ECO364: International Trade Theory

Lecture 1

Palermo Penano

University of Toronto

May 10, 2016

Important Course Scheduling Adjustment

Optimized for rest

- Lectures: Tuesday and Thursday: 2-4pm
- Tutorial: Friday 2-4pm (Sidney Smith 1072)
- Is this okay?

Important Course Scheduling Adjustment

Optimized for time (Original schedule)

- Otherwise...
- Lecture: Tuesday 2-5pm, Thursday 2-3pm
- Tutorial: Thursday 3-5pm (same room)

Hello

- My name is Palermo Penano
- 4th year PhD student in Economics...going into 5th :-O!
- Specializes in development economics and international trade
  - Office Hours: Tuesday and Thursday, 5-6pm, in GE 213
  - Email: palermo.penano@mail.utoronto.ca
- Office hours $\succ$ Email
- I will be teaching the first-half of the course

Hello

- Scott Orr will teach the second-half
  - Office Hours: Tuesday and Thursday, 5-6pm, in GE 213
    - does not begin until second-half
  - Email: scott.orr@mail.utoronto.ca

Textbook

- We will use **"International Economics: Theory and Policy"** by Paul R. Krugman, Marc J. Melitz, and Maurice Obstfeld.
- 10th Edition — other editions should be fine
- Recommended but not required

Course Website and TAs

- Website: Blackboard
- TAs:
  - William Gaelan MacKenzie (First-half)
    - Email: gaelan.mackenzie@mail.utoronto.ca
    - Office hours: TBA
  - Leandro Freylejer (Second-half)
    - Email: leandro.freylejer@mail.utoronto.ca
    - Office hours: TBA
- Both are fellow PhD students studying International Trade (hence, both are very knowledgeable about the material!)
- Office hours $\succ$ Email

Grading

- Problem Sets: 20%
  - 4 in total (see syllabus for due dates)
  - 1 day late, 50% of grade; more than 1 day late, 0%
- Midterm Exam: 30%
  - In class on **May 31**
- Final Exam: 50%
  - Some time in June 20-24

Goal of this Course

- Our goal is to work with you through some of the established frameworks in the field, which we hope will help you think more clearly about issues in international trade
- These frameworks will address some of the reasons why countries might trade *and* the consequences of their actions
- This is an international trade theory course, so the frameworks we will study are mathematical models

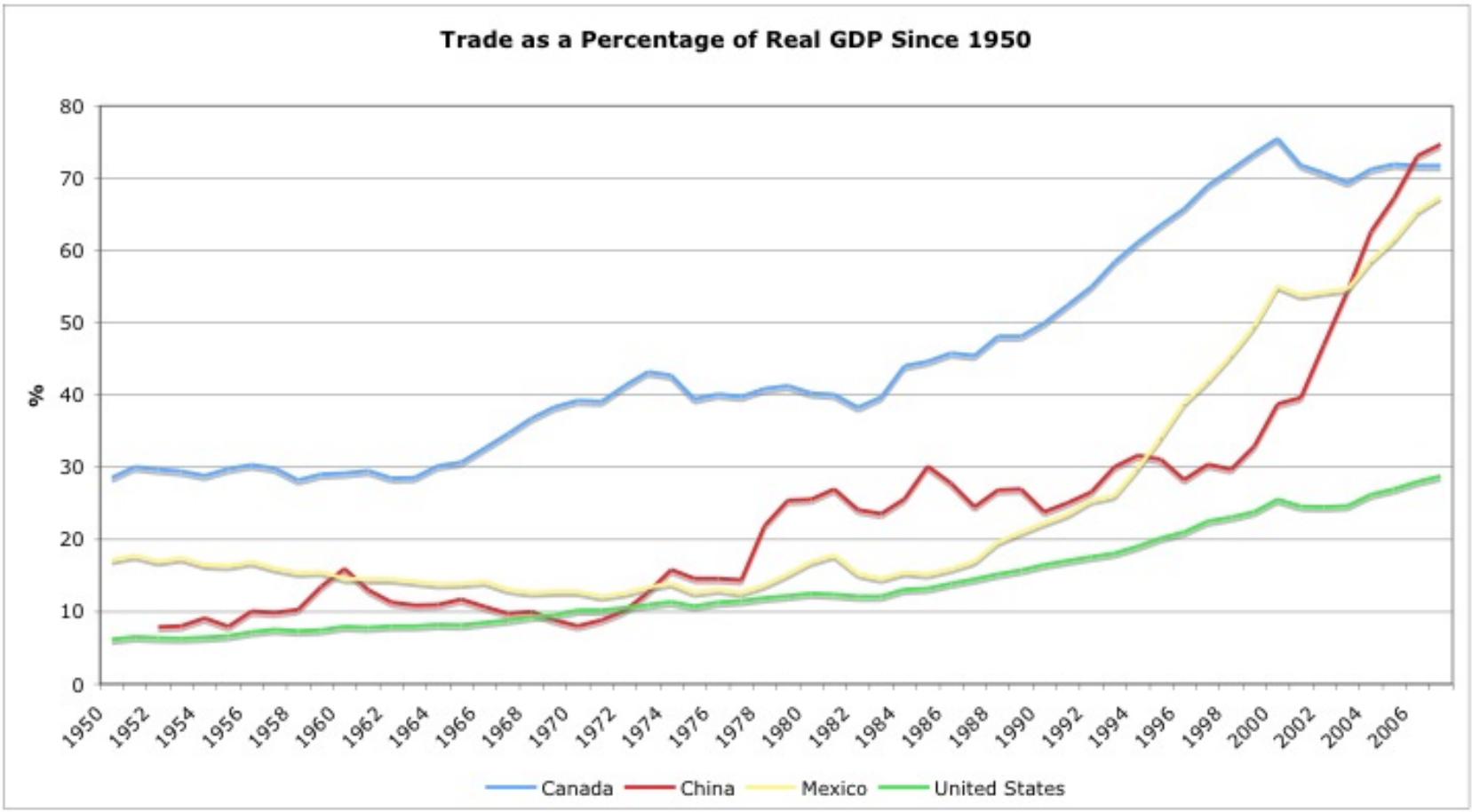
Goal of this Course

- Models are abstract versions of reality
  - Maps, Minecraft
  - In our case, the elements of our world will be characterized by variables, equations, and their relationship with each other
- But international trade is an empirical issue, so we will relate our theory to observations in the real world
  - Most research in the field have elements of both theory and empirics
- Recommended reading: *Two Cheers for Formalism* by Paul Krugman

Outline for Today

- Why is trade important?
- Trade facts for Canada, China, Mexico, and the U.S.
  - Trade over time
  - Trade by commodity
  - Trade by partner country
- Outline for Semester
- Ricardian Model

Trade Over Time



Trade Over Time

- Trade, as a share of GDP, has grown since the 1970s, with rapid increases beginning in the 1980s
- This is true for both advanced and developing countries
- In this course, we will offer suggestions for why this is happening

Trade by Commodity

Exports by Commodities (%) (1980)

Type of Goods	Canada	China	Mexico	United States
Cars and Airplanes	13.8	0.3	1.5	11.6
Chemicals	3.0	2.7	2.2	4.0
Food	10.2	14.5	9.6	13.2
Textiles	0.3	9.3	1.5	0.6

Source: Robert Feenstra, "World Trade Flows"

Trade by Commodity

Exports by Commodities (%) (1990)

Type of Goods	Canada	China	Mexico	United States
Cars and Airplanes	23.5	0.9	11.0	15.2
Chemicals	2.2	2.0	2.5	3.7
Food	6.8	7.7	6.9	8.1
Textiles	0.2	18.8	1.8	0.6

Source: Robert Feenstra, "World Trade Flows"

Trade by Commodity

Exports by Commodities (%) (2000)

Type of Goods	Canada	China	Mexico	United States
Cars and Airplanes	23.6	1.6	18.8	12.4
Chemicals	1.5	1.5	1.0	3.4
Food	5.5	3.5	3.5	4.7
Textiles	0.7	13.6	5.6	0.6

Source: Robert Feenstra, "World Trade Flows"

Trade by Commodity: Evidence of Specialization?

- In comparison to developing countries, more advanced countries produce more cars, airplanes, and chemicals
- Developing countries produce more textiles and food
- This suggests that countries are specializing, depending on their level of development

Trade by Partners

Canada

Export Share (1970)	%	Export Share (1995)	%
United States	65.3%	United States	75.0%
United Kingdom	9.4%	Japan	5.5%
Japan	5.5%	Germany	1.9%
(West) Germany	2.9%	United Kingdom	1.9%
Italy	1.3%	China	1.4%

Source: Robert Feenstra, "World Trade Flows"

Trade by Partners

China

Export Share (1970)	%	Export Share (1995)	%
Hong Kong	28.0%	Hong Kong	30.0%
Japan	15.2%	United States	20.9%
Singapore	7.6%	Japan	15.5%
(West) Germany	4.6%	Germany	4.8%
Malaysia	4.5%	South Korea	3.2%

Source: Robert Feenstra, "World Trade Flows"

Trade by Partners

U.S.A

Export Share (1970)	%	Export Share (1995)	%
Canada	20.6%	Canada	17.5%
Japan	12.1%	Japan	12.0%
West Germany	6.6%	Mexico	8.5%
United Kingdom	6.0%	United Kingdom	5.1%
France	4.1%.	Germany	5.0%

Source: Robert Feenstra, "World Trade Flows"

Major Points

- Trade flows appear to be greatest between countries that are big and countries that are geographically close
  - Larger economies produce more goods and services—more things to sell in the export market
  - Larger economies generate more income from goods and services sold, so they can buy more imports
- Thus, trade between two countries is greater, the larger is either country

Major Points

- This observation is modeled using an idea borrowed from physics: that large and close bodies exhibit greater gravitational force
- The model is called the Gravity Model of Trade:
  - countries i and j
  - Y is GDP, D is distance, A is a constant

$$\text{Trade Flows}_{ij} = A\frac{Y_i^a Y_j^b}{D_{ij}^c}$$

  - The superscripts a, b, c amplify the importance of each term to bilateral trade flows

Limitations of the Gravity Model

- The gravity model, however, has important limitations
  - Does not account for what goods each country produces
  - Does not account for factor prices (e.g. wages and return on capital)
  - Cannot make predictions on whether trade has been beneficial or harmful
- In this course, we will introduce models that will address these limitations

Outline (First-Half)

Palermo Penano

- Ricardian Model
  - One factor of production
  - Differences in productivity drives specialization
  - Welfare either increases or stays the same with trade (no losers)
- Heckscher-Ohlin Model
  - Two factors of production
  - Differences in factor abundance drives specialization
  - Trade could bring about a decrease in welfare
- Specific-Factors Model
  - Two factors of production (**one mobile, one stationary**)
  - Differences in factor abundance drives specialization
  - Trade could bring about a decrease in welfare
- Midterm: **May 31**

Outline (Second-Half)

Scott Orr

- Trade Policy
  - Instruments
    - Tariffs, quotas, export subsidies, voluntary export restraints
  - Politics
    - Why limit (encourage) trade?
    - Why do we have the WTO?
- Trade with increasing returns and imperfect competition
  - External versus internal economies of scale
    - Does trade encourage cost savings through economies of scale?
  - Market power and trade
    - Does trade limit (increase) market power?
  - Firm heterogeneity and trade
    - Do more productive firms benefit from trade liberalization?
    - Does trade encourage firms to invest in productivity?

WARNING

- This course will move *very* quickly
- Please make sure you aren't completely lost before each lecture
- Ideas from later lectures build on ideas from earlier topics
- How to succeed in this course:
  - Study the lecture slides thoroughly
  - Ask questions during office hours (we are available 4 hours a week!)
  - Do all the assignments
  - Ask questions in class and in tutorials

Ricardian Model

Comparative Advantage / Absolute Advantage

- Why might countries want to trade?
- Why might it be beneficial for the U.S. to trade with Canada?
  - One could argue that the U.S. is technologically superior to Canada
    - Benefit?
- Need to distinguish **Comparative Advantage** from **Absolute Advantage**
  - To understand the distinction, we must first introduce what's called an **Opportunity Cost**

Definition: Opportunity Cost

- Definition: *The value of what you gave up when one alternative is chosen*
- You went to university which entailed going to classes, studying, writing exams, solving problem sets, etc. all of which, as you may be fondly aware, take a lot of time
  - You gave up the wage you would have earned had you, instead, decided to work right after high school
  - This wage is the opportunity cost of your university education
  - You hope that it is worth it (it is! the data supports it)
- Pyrrhic Victory
  - Win at all cost

Comparative Advantage

- What does it mean for a person/country to have a **comparative advantage** over another person/country in undertaking a task?
- In completing a task, person A has a comparative advantage over person B if her **opportunity cost** in doing that task is lower than the **opportunity cost** of B for doing the same task
  - The key idea here is to ask What is the value of the thing that A had to give up in order to complete the task
  - Compare this value to the value of what B had to give up to do the same task
  - If it is lower for A, then A should do the task
- For countries, instead of tasks, consider their choice on what goods to produce and measure the value of what they had to give up in terms of the number of outputs

Comparative Advantage: Example

- This is a general principle that applies broadly to life
  - Lawyers are probably more efficient than their legal secretaries in everything related to their practice. But, the lawyer's time is better spent practicing law and delegating the more mundane part of their practice to their legal secretary. Both parties benefit
  - You always have that one person who knows everything when working as a group on a problem set. But because there's a deadline, it would be advantageous for that person to have their peers work on some of the questions
  - Parents are faster at doing the dishes (or any chore for that matter), but they have their kids do it (perhaps for a small wage)

Absolute Advantage

- Absolute advantage, on the other hand, makes raw comparisons of ability
- We say that person A has an **absolute advantage** over person B in a given task if A can do it faster, more efficiently, and with greater proficiency than B
- E.g. the U.S. probably has an absolute advantage over most developing countries when it comes to producing most goods
  - It has a more advanced manufacturing system, for example
  - But, in spite of this, it can only have a comparative advantage for some goods
  - To produce textiles, it must give up producing some computers!

Formal Model

- Let's show this analytically with a formal model
- Allows us to focus on how differences in technology can be the reason why it is mutually beneficial for countries to trade

Model World

1. Two countries: Canada (North: N) and Mexico (South: S)
2. Two goods: Computers, C and Textiles, T (e.g. clothing)
3. One factor in production: labour, L
4. Labour is stuck in each country, but they can move across industries within a country
   - implication for wages
5. Perfect competition (price = marginal cost)
6. Homothetic preferences
   - e.g. Whether a rich or a poor country: 40% Computers, 60% Textile
   - Believe this for now...

Definitions

- **Unit Labour Requirement**
  - ...labour for one unit requirement...
  - *the amount of labour needed to create one unit of a good*
  - e.g. 3hrs of labour for one computer
  - Denoted by a_j^i: country i (N or S) and type of good j (C or T)
- **Marginal Product of Labour** (*MPL*)
  - With one unit of labour, how many units of a good can we create
  - e.g. If 3 hrs of labour creates one computer, then working for an hour creates 1/3 of a computer (!)
  - So if labour is used up in 1hr increments, the marginal product of labour for computers is 1/3
    - $a_C^i = 3$, $MPL_C^i = \frac{1}{a_C^i} = \frac{1}{3}$

Example

- Canada: $a_C^N = 5$, $a_T^N = 5$
- Mexico: $a_C^S = 10$, $a_T^S = 5$

Table: Unit Labour Requirements

Country	Computers	Textiles
Canada	5	5
Mexico	10	5

Example

Table: Unit Labour Requirements

Country	Computers	Textiles
Canada	5	5
Mexico	10	5

- Canada has an absolute advantage over Mexico
  - 5 hours only to produce either Computer or Textiles
- Takes Mexico 10 hours of labour to produce a Computer
- So should Canada take over production of all goods?

Example

Table: Unit Labour Requirements

Country	Computers	Textiles
Canada	5	5
Mexico	10	5

- With 5 hours of labour, Canada can create 1 Textile
- But they can also use this 5 hours of labour to create 1 Computer
- To create 1 Textile in Canada, they had to give up 1 Computer
- i.e. In Canada, Opportunity Cost of 1 Textile is 1 Computer

Example

Table: Unit Labour Requirements

Country	Computers	Textiles
Canada	5	5
Mexico	10	5

- For Mexico, 1 Textile requires 5 hours of labour
- But 5 hours of labour creates 1/2 a Computer (!)
- To create 1 Textile in Mexico, they had to give up 1/2 a Computer
- In Mexico, Opportunity Cost of 1 Textile is 1/2 a Computer

Example

Table: Unit Labour Requirements

Country	Computers	Textiles
Canada	5	5
Mexico	10	5

- Canada has an Absolute Advantage over Mexico in producing both goods
- But Mexico gives up fewer Computers to produce 1 Textile, which means that it has a comparative advantage in this good over Canada
- Thus, aggregate output can increase if Canada focuses it's production in Computers
- and if Mexico focuses its production in Textiles

Unit Labour Requirements

- We're going to be working a lot using Unit Labour Requirements
- Here's one way to confirm that Mexico has a Comparative Advantage over Canada in producing Textiles
- With *1 hour of labour*, Mexico has a Comparative Advantage in the production of Textile if

$$\frac{\text{Textiles made}}{\text{Computers given up}}_N < \frac{\text{Textiles made}}{\text{Computers given up}}_S$$

$$\frac{\frac{1}{a_T^N}}{\frac{1}{a_C^N}} = \frac{a_C^N}{a_T^N} = 1 < 2 = \frac{a_C^S}{a_T^S} = \frac{\frac{1}{a_T^S}}{\frac{1}{a_C^S}}$$

- If in 1 hour you had to give up a lot of computers (very low left hand side) for one incremental production of textile, you should just produce computers

Unit Labour Requirements

- Using Unit Labour Requirements, we can see that Canada has a Comparative Advantage over Mexico in the production of Computers
- With 1 hour of labour, Canada produces 1/5 of a Computer and gives up 1/5 of a Textile
  - 1 Computer per Textile
- Mexico, on the other hand, produces 1/10 of a Computer and gives up 1/5 of a Textile
  - 1/2 a Computer per Textile
- Both gives up the same amount of Textile to produce Computers, but Canada was able to create more with their 1 hour of labour
- Therefore, Canada has a Comparative Advantage in the production of Computers

Unit Labour Requirements

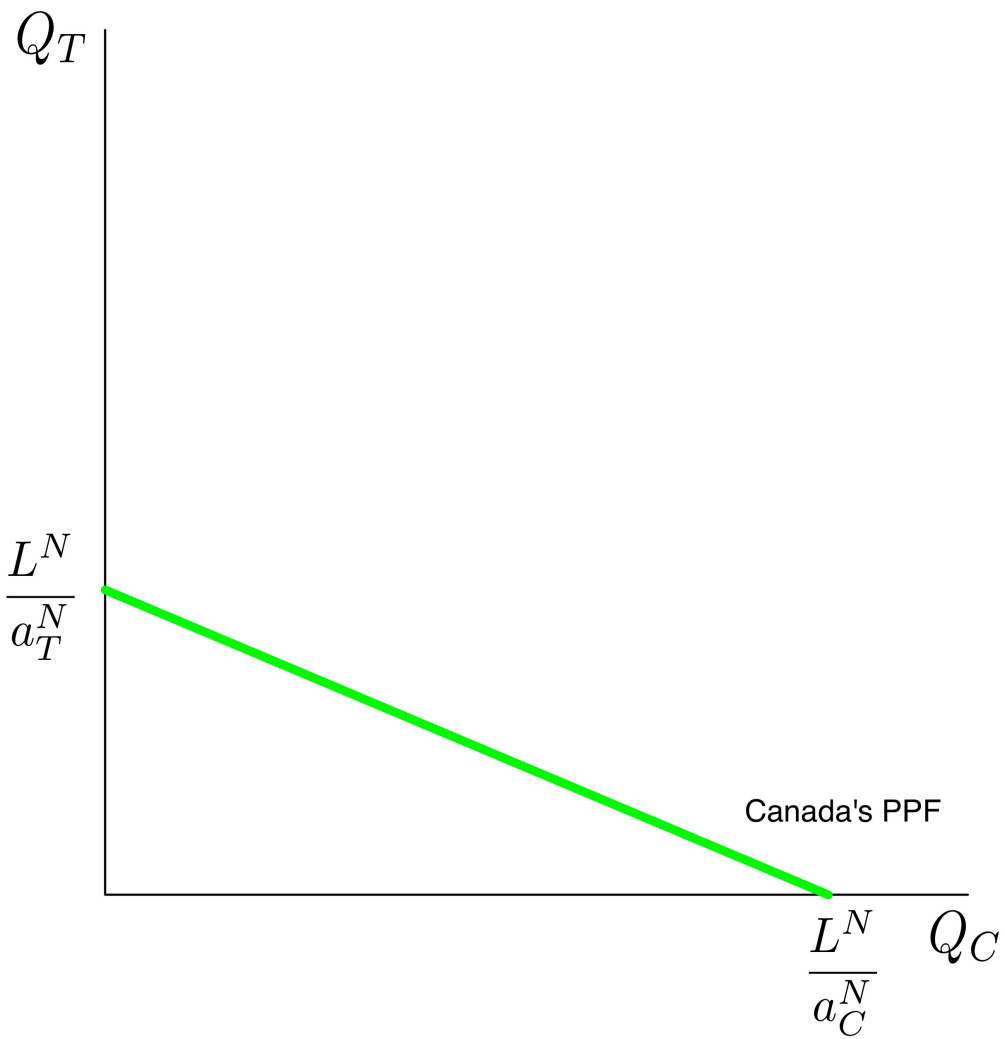
- No Comparative Advantage if

$$\frac{\frac{1}{a_T^N}}{\frac{1}{a_C^N}} = \frac{a_C^N}{a_T^N} = \frac{a_C^S}{a_T^S} = \frac{\frac{1}{a_T^S}}{\frac{1}{a_C^S}}$$

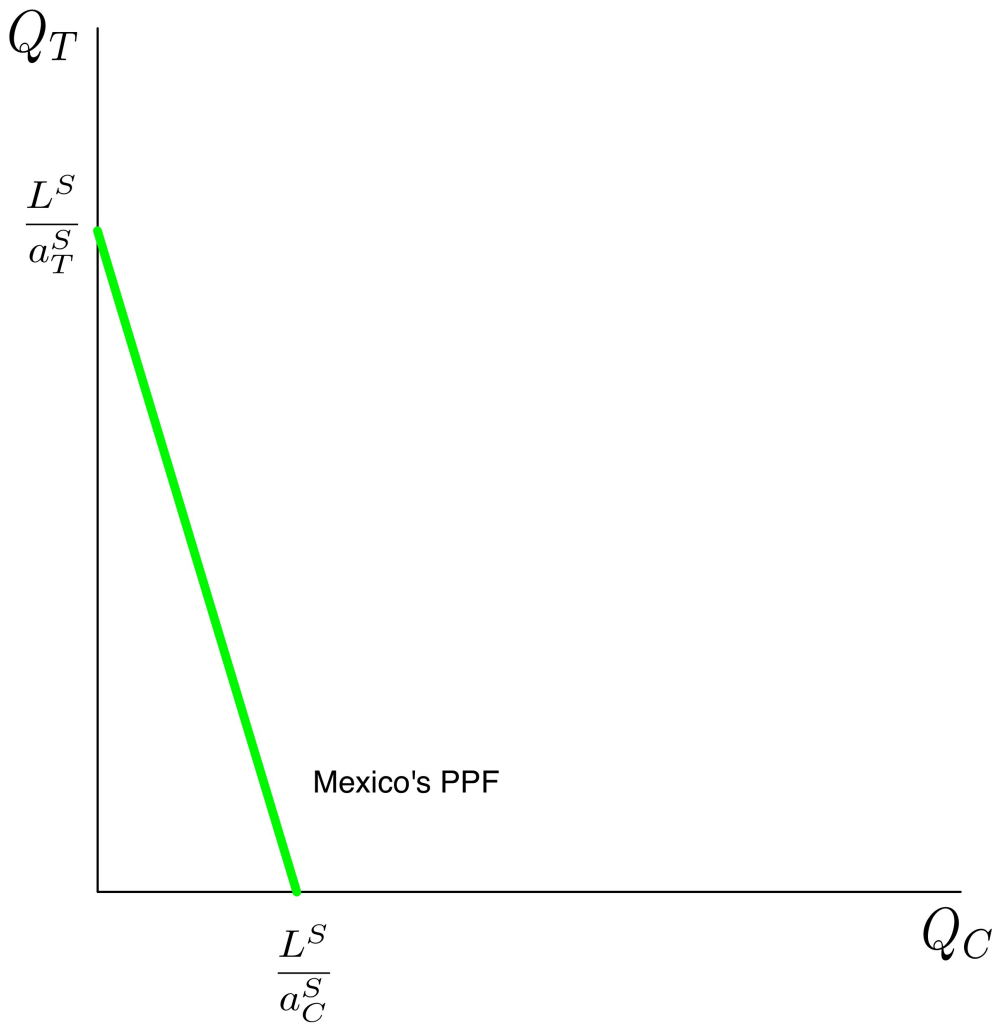
Autarky and PPF

- **Autarky**: a state in which a country does not trade with any other countries
- **Production Possibility Frontier (PPF)**: the set of outputs across all goods such that all the country's resources (labour) is being used
  - Canada: $a_C^N Q_C^N + a_T^N Q_T^N \leq L^N$
  - Mexico: $a_C^S Q_C^S + a_T^S Q_T^S \leq L^S$
- L^N is the maximum number of hours of labour available in Canada
- L^S is the maximum number of hours of labour available in Mexico
- The Unit Labour Requirements and Labour Endowments are *given*
- Thus, the PPF equations can be draw in the the output space
  - the PPF curve does not need to be linear

Canada's PPF Curve



Mexico's PPF Curve



Budget Constraint

- Now consider Canada as a consumer with the budget constraint:

$$P_C^N Q_C^N + P_T^N Q_T^N \leq w^N L^N$$

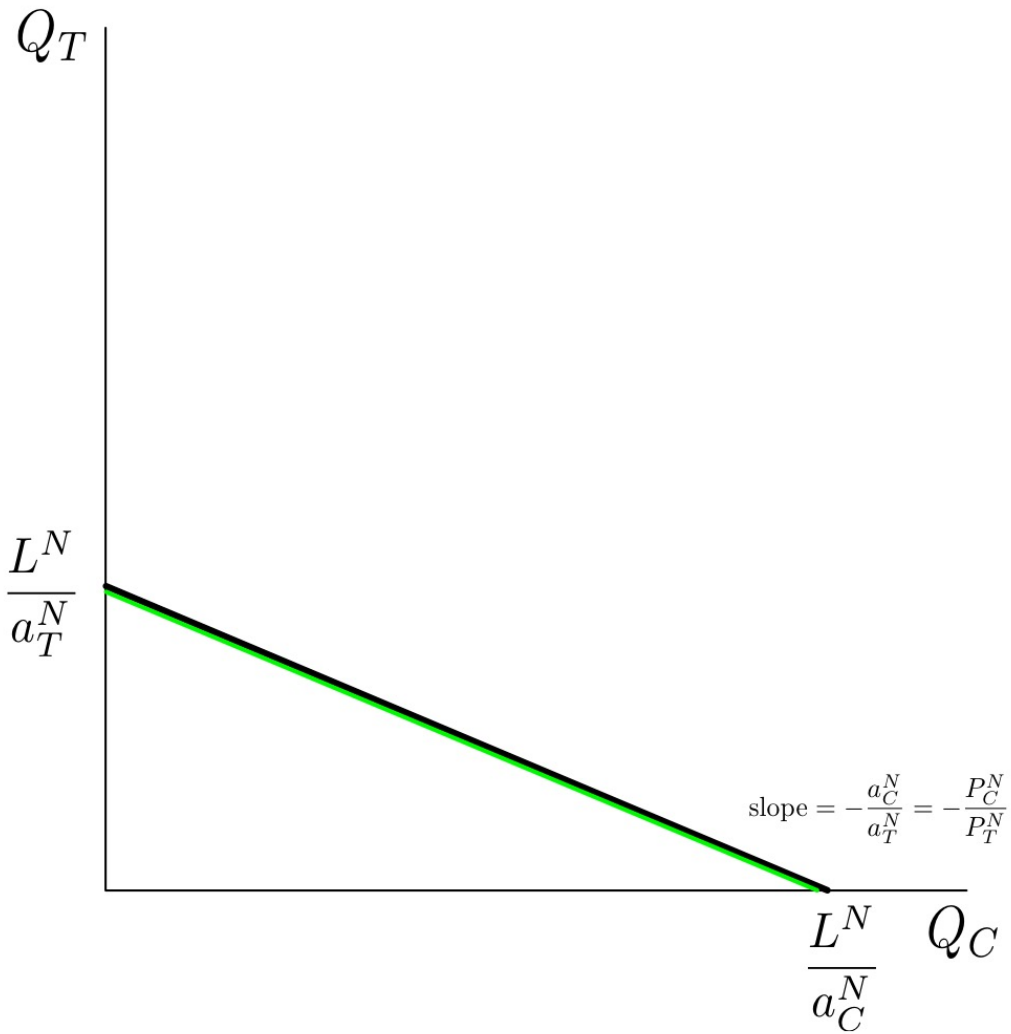
- Under Autarky, consumption is equal to production
- Labour is free to move across industries (hence, one wage for whole country)
- We can also represent the budget constraint in the output space
- But before we do that, because of perfect competition, unit revenue = unit cost

$$P_C^N = w^N a_C^N$$

$$P_T^N = w^N a_T^N$$

Budget Constraint overlaps PPF

- Substitute into budget constraint to see that it overlaps the PPF curve



Budget Constraint overlaps PPF

- From the perfect competition assumption we can see that the slopes of the budget constraint and PPF are equal

$$\frac{P_C^N}{P_T^N} = \frac{a_C^N}{a_T^N}$$

- This is also true for the southern country, Mexico

$$\frac{P_C^S}{P_T^S} = \frac{a_C^S}{a_T^S}$$

- We need to make some assumptions about preferences before we can calculate the optimal level of production of each good

Preferences

- Homothetic preferences imply that we can consider the whole country as one consumer
  - Each consumer will consume the same share of each good, they only differ in their level of income
- One type of utility function that characterizes homothetic preferences is the Cobb-Douglas

$$U = Q_C^{0.5} Q_T^{0.5}$$

Consumer Maximization

- The consumer's problem is to choose the level of Q_C and Q_T that solves

$$max\ U = Q_C^{0.5} Q_T^{0.5}$$

$$s.t.\ P_C^N Q_C^N + P_T^N Q_T^N \leq w^N L^N$$

$$P_C^N = w^N a_C^N,\ P_T^N = w^N a_T^N$$

Consumer Maximization