.0	100.0
South and Central America	30.3	24.4	21.2	1.3	2.7	1.8	16.1	100.0
Europe	7.9	1.4	73.5	3.3	2.6	2.6	7.5	100.0
Commonwealth of Independent States (CIS)	4.6	1.2	56.3	20.2	1.3	3.2	11.7	100.0
Africa	21.7	3.4	39.5	0.2	9.5	2.5	19.1	100.0
Middle East	11.0	0.6	14.3	0.6	3.6	12.3	52.3	100.0
Asia	19.9	2.4	18.8	2.1	2.4	4.0	49.7	100.0
Share of regional trade flows in world merchandise exports								
World	18.5	3.3	43.7	2.9	2.6	3.5	24.2	100.0
North America	7.0	1.0	2.4	0.1	0.2	0.4	2.6	13.6
South and Central America	1.1	0.9	0.8	0.0	0.1	0.1	0.6	3.7
Europe	3.4	0.6	31.2	1.4	1.1	1.1	3.2	42.4
Commonwealth of Independent States (CIS)	0.2	0.0	2.1	0.8	0.1	0.1	0.4	3.7
Africa	0.7	0.1	1.2	0.0	0.3	0.1	0.6	3.1
Middle East	0.6	0.0	0.8	0.0	0.2	0.7	2.9	5.6
Asia	5.6	0.7	5.2	0.6	0.7	1.1	13.9	27.9

- Actual World trade flows



- However, trade between LDCs has increased to about 10% of world trade

Why Determines Patterns of Trade ?

1. Comparative Advantage (technology differences)
2. Relative Factor Endowments
3. Differing Preferences
4. Economies of Scale

1. Comparative Advantage — Ricardian Trade Theory

- Example:

↪ 2 countries: **N**orth and **S**outh

↪ 2 goods: **C**omputers and **R**ice

↪ 1 factor: labour – 600 workers each

↪ perfect competition and labour mobility

- Technological assumptions:

Labour Required	One Computer	One sack of Rice
in North	10	15
in South	40	20

↪ North has an absolute advantage in both goods,

↪ but a comparative advantage in computers.

↪ South has a comparative advantage in rice.

Production possibilities frontier

- In North:

$$10C_N + 15R_N = 600$$

$\hookrightarrow$ can be written as

$$R_N = 40 - \frac{2}{3}C_N$$

- In South

$$40C_S + 20R_S = 600$$

$\hookrightarrow$ can be written as

$$R_S = 30 - 2C_S$$

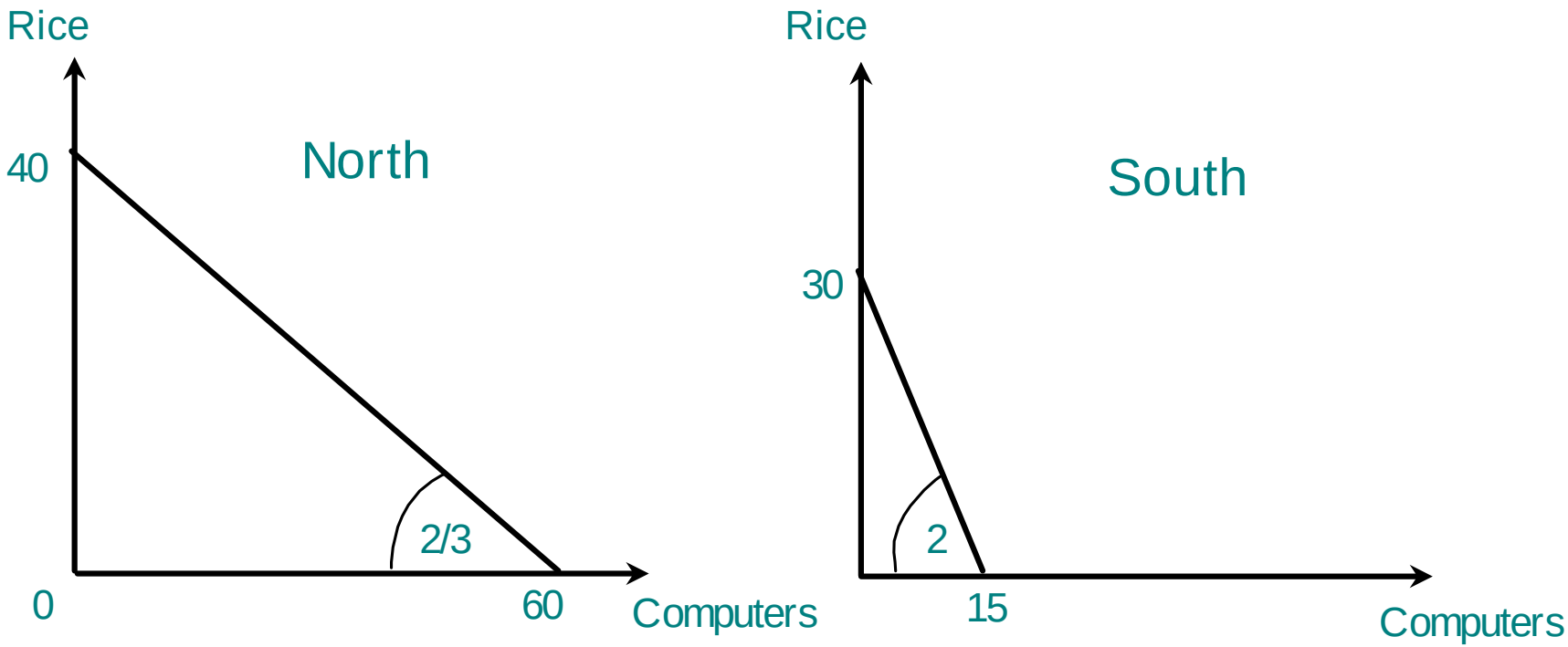


Figure: Production Possibilities

Autarky

- If both goods are consumed in North:

$$\frac{p_c^N}{p_r^N} = \frac{10}{15} = \frac{2}{3}.$$

- Why?

↪ Competition $\Rightarrow$

$$p_c^N = 10w_c \quad \text{and} \quad p_r^N = 15w_r$$

- If $\frac{p_c^N}{10} > \frac{p_r^N}{15}$, then $w_c > w_r \Rightarrow$ all workers flow into computers
- If $\frac{p_c^N}{10} < \frac{p_r^N}{15}$, then $w_c < w_r \Rightarrow$ all workers flow into rice

- For both goods to be produced, we need

$$\begin{aligned} w_c &= w_r \\ \frac{p_c^N}{10} &= \frac{p_r^N}{15} \end{aligned}$$

- Similarly, if both goods are consumed in South:

$$\frac{p_c^S}{p_r^S} = \frac{40}{20} = 2.$$

Free Trade

- If both goods are going to be produced:

$$\frac{2}{3} < \frac{p_c}{p_r} < 2.$$

- Why ?

↪ if $\frac{p_c}{p_r} < \frac{2}{3} < 2$, both countries specialize in rice

↪ if $\frac{p_c}{p_r} > 2 > \frac{2}{3}$, both countries specialize in computers

- If $\frac{2}{3} < \frac{p_c}{p_r} < 2$,

↪ North specializes in computers

↪ South specializes in rice.

- If it is cheaper to produce rice in North, why don't people buy rice there?

↪ market wages adjust so that rice is **not** cheaper in the North.

↪ as we move from autarky to free trade

$$\begin{array}{ll} p_c^N \uparrow & p_r^N \downarrow \\ p_c^S \downarrow & p_r^S \uparrow \end{array}$$

↪ so that

$$\text{North} \quad : \quad \frac{p_c^N}{10} = w^N > \frac{p_r^N}{15} \Rightarrow \text{specialize in C}$$

$$\text{South} \quad : \quad \frac{p_c^S}{40} < w^S = \frac{p_r^S}{20} \Rightarrow \text{specialize in R}$$

↪ effectively nullifies North's advantage in rice production.

Predictions of Ricardian Theory

- Each country specializes in the production of the goods in which it has a comparative advantage and exports them in return for other goods

- All households in both countries are unambiguously better off with free trade than in autarky.

↪ the wage in both countries rises

↪ consumption possibilities lie outside the PPF

- **Caveats**

↪ only one factor of production

↪ labour is perfectly mobile across sectors

↪ competitive markets

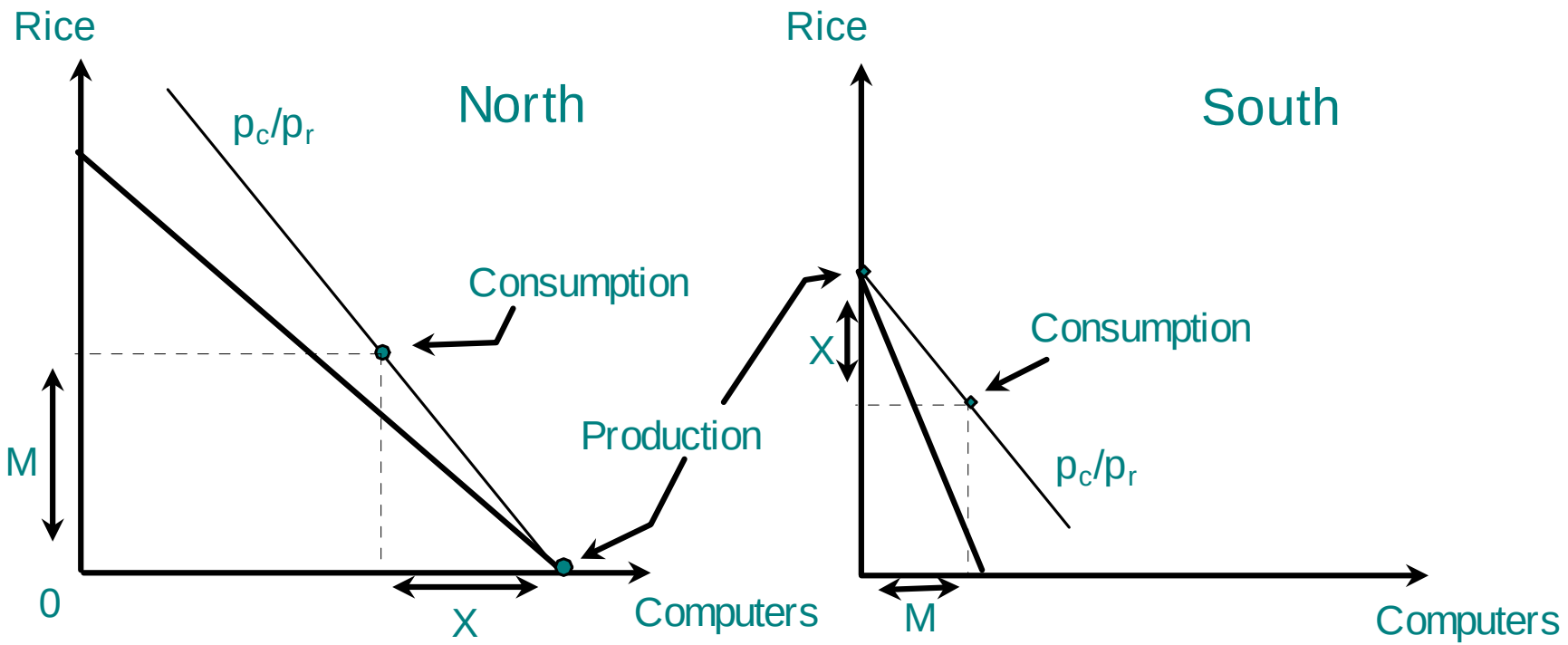


Figure: Gains From Trade

2. Factor Endowments — Neoclassical Trade Theory

Eli Heckscher and Bertil Ohlin

- **Example**

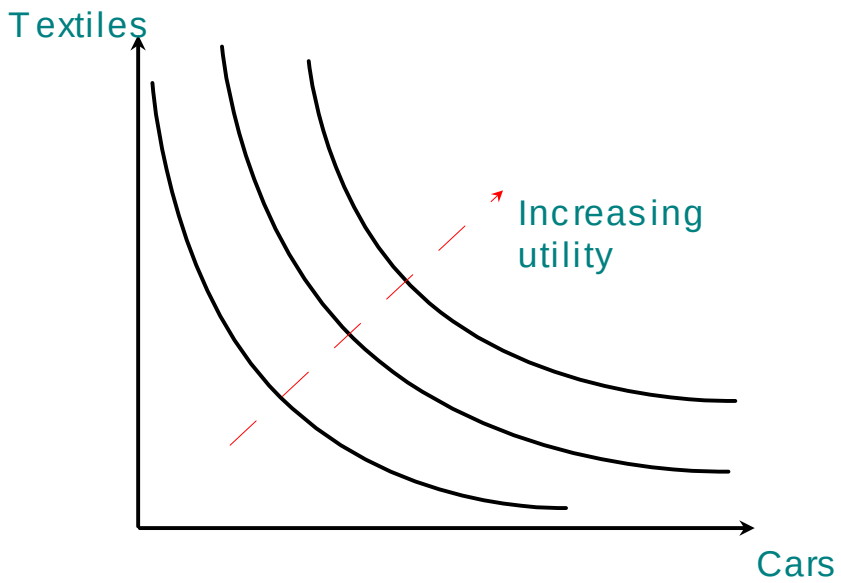
↪ 2 countries: **N**orth and **S**outh

↪ 2 goods: **C**ars and **T**extiles

↪ 2 factors: Capital (K) and Labour (L) — perfectly mobile

↪ labour receives wage w and capital receives a rent r

↪ identical preferences across countries



- North is relatively well endowed with capital:

$$\frac{K^N}{L^N} > \frac{K^S}{L^S}$$

- Car production is **capital intensive** and textile production is **labour intensive**.

$\hookrightarrow$ given the same r/w. the optimal capital-labour ratio for cars exceeds that for textiles:

$$\begin{aligned} \frac{\hat{K}_C^i}{\hat{L}_C^i} &> \frac{\hat{K}_T^i}{\hat{L}_T^i} \qquad i = S,\ N \\ k_C^i &> k_L^i \qquad i = S,\ N \end{aligned}$$

- How does the PPF look now?

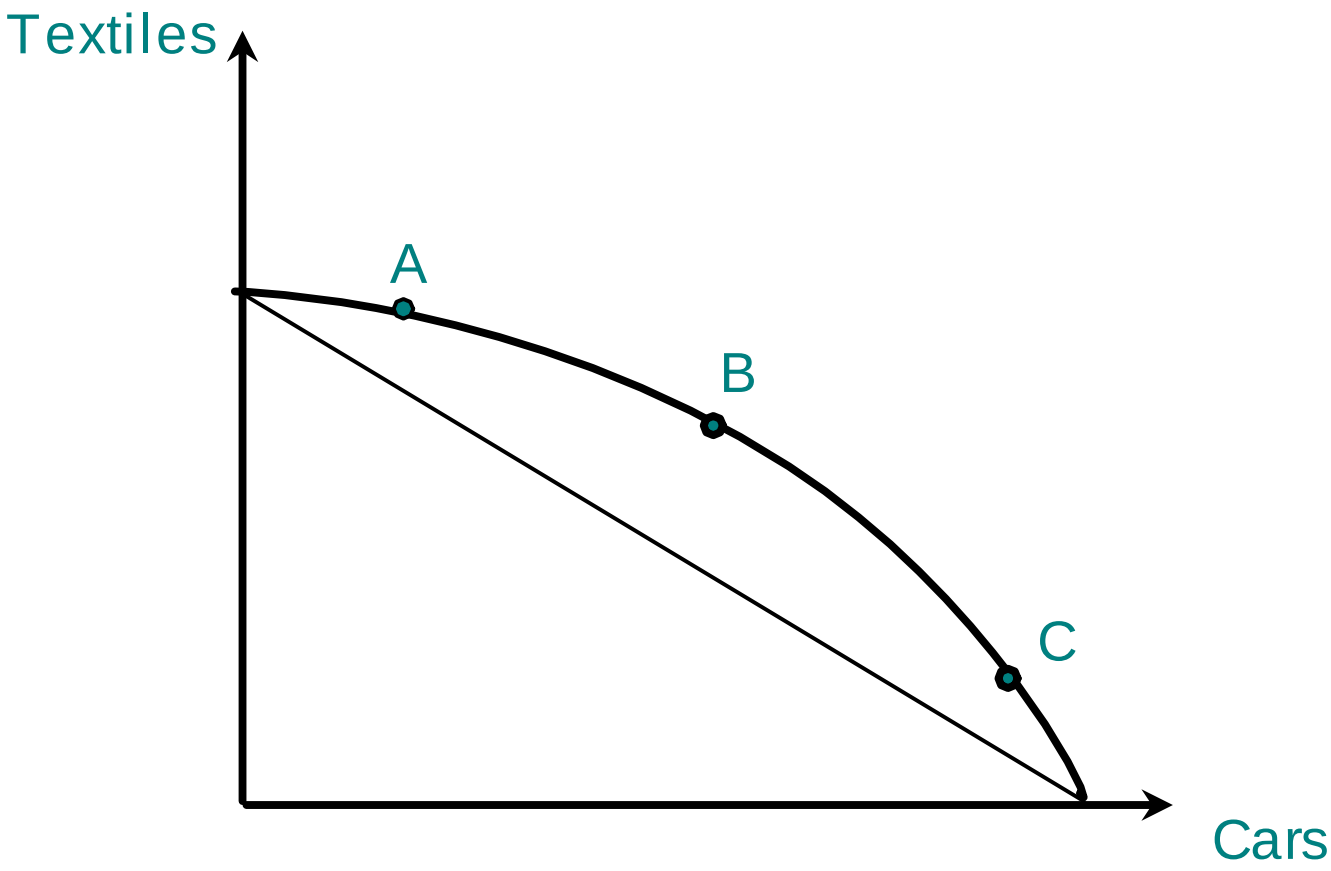


Figure: Production Possibilities Frontier for North

Why is the PPF bowed out?

- Shift towards more capital–intensive industry ($A \longrightarrow B \longrightarrow C$)

$\hookrightarrow$ drives up relative demand for capital

$\hookrightarrow$ since relative supply is fixed, relative cost of capital, r/w, must rise

$\hookrightarrow$ capital–labour ratios within each industry k_C and k_T fall in proportion

$\hookrightarrow$ productivity of car production falls *relative* to that of textiles

$\hookrightarrow$ for every unit of textiles given up, the gain in terms of cars declines

Example:

- Cobb-Douglas production functions for Cars and Textiles

$$Y_C = K_C^{\alpha} L_C^{1-\alpha} \text{ and } Y_T = K_T^{\beta} L_T^{1-\beta}$$

$\hookrightarrow$ where cars are more capital intensive $\Rightarrow \alpha > \beta$

- Productivity (output per worker):

$$y_C = k_C^{\alpha} \text{ and } y_T = k_T^{\beta}$$

$\hookrightarrow$ relative productivity of cars

$$\frac{y_C}{y_T} = \frac{k_C^{\alpha}}{k_T^{\beta}}$$

- If k_C and k_T fall in proportion, k_C^{α} must fall more than k_T^{β}

$\Rightarrow$ y_C falls more than y_T

$\hookrightarrow$ for every unit of textiles given up, the gain in terms of cars declines

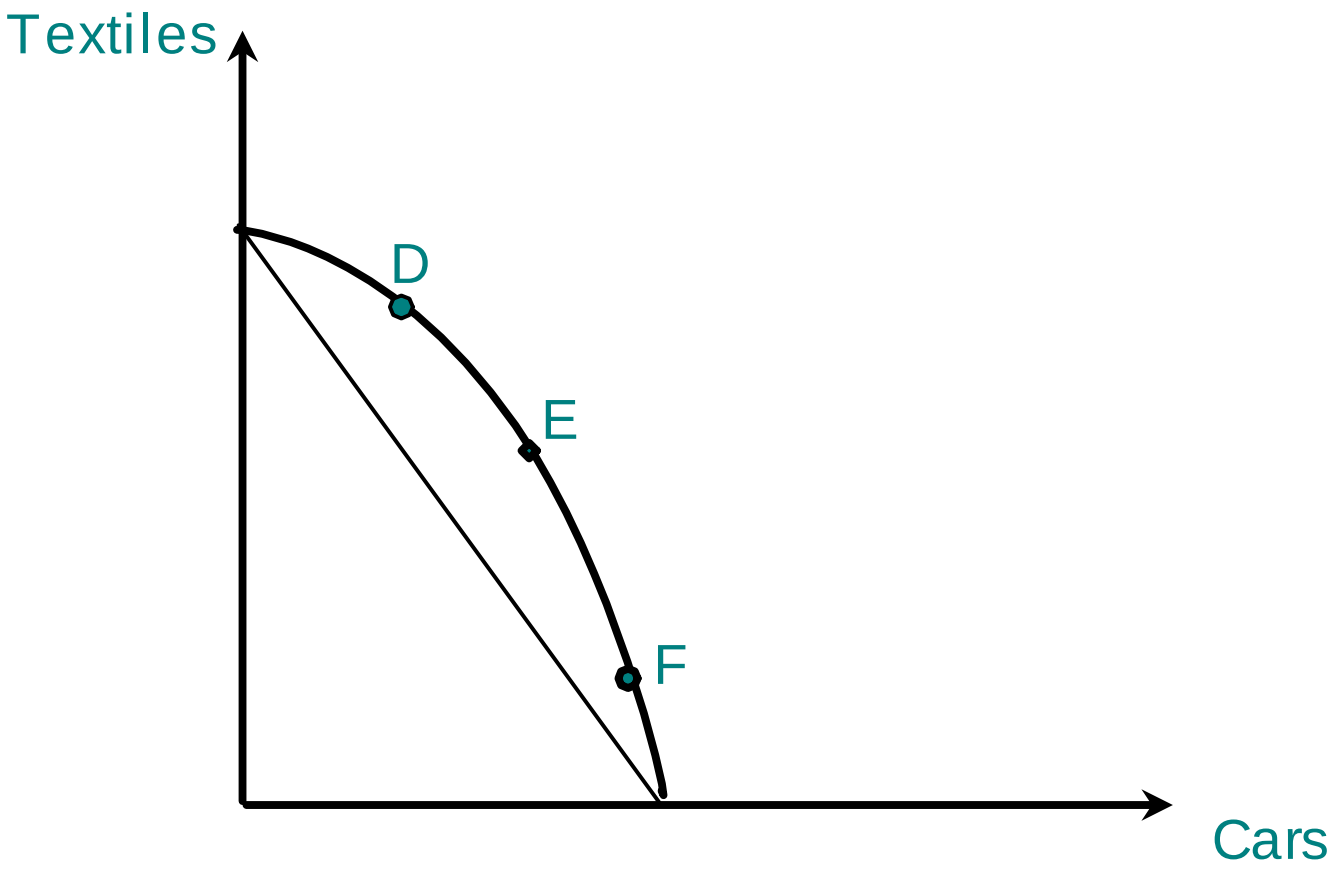


Figure: PPF for South

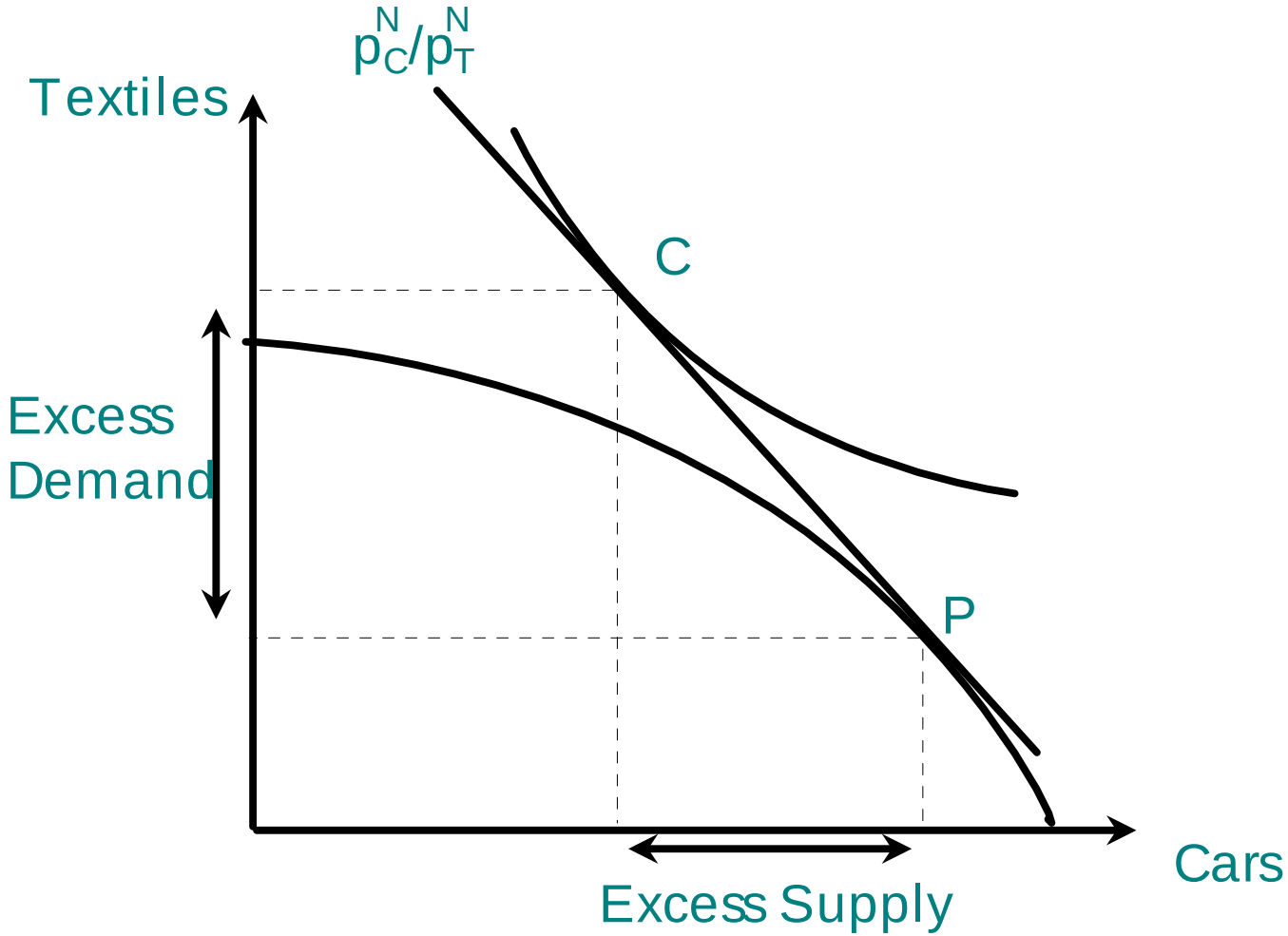


Figure: Disequilibrium in Autarky

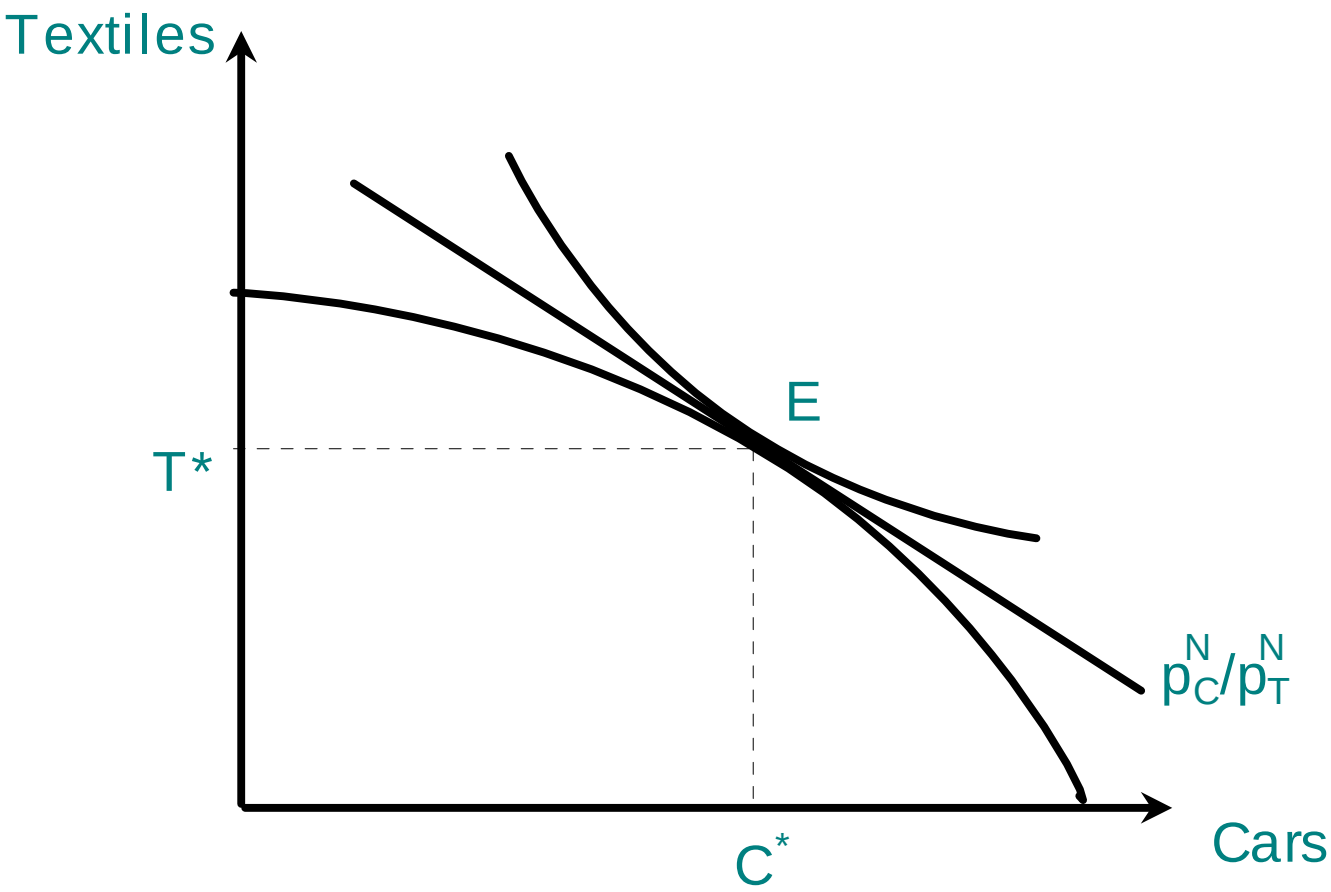


Figure: Equilibrium under Autarky

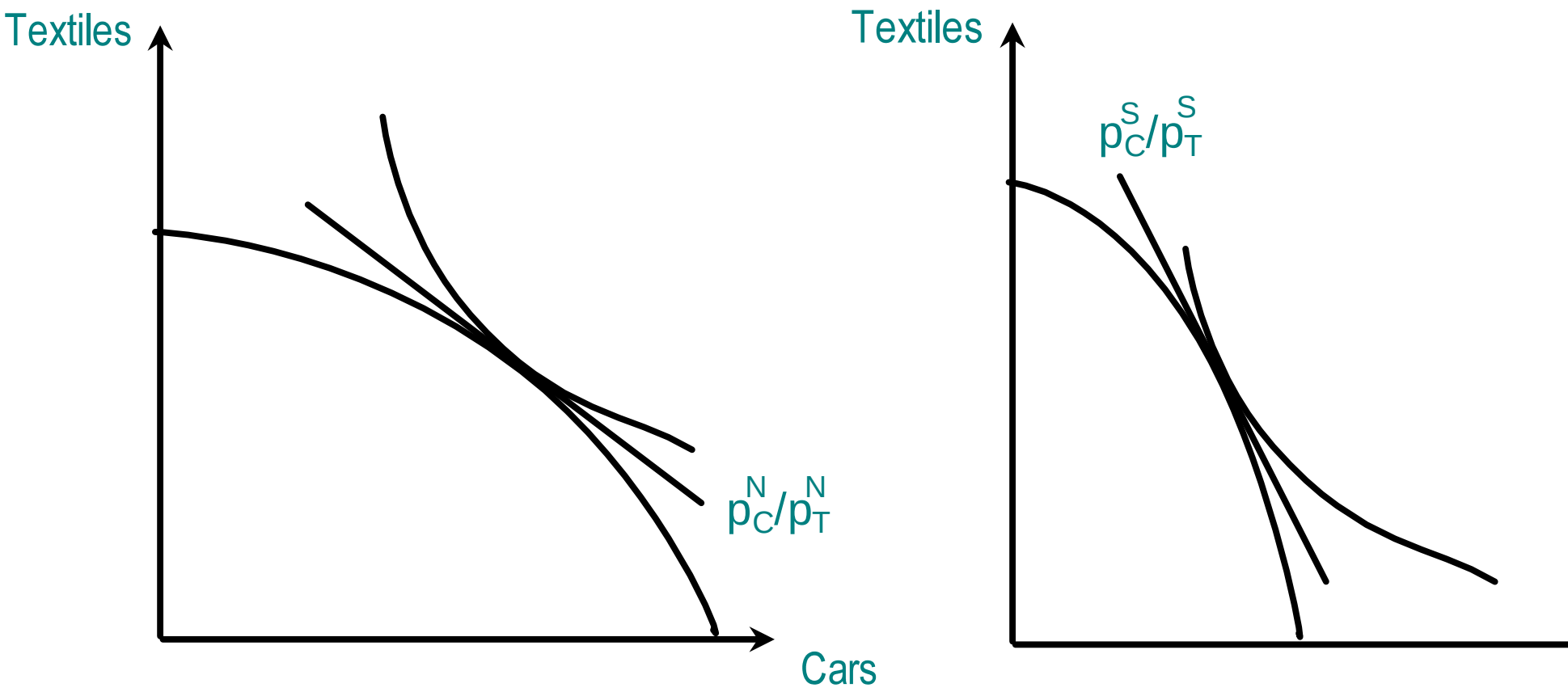
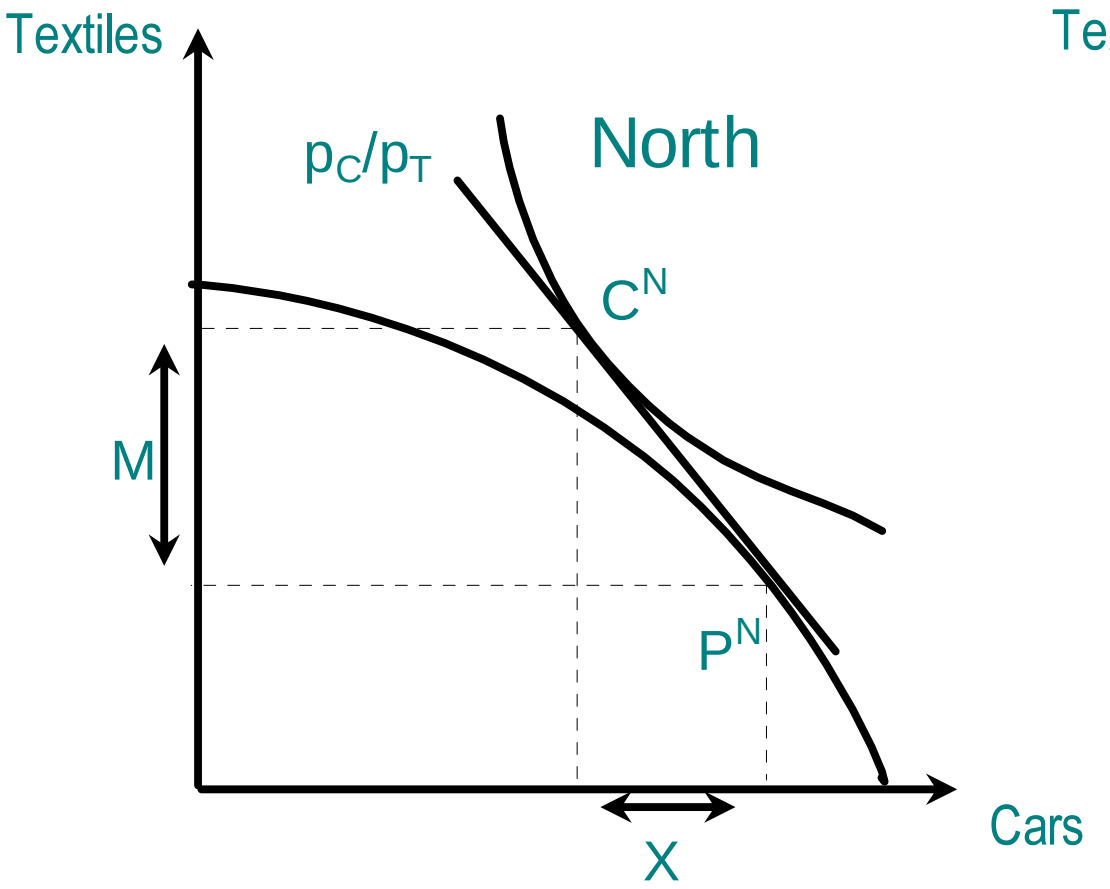


Figure: Autarky in North and South



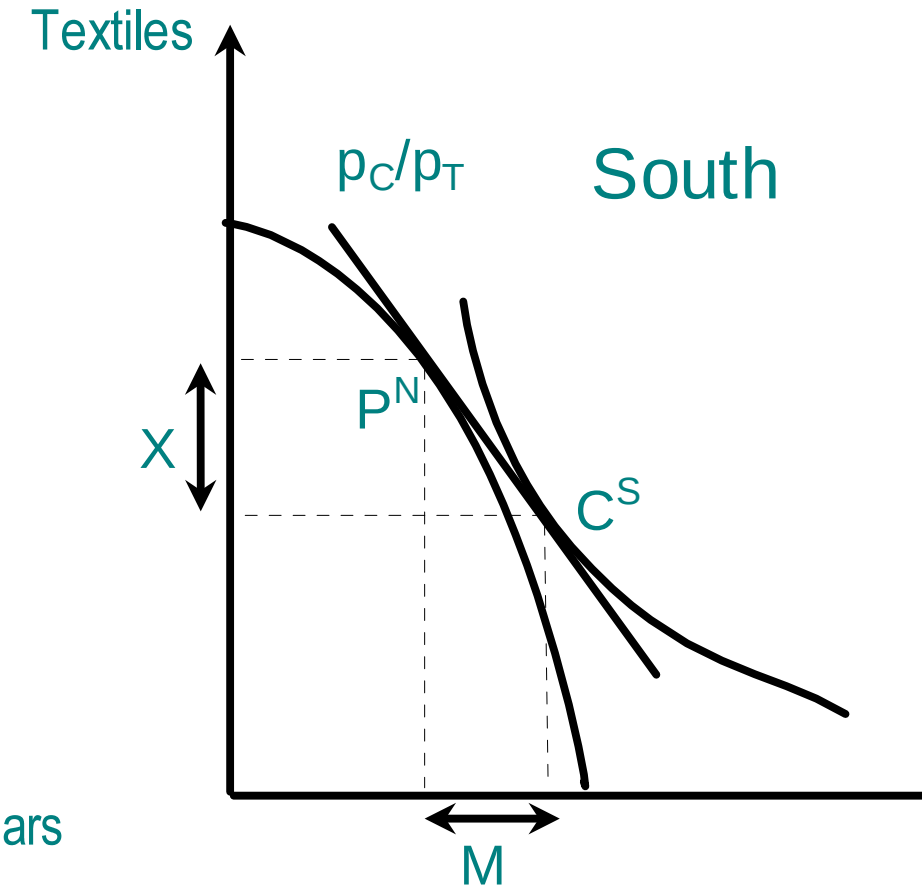


Figure: Free Trade Equilibrium

Implications of Neoclassical Trade Theory

- Under free trade the price ratio settles at a level between the two autarkic price ratios

- Incomplete specialization — both countries produce both goods

- *A country will tend to export the commodities that are intensive in factors that are possessed by that country in relative abundance.*

↪ does not explain trade flows amongst developed countries

↪ predicts a lot of trade between DCs and LDCs

- Households in both countries are **potentially** better off with free trade

↪ BUT there are **distributional** consequences

3. Differences in Preferences

- Assume technologies and factor endowments are identical

- How do preferences differ between LDCs and DCs ?

↪ one hypothesis: DCs spend proportionately more on manufactured goods (luxuries)

↪ i.e. as countries get richer, preferences biased away from primary goods

↪ drives down relative price of primary goods as DCs get richer

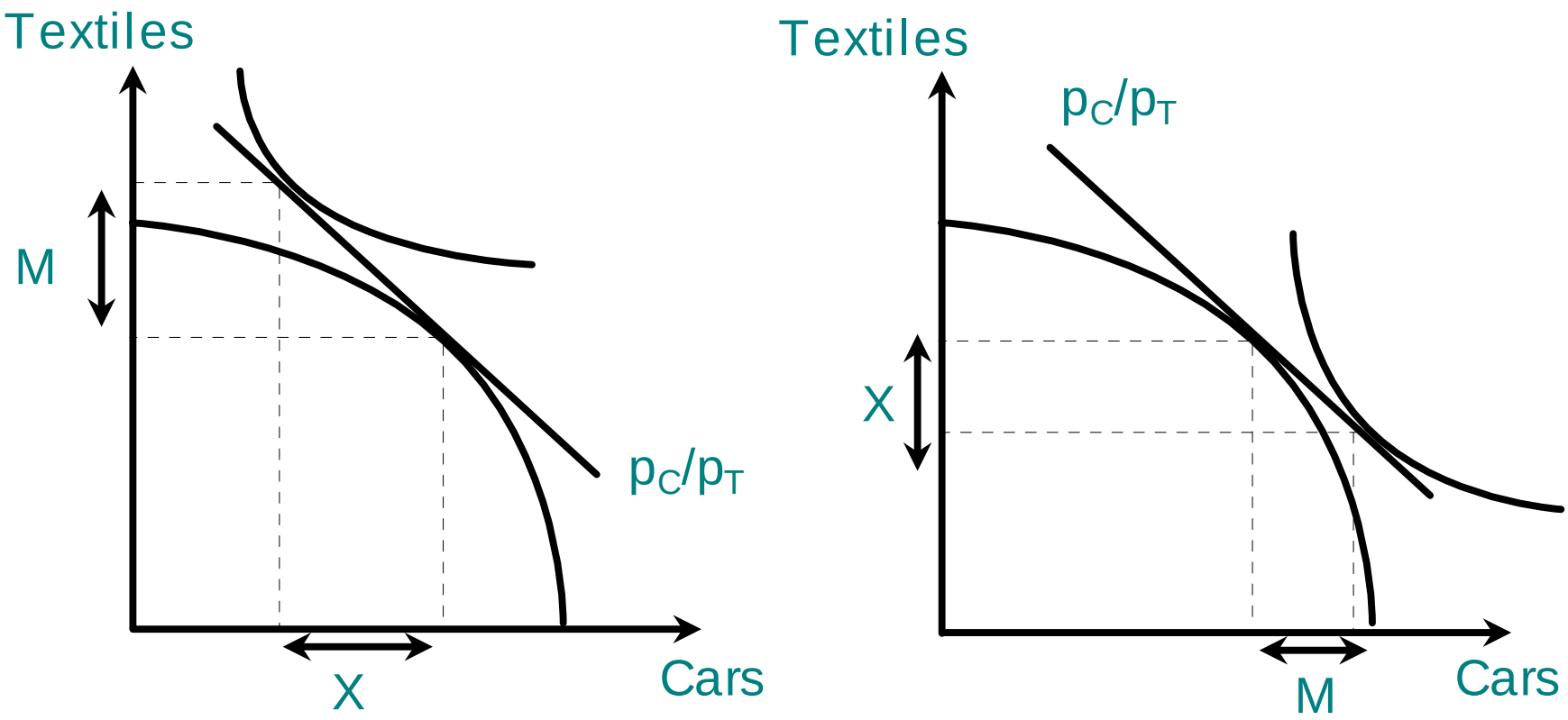


Figure: Trade due to differences in preferences

4. Economies of Scale

- Trade allows concentration of production in some countries to maximize the effects of economies of scale

- **Example:**

↪ 2 identical countries — East and West

↪ 2 goods — ships and aircraft

↪ declining average cost

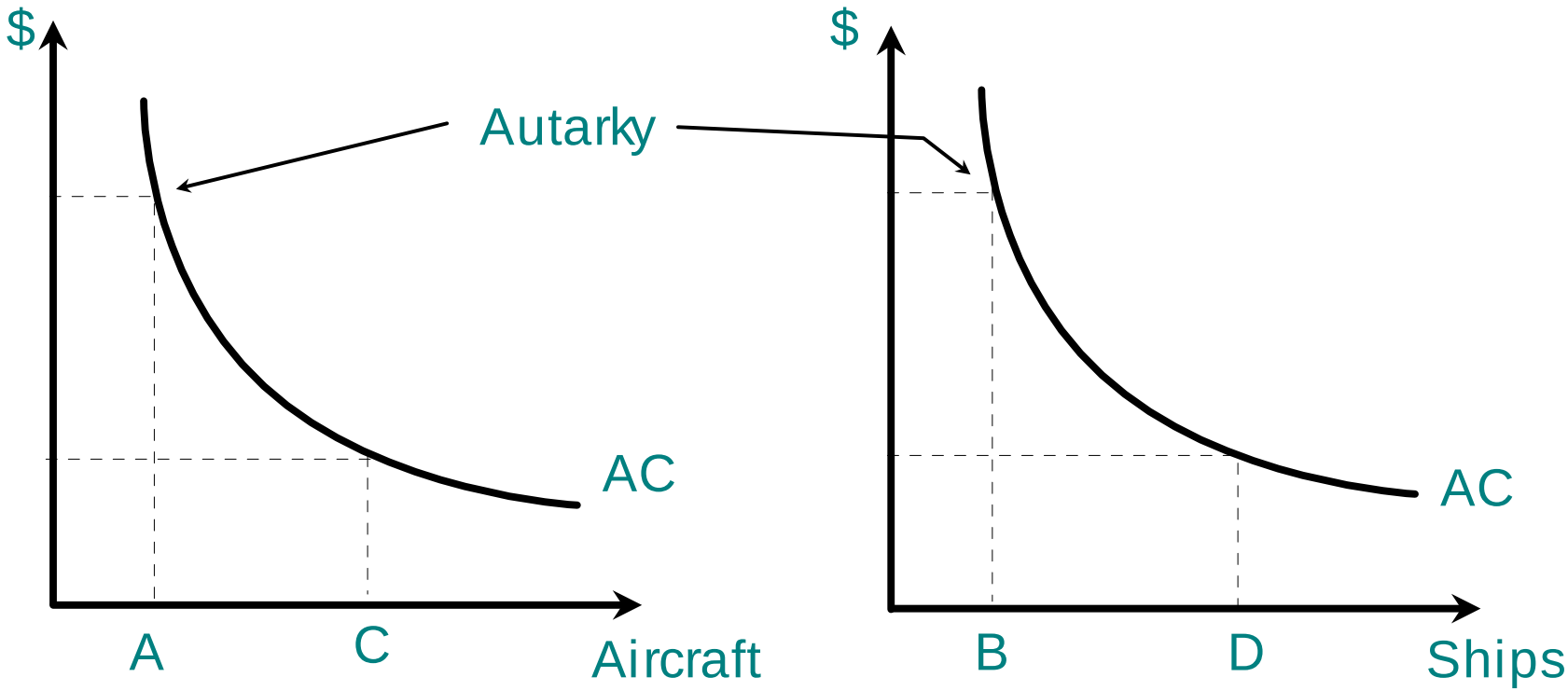


Figure: Trade and Specialization with Economies of Scale

Distributional Consequences of Trade

- Neoclassical theory $\Rightarrow$ **potential** gains due to increased goods/services

$\hookrightarrow$ BUT not necessarily **actual** gains to all members of society

- **Example (from earlier):** Move toward free trade in North

$\hookrightarrow$ increased (capital–intensive) car production

$\hookrightarrow$ reduced (labour–intensive) textile production

$\hookrightarrow$ r/w rises, but K/L is fixed

$\hookrightarrow$ i.e. labour loses, capital gains

- Distribution of gains depends on distribution of factor ownership

Static vs. Dynamic Gains/Losses from Trade

- Comparative advantage is a **static** concept

↪ but technologies and factor endowments change over time

- LDCs could allow trade patterns to change as they accumulate physical / human capital

↪ "natural" shift from primary to manufacturing

↪ BUT may get stuck as primary producer and never invest enough to get beyond this stage

The Prebisch–Singer Hypothesis

- As world gets richer, fraction of income spent on primary products declines

↪ long–term deterioration in the **terms of trade** faced by many LDCs:

$$\text{T.o.T.} = \frac{\text{Export Price Index}}{\text{Import Price Index}}$$

⇒ real incomes grow less rapidly

↪ less capital accumulation / infrastructure

- **Policy implication:** need to protect / promote domestic manufacturing

↪ may lower **current** income by distorting the gains from trade

↪ but this is an "investment" which will raise **future** incomes.

Does this hypothesis make any sense?

- Not necessary that world demand will go against primary products

↪ slow recovery from 60% decline in early 1980s

↪ but recent rapid increase primary product prices (China, speculation?)

↪ volatility a problem in itself

- Policy implication assumes capital markets are not working properly

↪ high future returns in manfacturing should induce investment flow into it and away from primary production

- BUT there are many **market failures**

↪ **imperfect capital markets**

↪ dynamic gains from investment may involve **positive externalities**

⇒ may justify **government intervention** in the form of **trade policy.**

Figure 4: Commodity Terms of Trade: Fuel Exporters

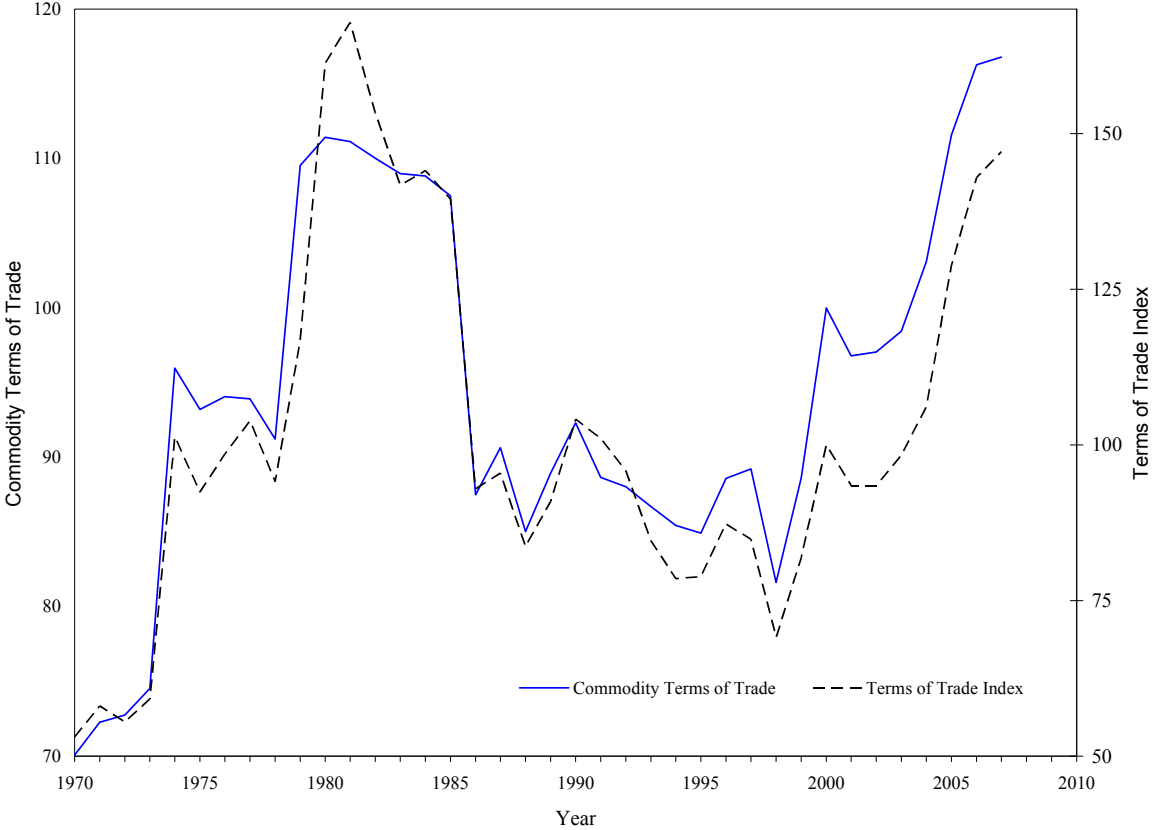


Figure 5: Commodity Terms of Trade: Non-Fuel Commodity Exporters