

Lecture 2:
***Trade Theory, Economic Growth
and Standard of Living***

- Absolute and Relative Advantages
- Terms of Trade and Standard of Living

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Opportunity Costs and Comparative Advantages

- The concept of opportunity cost
 - How much do you give up of something to have one unit of something else
 - If Canada wants to produce more automobiles it will have to stop producing other things such as ships or oil and gas
 - Apply to individuals as well (e.g., do that instead of doing that)
 - Limited resources implies choices (e.g., time)
 - Technology and resource endowments are key elements affecting opportunity costs
- Comparative advantages arise from the fact that countries have different opportunity costs for the same products
 - Country A has a comparative advantage over country B at producing good X if and only if country A has a lower opportunity cost at producing X than country B (need to know how much it costs to produce Y)
 - Countries will benefit from trade if they exports products for which they have a comparative advantage.

The Ricardian Model of Trade: One Factor Model

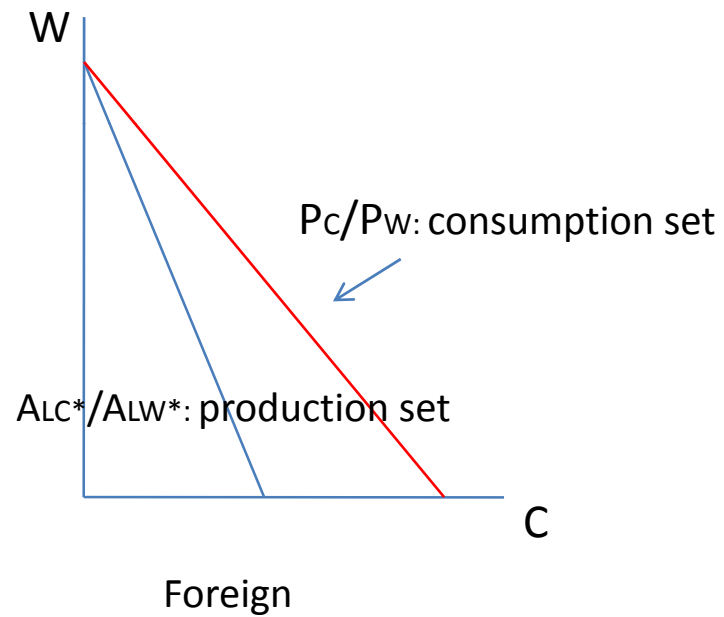
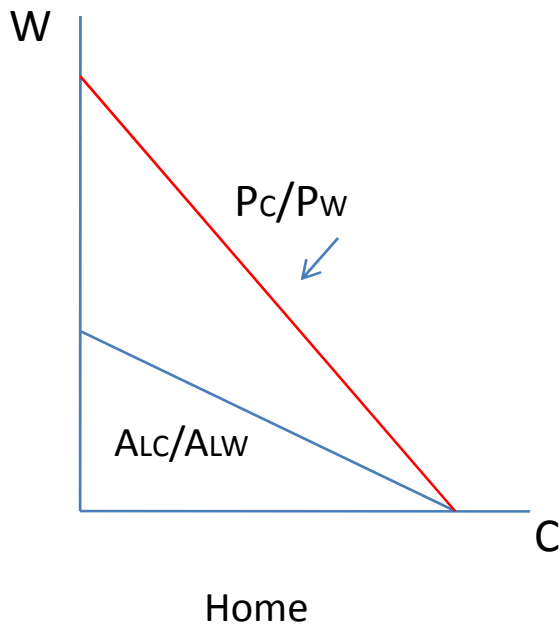
- One factor only: labour (L)
- Two goods: wine (W) and Cheese (C)
- Production possibility frontier:
 - $A_{LC} Q_C + A_{LW} Q_W \leq L$, where A_{ij} represents the unit labour requirement
 - Opportunity cost of cheese in terms of wine : A_{LC}/A_{LW}
 - E.g., $.5 Q_C + Q_W = L$, $Q_W/Q_C = .5$ is the opportunity cost of cheese (in terms of wine)
- Prices and Wages (autarky)
 - At equilibrium, without trade, wages must be the same in the two sectors (S)
 - Prices will reflect their costs: $P_C = S/A_{LC}$, $P_W = S/A_{LW}$
 - E.g., $S=5$, then $P_C = 5/.5 = 2.5$ and $P_W = 5/1 = 5$
- Without trade, the relative prices of cheese and wine is equal to the opportunity cost:
 - $P_C/P_W = A_{LC}/A_{LW}$ (e.g., $2.5/5 = .5$)

The Ricardian Model of Trade: One Factor Model (cont'd)

- Two countries: home (H) and Foreign (F)
- Assume home as a comparative advantage in cheese:
 - $ALC/ALW < ALC^*/ALW^*$ (* stands for foreign parameters)
 - In autarky, the price of cheese (in terms of wine) is lower at home than in foreign while the price of wine is lower in foreign.
 - Unsustainable under free trade: At equilibrium, the relative price of goods must be the same in both countries:
 - With trade the (aggregate) demand for cheese will drive its price higher in terms of wine: that will encourage home to produce more cheese. The demand for wine in foreign will increase and encourage it to produce more wine.
 - As cheese is now produced home and imported by foreign, it frees up labour to produce more wine in foreign.
 - Countries will specialize in the production for which they have a comparative advantage
 - At equilibrium, there will be a unique relative price of cheese. Normally the price will stabilize between the two pre-trade prices.

The Ricardian Model of Trade: One Factor Model (cont'd)

- In equilibrium, $P_C/P_W > A_{LC}/A_{LW}$: Production and consumption sets expand: there are gains for both countries.



The Ricardian Model of Trade: One Factor Model (cont'd)

- With trade, the prices of goods must be the same at equilibrium. As before, prices will reflect costs. In our two-country model, this means:
 - $P_C = S/ALC = S^*/ALC^*$ and $P_W = S/ALW = S^*/ALW^*$
 - But clearly, if $ALC \neq ALC^*$, then $S \neq S^*$ and, in particular,
 - If $ALC > ALC^*$, then $S > S^*$
- If Home is more productive than Foreign in the two goods (or on average more productive), then the wage of labour in Foreign must be lower than the wage in Home at equilibrium (the relative wage is lower). Note that the wage must be the same across the two sectors for a given country.
- Both countries are better-off with trade than without trade, no matter what are the productivity level difference between them. This is seen by the fact that the consumption set is larger than the production set.

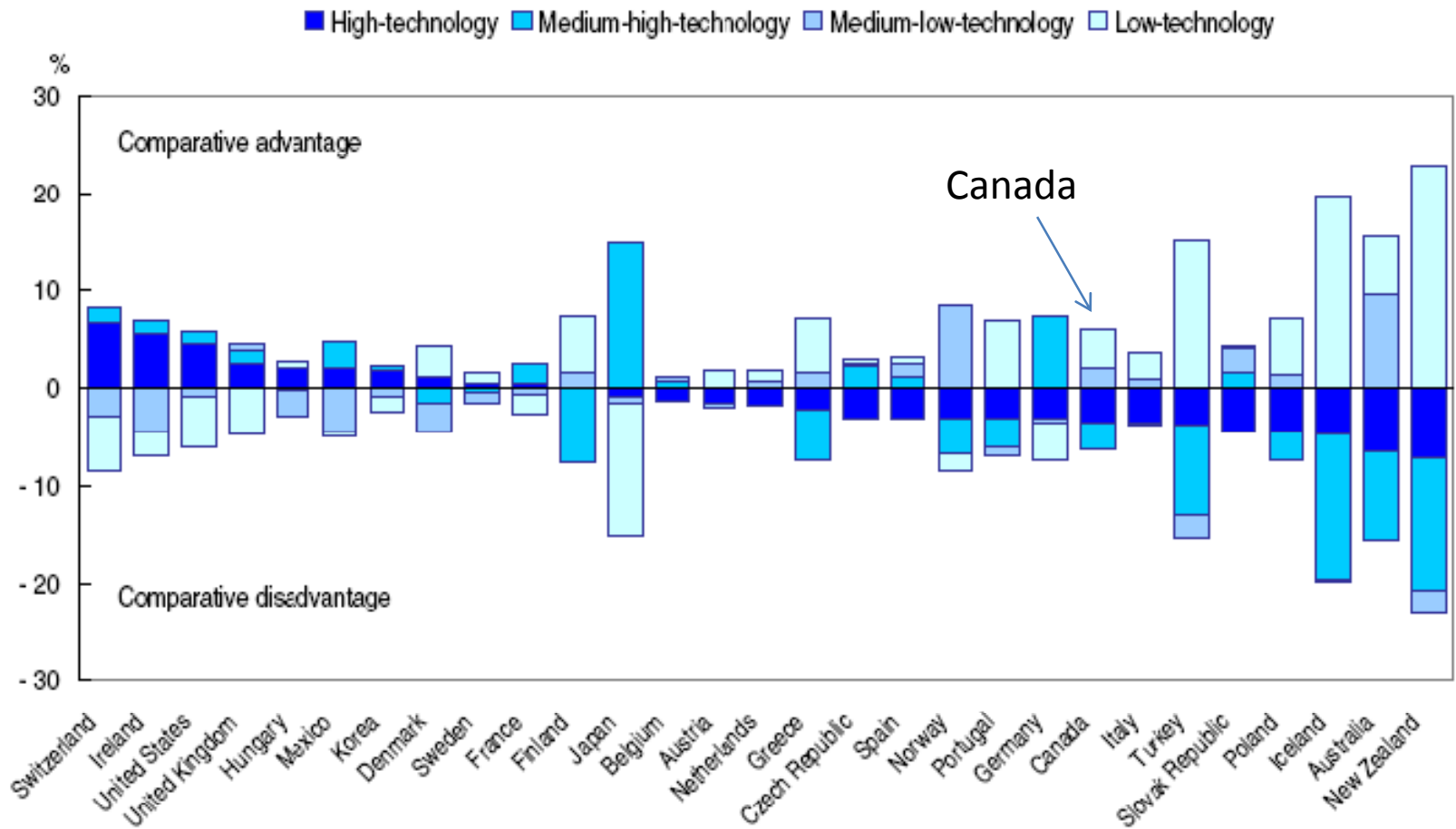
Absolute vs Relative Advantages

- We assumed that Home had a comparative advantage in the production of cheese:
 - $ALC/ALW < ALC^*/ALW^*$
- This can be rewritten:
 - $ALC/ALC^* < ALW/ALW^*$
 - Home relative productivity in cheese is higher than home relative productivity in wine
- This does not mean that one of the country has an “absolute advantage”:
 - e.g., $ALC < ALC^*$ or $ALW < ALW^*$, or both

	Home-a	Foreign-a	Home-b	Foreign-b
Cheese	1	3	3	2
Wine	3	4	6	3

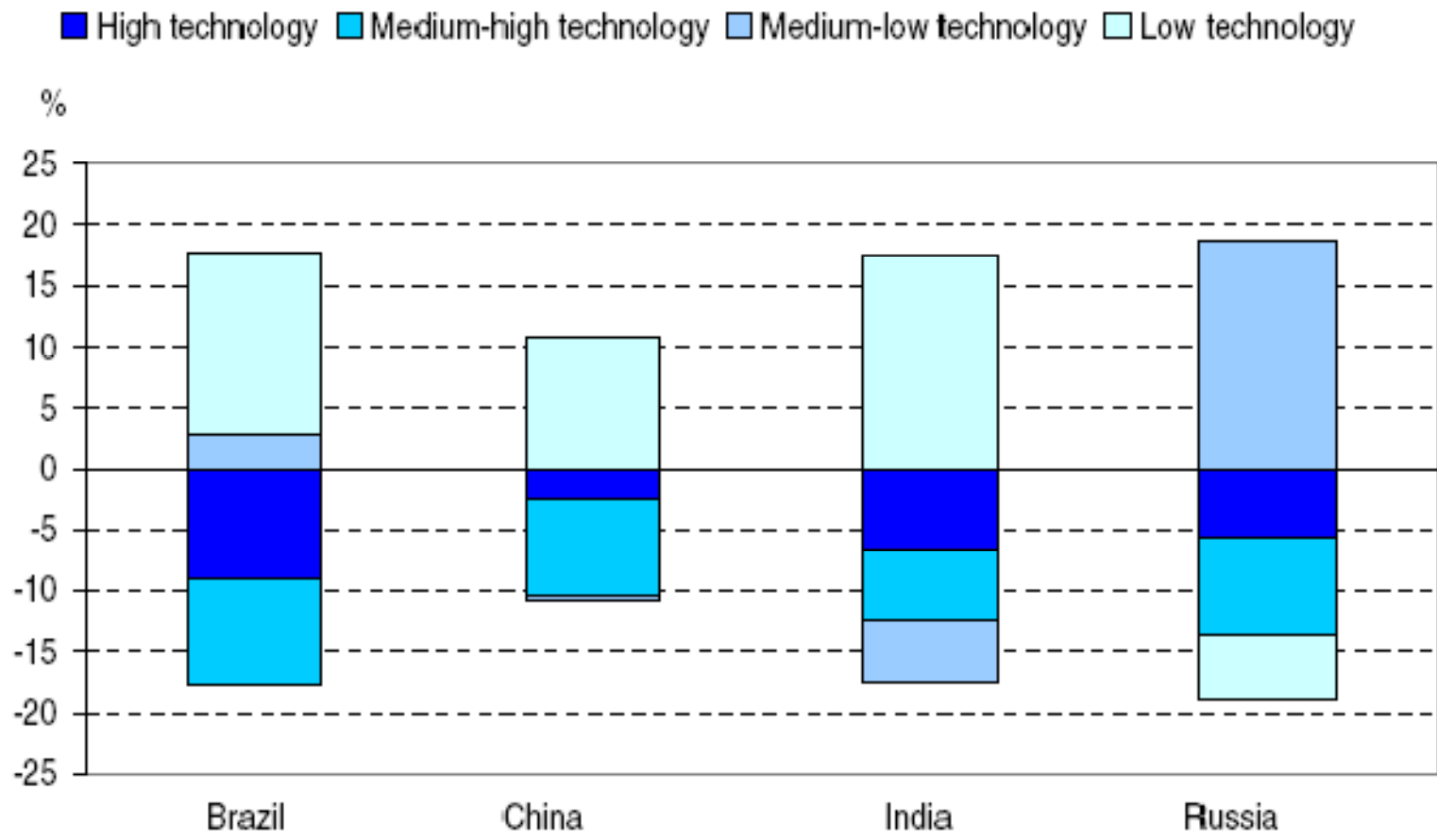
- a: Home has absolute advantage; b: Foreign has absolute advantage
- In both cases, Home has a comparative advantage in cheese

Contribution to the manufacturing trade balance, 2003
 – As % of total manufacturing trade –



$(E_{ci}/E_c) - (E_i/E)$

Contribution to the manufacturing trade balance, 2004
– As % of total manufacturing trade –



Source: OECD, Bilateral Trade Database.

Revealed comparative advantages (2006-07): (Share of j in country's exports/Share of j in world total exports)≥1

HS	Description	Canada	US	EU 27	China	Japan	Other East Asian	Canada Share in exports
75	Nickel & articles thereof	6.2	0.5	0.7	0.2	0.3	0.3	1.8
47	Wood pulp etc.	5.9	2.2	0.8	0.0	0.4	0.1	1.6
01	Live animals	4.1	0.6	1.5	0.3	0.0	0.1	0.5
44	Wood	3.8	0.7	1.1	0.9	0.0	0.6	3.5
31	Fertilizers	3.2	1.2	0.7	0.8	0.1	0.2	0.9
79	Zinc and articles thereof	2.9	0.2	1.0	0.8	0.3	1.0	0.5
12	Misc grain, seed, fruit	2.5	3.3	0.5	0.4	0.1	0.1	0.8
10	Cereals	2.4	3.3	0.6	0.3	0.0	0.5	1.2
48	Paper, paperboard	2.4	1.0	1.5	0.4	0.3	0.4	3.0
76	Aluminum and articles thereof	2.3	0.8	1.1	0.8	0.3	0.4	2.7
78	Lead and articles thereof	2.2	0.3	0.9	1.4	0.2	0.7	0.1
87	Vehicles other than railway	1.8	1.0	1.3	0.3	2.5	0.6	15.9
27	Mineral fuel, oil etc	1.8	0.3	0.5	0.1	0.1	0.6	20.4
28	Inorganic chemicals, isotopes	1.7	1.4	0.9	1.1	0.8	0.3	1.2
03	Fish and seafood	1.7	0.8	0.7	0.9	0.3	0.7	0.8
07	Vegetables	1.7	0.8	1.2	1.1	0.0	0.2	0.5
19	Baking related	1.6	0.7	1.6	0.3	0.1	0.5	0.5
43	Fur skins & artificial fur	1.6	0.5	1.1	1.7	0.0	1.7	0.1
26	Ores, slag, ash	1.6	0.7	0.2	0.1	0.0	0.0	1.1
11	Milling; malt; starch	1.5	1.1	1.3	0.4	0.1	0.6	0.1
88	Aircraft, spacecraft	1.5	4.1	1.1	0.1	0.2	0.3	2.3
25	Salt; sulfur; earth, stone	1.5	0.8	1.0	1.1	0.3	0.5	0.3
02	Meat	1.4	1.1	1.2	0.1	0.0	0.1	0.9
99	Commodities nes	1.4	1.0	0.9	0.1	1.6	0.5	4.1
36	Explosives	1.3	2.2	0.8	2.0	0.1	0.2	0.0
94	Furniture and bedding	1.3	0.6	1.3	2.4	0.1	0.4	1.6
49	Book and Newspapers	1.1	1.5	1.4	0.5	0.3	0.9	0.4
81	Other base metals, etc.	1.1	1.7	0.8	2.1	1.6	0.3	0.2
74	Copper and articles thereof	1.1	0.6	1.0	0.5	1.1	0.8	1.1
Export share in 2006-07		68.1	33.9	33.2	13.8	31.9	19.0	68.1

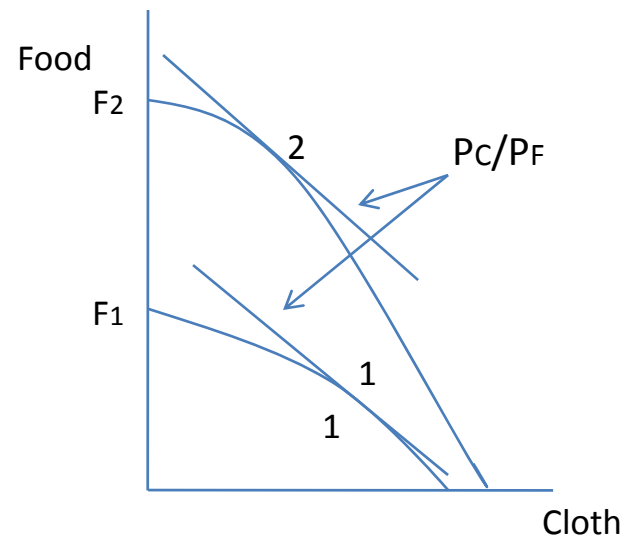
29 out of 96
(2-digit coding)

Some Policy Lessons from the Ricardian model

- Productivity and Competitiveness
 - Lower productivity levels (output divided by inputs) than in another country in all goods do not mean that you cannot benefit from trade (e.g., China). A country may have lower productivity than another one in all industries and still gain from trading with this more productive country (e.g., Britain vs the US in Krugman & Obstfeld, Chapter 3).
 - What counts to be able to compete and export is to have lower production costs compared to other countries. Relative wages must be taken into account along with productivity (e.g., China's low productivity is offset by its low wages).
 - Competing with low wages or with high productivity is inconsequential to the fact that trade makes countries better-off.
- Low productivity has consequences for living standards. Lower productivity implies a lower level of (relative) wage and hence a lower level of income and consumption than a more productive country. However, theory shows that trade does not worsen living standards, on the contrary, it contributes to raise them.

Resources and Comparative Advantages

- Comparative advantages may also result from the fact that resource endowments differ across countries (Heckscher-Ohlin).
 - A country with lots of land and little labour such as Canada will tend to produce and export goods that use land intensively (i.e., high land/labour ratio). Agricultural products in the case of Canada for example.



Production Possibilities
with two goods, two
inputs (K&O fig.4-10):
1: *Labour abundant economy*
2: *Land abundant economy*

Resources and Comparative Advantages

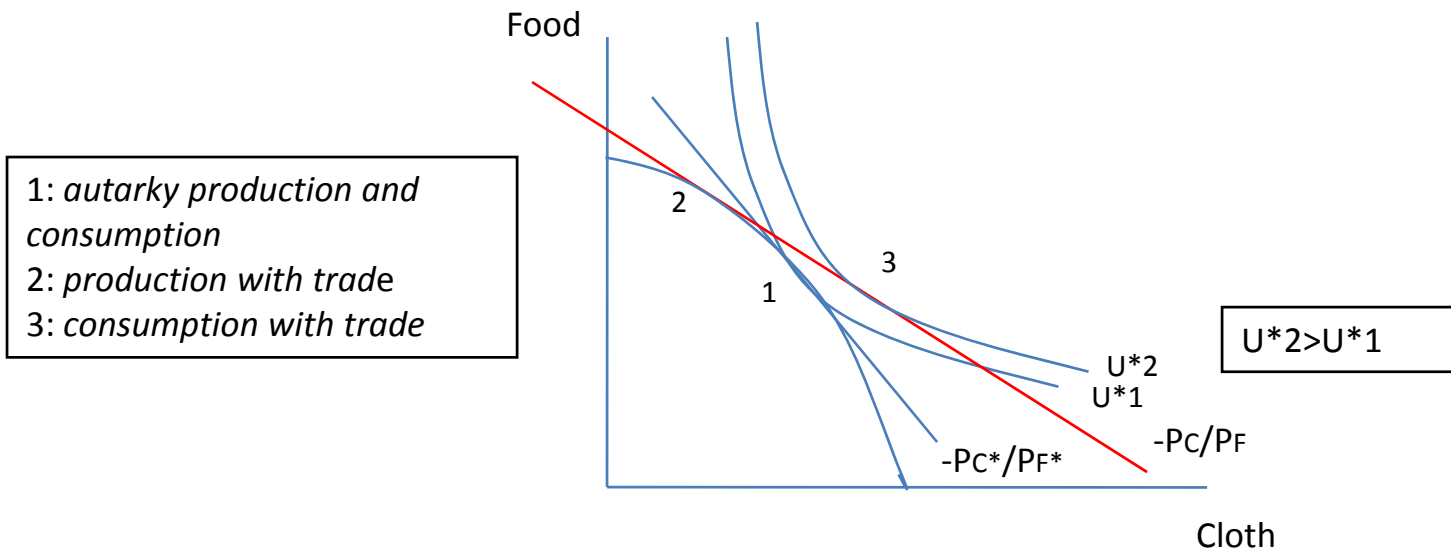
- Want to focus on how relative abundance can explain the composition of trade
 - Assume preferences and technologies are the same between home and Foreign:
 - $U(F,C)=U^*(F^*,C^*)=U(F,C)$
 - $QF(L,T)=QF^*(L^*,T^*)$ and $QC(L,T)=QC^*(L^*,T^*)$
 - Abundance differs: home has more labour than land and foreign has more land than labour:
 - $(L/T)>(L^*/T^*)$

Trade Flows when Resource Abundance Differs

- In the absence of trade, cloth is less expensive (in terms of food) at home than in Foreign (labour abundant).
- Opening trade will create an *excess demand* for Home cloth, driving its relative price up. The fall in the consumption of cloth in Home as the price is rising will free up resources to produce cloth for exports to Foreign.
- In Foreign, the price of cloth is falling and its consumption is rising. There is a fall in the consumption of food, freeing up resources to export food to Home.
- This process of price adjustment through trade will continue until prices converge between the two countries. The equilibrium price with trade will stabilize somewhere between the autarky price at Home and in Foreign.
- Countries that have same technologies and same preferences but differ in terms of resource abundance will benefit from trade (i.e., will tend to engage in trade).

Gains from Trade

- Chart illustrate how Foreign gains from trading with Home
 - Trade reduces the price of cloth for Foreign, which is now imported from Home
 - The production of food is increased and exported to Home
 - Foreign (and Home) gains with an upward shift in well-being from U^*1 (autarky) to U^*2 (with trade).



The effect of trade on income distribution

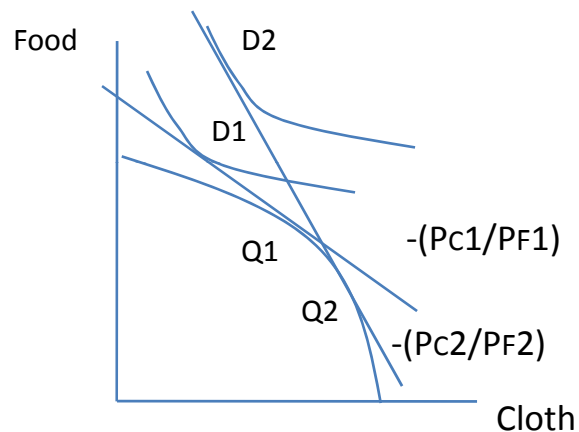
- The two-factor model shows that trade affects the relative price of goods and factors of production. Trade can have important effects on the distribution of income in an economy.
 - The price of cloth is falling in Foreign relative to food. This will tend to drive the wage of labour down and increase the rent of landowners compared to a situation without trade.
 - Without trade, the relative wage is higher in Foreign than in Home as it is the scarce factor. In Home the rent of land is higher than in Foreign.
 - Trade in this model will not only equalize the price of goods but also the price of factors. Trade of goods amounts to trading the factors embodied in the goods. So, any gap in relative factor prices between the two countries will tend to yield trade flows in goods until there is complete convergence.
 - Note that if technologies differ across countries, factor prices will not equalized although good prices would (absent any restriction on trade).
- Limited empirical success of this model to explain trade flows. Must be augmented with considerations resulting from differences in technologies.

Terms of Trade

- Assuming a country cannot borrow or lend to the rest of the world, then the value of consumption (i.e., absorption: consumption plus investment) or spending must equal the value of production or the income generated (basic budget constraint each country is facing):
 - $P_C Q_C + P_F Q_F = P_C D_C + P_F D_F = V$ (where D represents domestic demand)
 - Or, $P_F (D_F - Q_F) - P_C (D_C - Q_C) = 0$
 - The value of imports (exports) equals the value of exports (imports).
- This can be rewritten as:
 - $(D_F - Q_F) / (D_C - Q_C) = (P_C / P_F)$
- The *terms of trade* refer to the relative prices at which exports take place relative to imports:
 - If you are a country that export (import) cloth and the price of cloth increases relative to the price of food, then your term-of-trade are improving (deteriorating).

Terms of Trade (Cont'd)

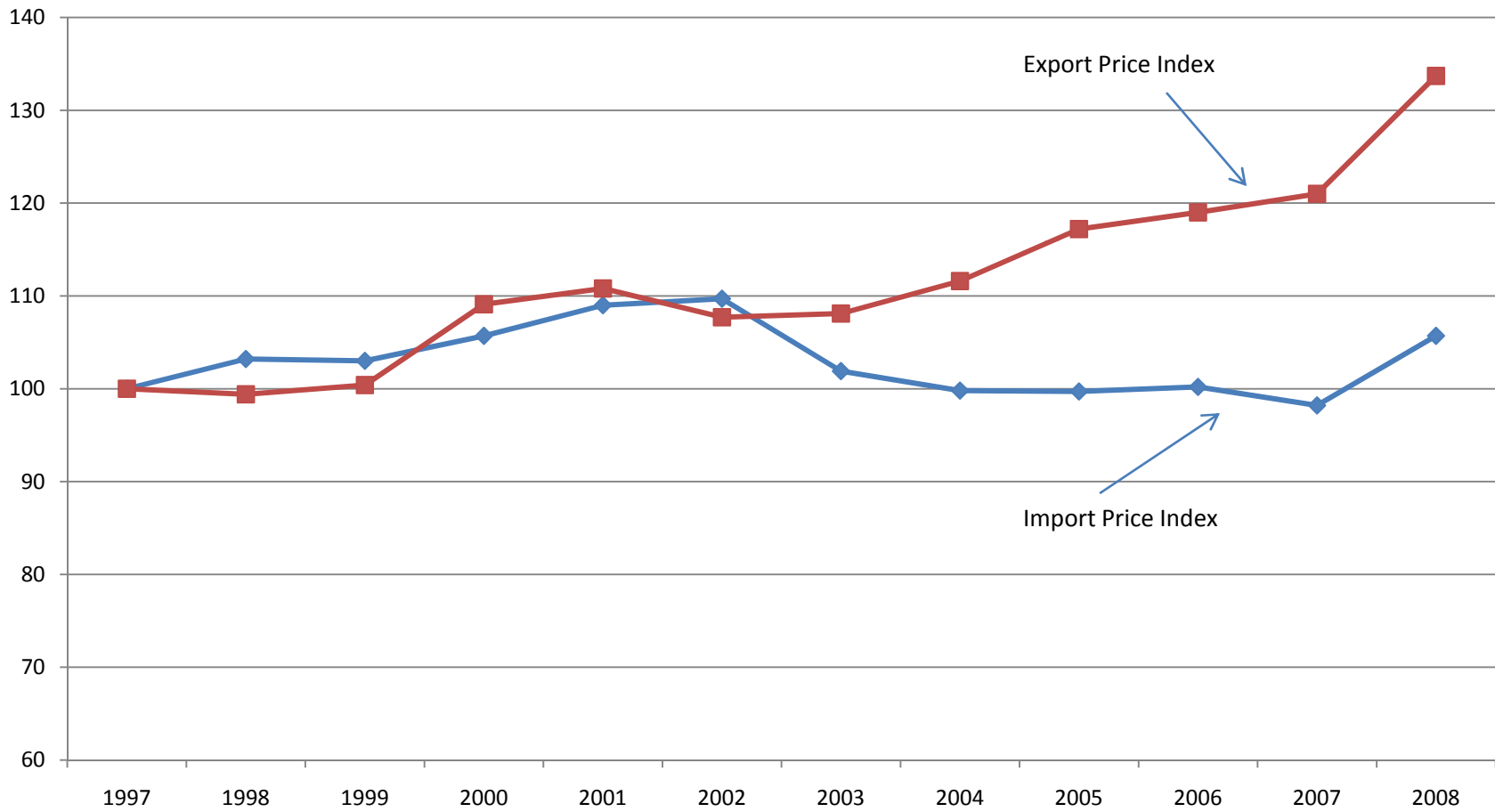
- When your terms of trade improve, you are better-off. When your terms of trade deteriorate, you are worse-off.



Q1; Production at time 1
Q2: Production at time 2
D1: Consumption at time 1
D2: Consumption at time 2

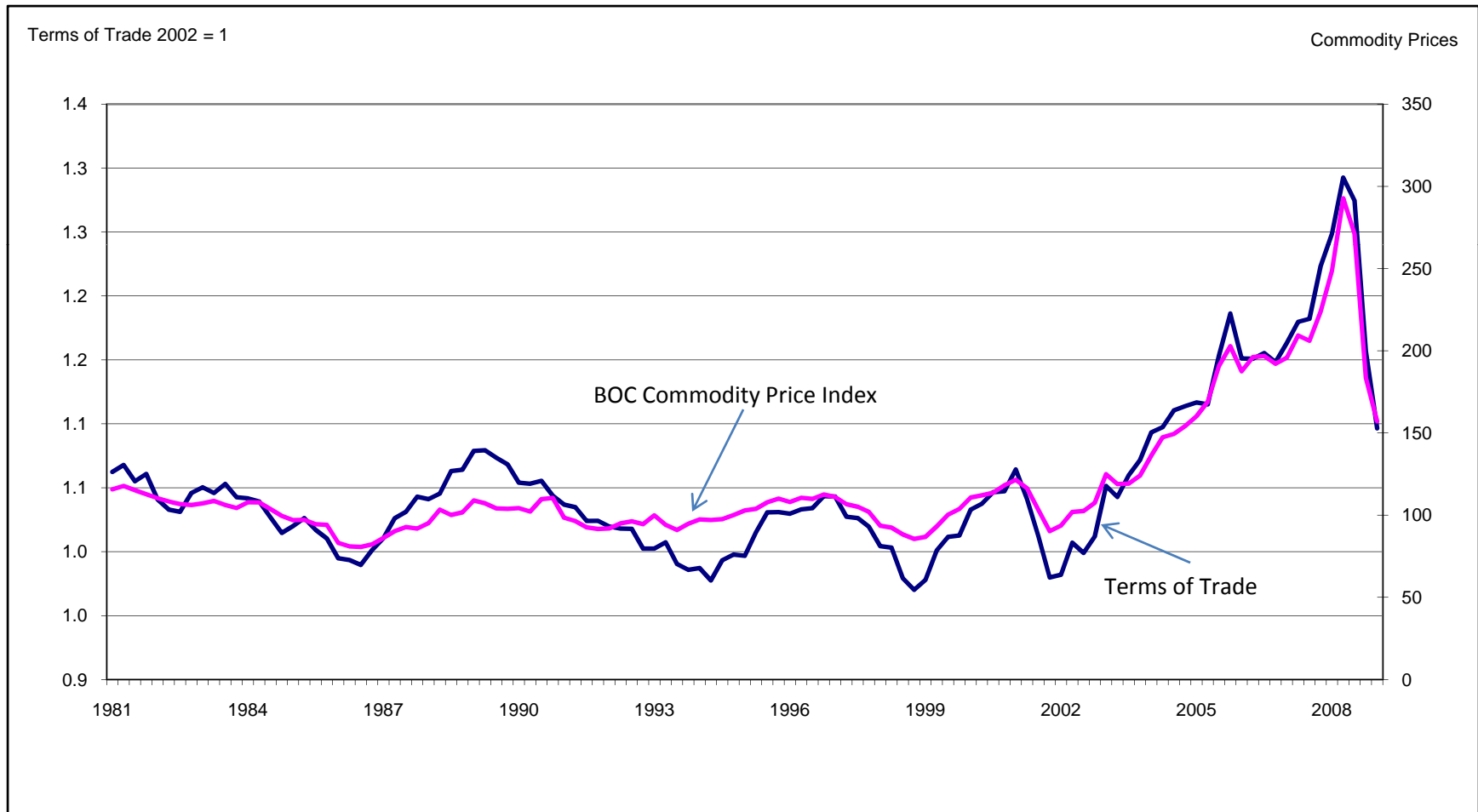
- The country illustrated is an initial exporter of cloth. The price of cloth goes up from time 1 to time 2. Production of cloth increases, consumption falls. The improvement in the terms of trade lead to an increase in the country's welfare.
- Clearly, what happens to a country's terms of trade through time is important for welfare.

Import and Export Price Indices (1997-2008)



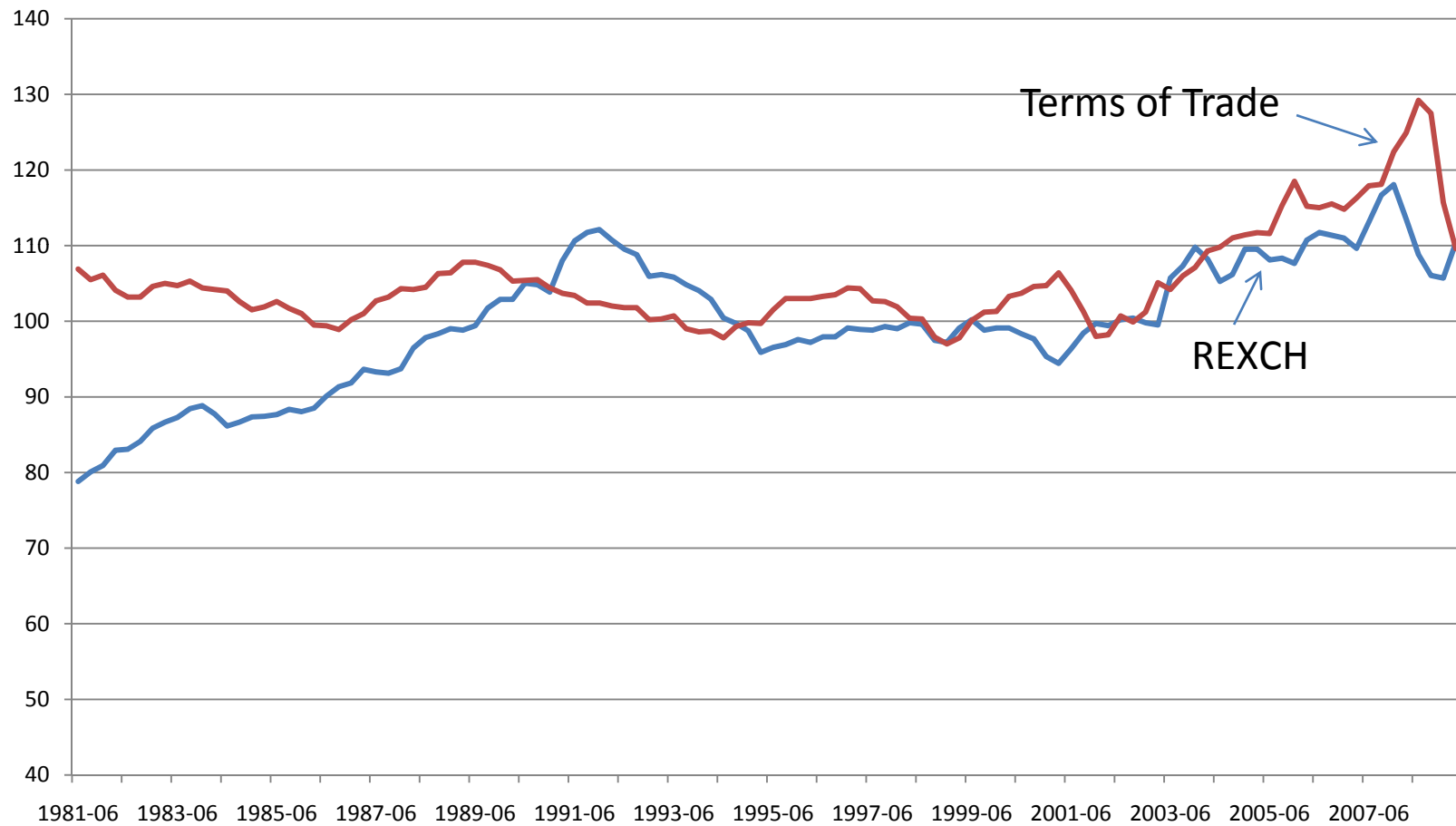
Source: Cansim, Laspeyre Indices, custom basis.

Canadian Terms of Trade and Commodity Prices (1981Q1-2009Q1)



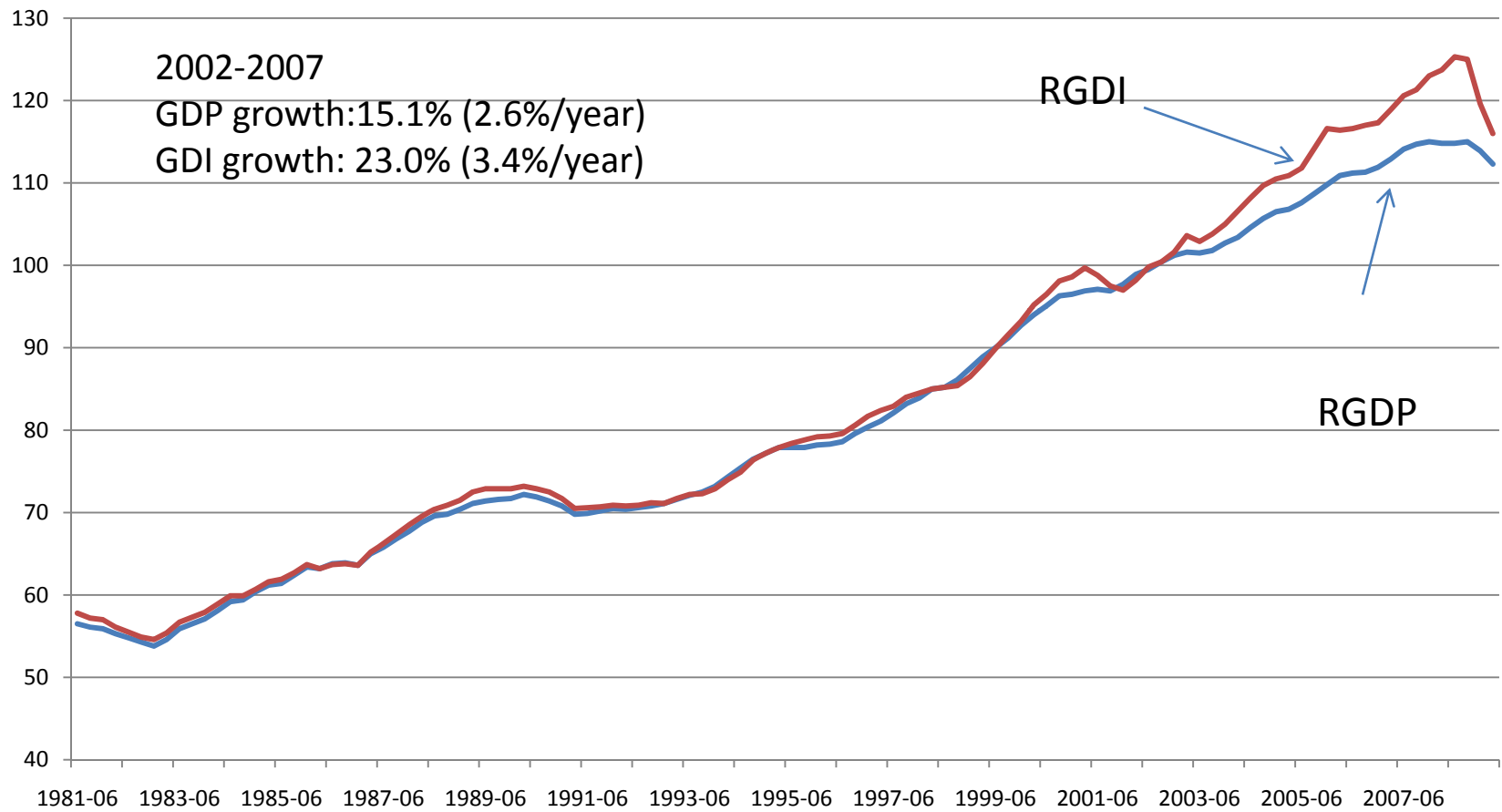
Source: Bank of Canada, CANSIM

Canadian Terms of Trade and the Real Exchange Rate (1981Q2-2009Q1, 2002=100)



Source: Cansim

Canadian Production and Income in Volumes (1981Q2-2009Q1, 2002=100)



Source: Cansim

RGDI \approx Real domestic demand + $(1/P) (P_X X - P_M M)$, where X and M are the volumes of exports and imports and P the final domestic demand deflator: it is a measure of the purchasing power of domestic income. Command GDP is the P variable is given by the import deflator P_M .

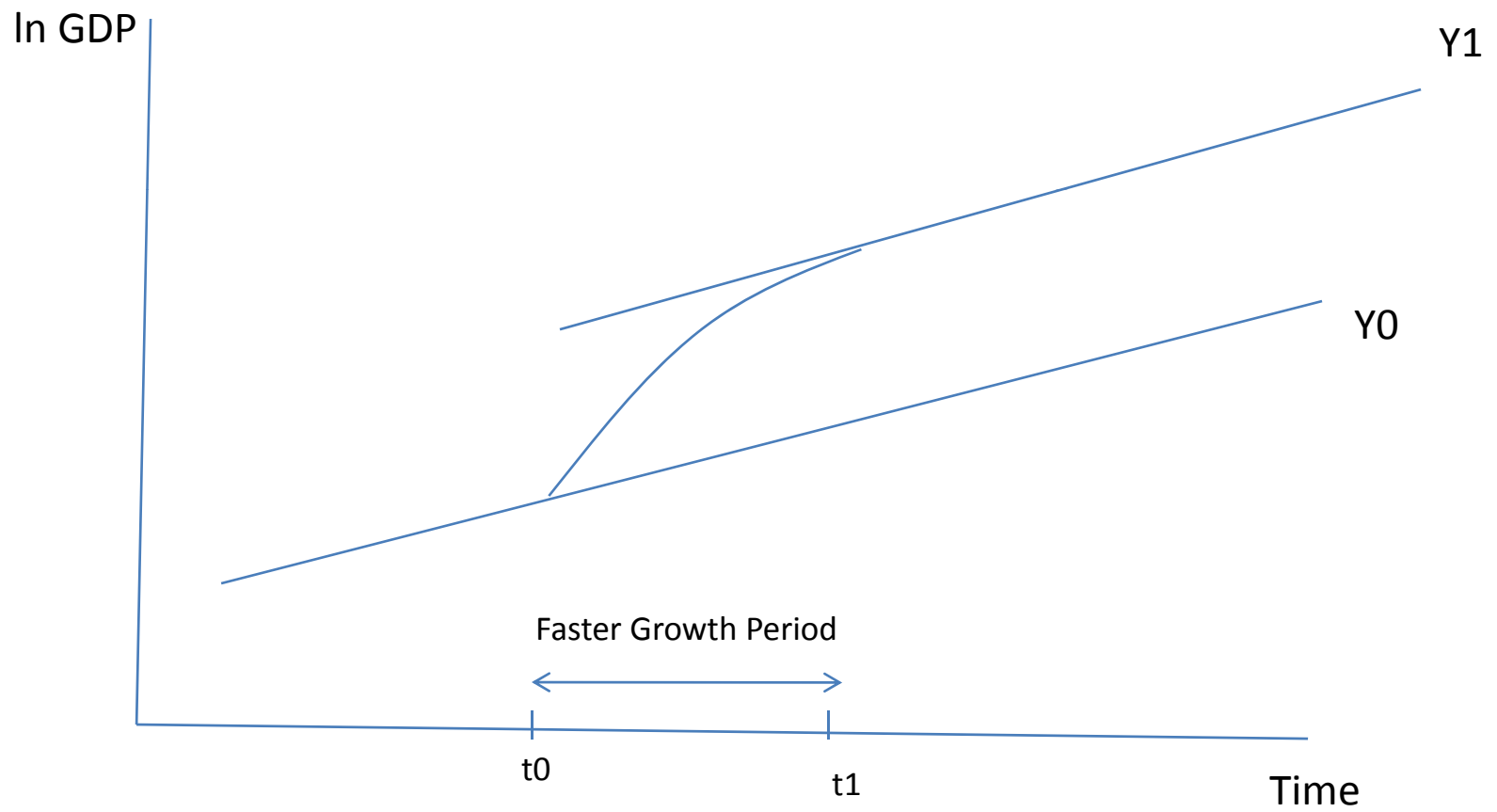
Trade and Economic Growth

- Own country economic growth and effects on terms of trade.
 - Export-biased growth in a country tends to deteriorate the country's terms of trade by increasing the supply of these exports on world markets and push the price of exports down. Because the terms of trade deteriorate, it decreases the welfare of the exporter and increases it for the importers.
 - Import-biased growth, by increasing the total supply of the imported good, tends to put downward pressures on the price of imports and therefore improves a country's terms of trade.
 - Canada is a price taker and its production has not much effect on its terms of trade (there are exceptions, e.g., medical isotopes)
- Rest of world growth and effects on terms of trade.
 - Export-biased growth in the rest of the world would reduce the price of our imports and therefore improve our terms of trade. Import-biased growth will reduce the demand for our goods and hence the price of our exports, deteriorating our terms of trade.
 - The rapid development of China's exports (export-biased growth) has contributed to reduce the price of our imports and improves our terms of trade (e.g., lower prices for a host of products).
 - Moreover, it has also pushed up the demand for our exports (intermediate goods such as metals and minerals, but also luxury goods such as ice wine), driving prices for our exports up and leading to income gains in Canada.

Trade and Economic Growth (Cont'd)

- We know that trade improves welfare. Does trade contribute to growth? Are trading countries growing faster than non-trading countries? How can trade stimulate economic growth?
- Basic growth equation:
 - $d\ln y/dt = a + \alpha d\ln L/dt + \beta d\ln K/dt$
 - Essentially growth result from the pace at which capital accumulates (human and physical) and from the growth in productivity (i.e., the efficiency with which inputs are transformed in output)
 - No obvious, clear-cut and direct role for trade in this very simple aggregate model. Trade will improve income but can it improve growth in GDP?
- Empirical work relating economic growth to trade tends to support the view that trade liberalization induces a temporary (but long-lived) increase in economic growth (Winters, 2004).
 - A major component of that growth being productivity
 - Certainly the success of East Asian countries over the past 10-15 years have provided support for trade liberalization (Sliglitz, 2008). There are failures of course.

Economic Growth: Transition Dynamics



Trade and Economic Growth: Some channels

- Specialization:
 - Trade induces greater specialization in production by allowing countries to reshuffle production along their comparative advantages;
 - Countries that trade tend to have a higher *level* of productivity.
- Technological knowledge transfers:
 - Transfer of technological “know how” through the trade of capital good and business services (e.g., licensing) is another channel through which trade flows raise productivity.
- Enhanced competition:
 - Plant-level studies show that the opening of trade increases competition and forces low productive firms to leave the market while high productive firms gain market shares, pushing industry-level productivity up (e.g., Baldwin-Gu, 2004)
- Economies of scale:
 - Firms that have access to a larger market can benefit from economies of scale and therefore raise their productivity (Note: A different argument than specialization with constant returns to scale) See Trefler 2004.

Trade with increasing returns

- Trade allows countries to limit the variety of products they produce and specialize in order to benefit from economies of scale (declining average costs).
 - So, even if technology were the same across (firms) countries as well as resources, there are still incentives for (firms) countries to engage in trade as trade expand markets and allow them to realize scale economies (to be more productive).
- Consumers have more choice (more variety) with trade than without trade, at better prices.
- The Canadian economic literature finds empirical support for the thesis that NAFTA has induced Canadian firms to benefit from economies of scale.

Intra-Industry trade

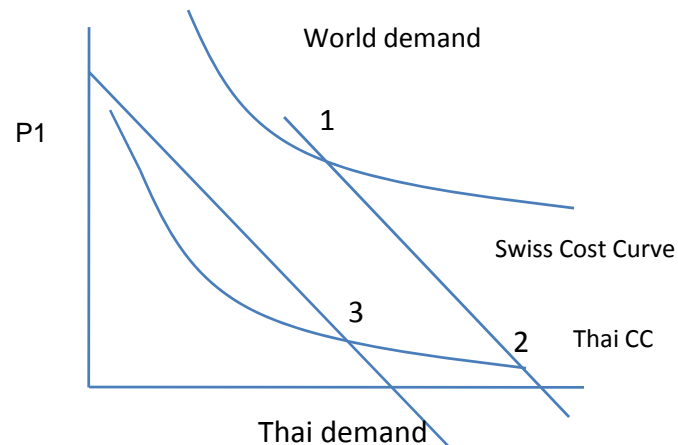
- Intra-industry trade is the two-way exchanges of goods within a given industry across countries
 - Canada BOB, \$ millions, 2008

	Imports	Exports
Automotive products	71959	61082
Aircraft and transportation equipment	17544	20339
Forestry products	2869	25659

- First two groupings reflect exchanges across developed countries (similar capital/labour ratios and productivity). Trade flows are mainly driven by economies of scale and specialization within industries rather than inter-industry specialization (e.g., NA Auto Pact where countries have product mandates).
- The large net exports in the last entry, forestry products, most likely reflects our large forested land endowments providing Canada a comparative advantage in forestry products.
- Also, less potential for product differentiation (commodity-based trade) in forestry products than in sophisticated manufacturing.

Trade with external economies

- External economies, which result in cost reductions from the presence of a cluster of firms in the same industry (e.g., auto industry in the Toronto-Windsor area), provide another source of competitiveness affecting trade.
 - External economies yield decreasing average cost at the industry level, even though individual firms might each face increasing average costs.
 - It provides a trade advantage to countries that have a large established industry.



- 1: actual situation with trade (run counter to comparative advantage)
- 2: potential situation (Thai has all the market)
- 3: Thai situation in autarky (better-off than with trade)

- “Accident of history” seems to play an important role in trade.

Conclusions

- Comparative advantages based on diverging opportunity costs in production provide scope for profitable trade.
- An absolute advantage in production (i.e., lower absolute costs) is neither necessary nor sufficient to make trade profitable:
 - Competitiveness (not comparative advantages) depends on productivity and wages (unit labour costs).
 - Productivity is the key to standard of living, not trade per se.
- The relative abundance of a production factor may provide a comparative advantage to a country and explains trade.
- The evolution of the terms of trade affects a country's income
- Trade can stimulate productivity and hence GDP growth through a number of channels
- Trade is also dependant on economies of scale and industry externalities