

INTERNATIONAL TRADE - ECON 245

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GAINS FROM TRADE

BRIEF HISTORY OF INTERNATIONAL TRADE THEORY

- ▶ 1830-1980: Neoclassical Trade Theory
 - ▶ Ricardo; Heckscher-Ohlin-Samuelson
- ▶ 1980-2000: New Trade Theory (Krugman's Nobel Prize)
 - ▶ Krugman-Helpman; Brander-Krugman; Grossman Helpman
- ▶ 2000- : New New Trade Theory
 - ▶ Eaton-Kortum; Melitz; Arkolakis Costinot Rodriguez-Clare

BRIEF HISTORY OF INTERNATIONAL TRADE EMPIRICS

- ▶ 1830-1990: Not much!
- ▶ 1990-2000: Empirical Tests of Heckscher-Ohlin and Ricardian Ideas
 - ▶ Leamer; Trefler; Davis-Weinstein
- ▶ 2000-2015: Firms
 - ▶ Bernard-Jensen; Tybout; Eaton-Kortum-Kramarz
- ▶ 2015-onwards: Distributional Consequences of Trade Liberalization, Service Trade, and Regional Impacts
 - ▶ Autor Dorn Hanson; Burstein Vogel; Feenstra Hanson; **You?**

WHAT IS TRADE AND SPATIAL ECONOMICS

- ▶ What is special about these fields is study of **hierarchical market structure**.
 - ▶ Global output markets + Regional factor markets
- ▶ Output: enters utility function, elastic supply+demand, freely traded
- ▶ Factors: affect budget constraint, fixed supply, not traded
- ▶ *Our interest:*
 - ▶ How does market integration affect goods+services prices?
 - ▶ How do changing output prices affect factor prices, allocation, spatial organization, and welfare?

SIDENOTE: PAPERS DIFFERENTIATING TRADABLE+NONTRADABLE INDUSTRIES

- ▶ Mian and Sufi: "What Explains the 2007-2009 Drop in Employment?", ECMA
- ▶ Burstein, Hanson, Tian, Vogel "Tradability and the Labor Market Impact of Immigration", ECMA
- ▶ Autor Dorn "The Growth of Low-Skill Service Jobs and the Polarization of the US Labor Market", AER
- ▶ Blinder Krueger "Alternative Measures of Offshorability: A Survey Approach", JLE
- ▶ Althoff, Eckert, Ganapati, Walsh: "The City Paradox", Working Paper

GAINS

FROM TRADE

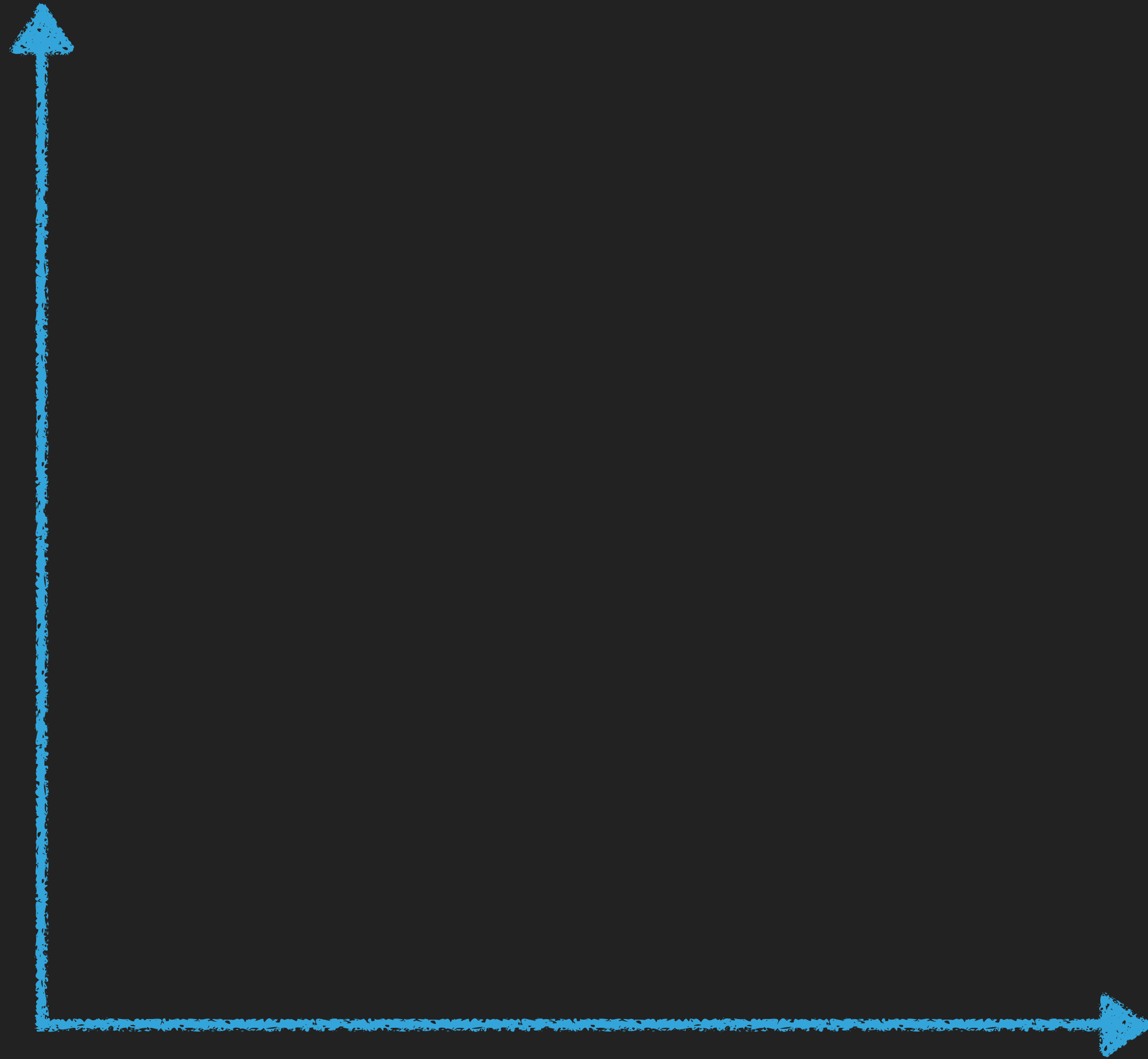
THE GAINS FROM TRADE

- ▶ Start with the broadest normative question:
 - ▶ When and why are there *potential* gains from free trade?
 - ▶ Are the potential gains realized in the market place?
 - ▶ Do all countries/individuals share in them?
- ▶ We compare free trade and autarky – comparing theoretical extremes to make the point.

THE BASIC ASSUMPTIONS

- ▶ Neoclassical Trade Models are characterized by three key assumptions
 - ▶ Perfect Competition
 - ▶ Constant Returns to Scale
 - ▶ Identical Households with homothetic preferences
- ▶ Under these assumptions can derive:
 - ▶ Gains from Trade (Samuelson 1939)
 - ▶ Law of Comparative Advantage (Deardorff 1980)

GAINS FROM TRADE FOR A SMALL COUNTRY



**SMALL COUNTRY =
INTERNATIONAL PRICES REMAIN
FIXED AT ANY LEVEL OF TRADE**

**FREE TRADE
IS SIMILAR TO
TECHNOLOGICAL PROGRESS**

HOW GENERAL IS THIS POINT?

- ▶ Profit Maximization implies $MRT = p^*$
- ▶ $X^a = C^a$ lies inside hyperplane formed by price line
 - ▶ General revealed preference argument: $C^f \succ C^a$
 - ▶ Does not depend on number of goods and factors
 - ▶ Does require $p^* \neq p^a$
- ▶ A large country cannot trade all it wants at fixed TOT
 - ▶ Need concept of offer curve: locus of all possible price-quantity pairs

FORMALIZATION: BASIC ENVIRONMENT

- ▶ Countries: $n = 1, \dots, N$; Households $h = 1, \dots, H^n$
- ▶ There are $g = 1, \dots, G$ goods:
 - ▶ Output vector in country n : $y^n \equiv (y_1^n, \dots, y_G^n)$
 - ▶ Consumption vector of h in n : $c^{nh} \equiv (c_1^{nh}, \dots, c_G^{nh})$
 - ▶ Good price vector in n : $p^n = (p_1^n, \dots, p_G^n)$
- ▶ There are $f = 1, \dots, F$ factors:
 - ▶ Endowment vector of country n : $v^n = (v_1^n, \dots, v_1^F)$
 - ▶ Factor price vector in country n : $w^n \equiv (w_1^n, \dots, w_F^n)$

SUPPLY

- ▶ Denote the set of combinations (y, v) feasible in country n by Ω^n
- ▶ Revenue function in country n :

$$r^n \equiv \max_y (py \mid (y, v) \in \Omega^n)$$

- ▶ *Comments:*
 - ▶ Revenue function summarizes all relevant properties of technology
 - ▶ Under perfect competition y^n maximizes the value of output in country n

$$r^n(p^n, v^n) = p^n y^n$$

DEMAND

- ▶ Denote by u^{nh} the utility function of household h in country n
- ▶ Expenditure function for household h in country n is defined as

$$e^{nh}(p, u) = \min_c \{pc \mid u^{nh}(c) \geq u\}$$

- ▶ *Comments:*
 - ▶ Factor supply here is fixed; can be made a choice variable
 - ▶ Holding p fixed $e^{nh}(p, u)$ is increasing in u
 - ▶ Household maximization implies in equilibrium: $e^{nh}(p^n, u^{nh}) = p^n c^{nh}$

GAINS FROM TRADE

- ▶ Representative Household for now, drop h superscript.
- ▶ In a neoclassical trade model with one household per country, free trade makes all households (weakly) better off.

$$p^f(c^f - y^f) = 0$$

$$p^f c^f = p^f y^f$$

$$p^f c^f \geq p^f y^a$$

$$p^f c^f \geq p^f c^a$$

GAINS FROM TRADE

GAINS FROM TRADE FOR EVERYONE?

- ▶ Households provide different types (or combinations) of factors
 - ▶ Trade may benefit some and hurt others
- ▶ So for free trade to be Pareto improving may need policy instruments
 - ▶ Start with domestic lump-sum transfers
- ▶ Denote by τ^h the lump-sum transfer from government to household h
 - ▶ Can be positive or negative (subsidy or tax)

GAINS FROM TRADE FOR EVERYONE?

- ▶ In a neoclassical trade model with multiple households per country, there exist domestic lump-sum transfers such that free trade is (weakly) Pareto superior to autarky in all countries.
- ▶ Step 1: For any h , set the lump-sum transfer τ^h such that

$$\tau^h = (p - p^a)c^{ah} - (w - w^a)v^h$$

Budget constraint under autarky $p^a c^{ah} \leq w^a v^h$. Therefore

$$pc^{ah} \leq wv^h + \tau^h$$

GAINS FROM TRADE FOR EVERYONE?

- ▶ In a neoclassical trade model with multiple households per country, there exist domestic lump-sum transfers such that free trade is (weakly) Pareto superior to autarky in all countries.
- ▶ Step 2:

$$\begin{aligned} -\sum \tau^h &= (p^a - p) \sum c^{ah} - (w^a - w) \sum v^h \\ &= (p^a - p)y^a - (w^a - w)v \\ &= -py^a + vw \\ &\geq -r(p, v) + wv \\ &= -(py - wv) = 0 \end{aligned}$$

GAINS FROM TRADE FOR EVERYONE?

- ▶ Lump-sum taxes, even if just domestic, still very information-intensive.
 - ▶ How about commodity taxes and subsidies only?
- ▶ Suppose the government can affect prices for factors and goods as follows:

$$p^{\text{household}} = p + \tau^{\text{good}}$$
$$w^{\text{household}} = w + \tau^{\text{factor}}$$

GAINS FROM TRADE FOR EVERYONE?

- ▶ Consider the two following taxes:

$$\tau^{\text{good}} = p^a - p$$

$$\tau^{\text{factor}} = w^a - w$$

By construction, household is indifferent between autarky and free trade.

$$\begin{aligned} -\sum \tau^h &= \tau^{\text{good}} \sum c^{ah} - \tau^{\text{factor}} \sum v^h \\ &= (p^a - p) \sum c^{ah} - (w^a - w) \sum v^h \geq 0 \end{aligned}$$

GAINS FROM TRADE FOR EVERYONE?

- ▶ So as long as there are production gains from trade; it is Pareto improving.
 - ▶ More general public finance insight: don't distort production
 - ▶ Trade here is like a new production technology
 - ▶ Thus trade should remain free
- ▶ Problem: factor taxation still difficult; need to know each household's endowment in efficiency units...?

COMPARATIVE ADVANTAGE

LAW OF COMPARATIVE ADVANTAGE

- ▶ So far normative predictions – can we make general positive predictions? Yes!
- ▶ **Comparative Advantage Differences**: differences in relative autarky prices (more broadly: relative opportunity costs)
 - ▶ Term coined by David Ricardo: father of Ricardian trade theory
 - ▶ Many lay people get this wrong and think you should do what you are “best at”
- ▶ “Law of Comparative Advantage:”
 - ▶ Countries tend to export goods in which they have CA, i.e., lower relative autarky prices compared to other countries.

DEARDORFF'S "GENERALIZED" LAW OF COMPARATIVE ADVANTAGE

- ▶ Let $t^n \equiv (y_1^n - \sum c^{nh}, \dots, y_G^n - \sum c^{nh})$ denote net exports in country n
- ▶ Let u^{an} and u^n denote the utility level of the representative household in country n under autarky and free trade
- ▶ Let p^{an} denote the vector of autarky prices in country n
- ▶ Without loss of generality: $\sum p_g = \sum p_g^{an} = 1$

▶ Notation

$$\text{cor}(x, y) = \frac{\text{cov}(x, y)}{\sqrt{\text{var}(x)\text{var}(y)}} \quad \text{cov}(x, y) = \sum_{i=1}^n (x_i - \bar{x})(y_i - \bar{y}) \quad \bar{x} = \frac{1}{n} \sum_{i=1}^n x_i$$

DEARDORFF'S "GENERALIZED" LAW OF COMPARATIVE ADVANTAGE

- ▶ In a neoclassical trade model, if there is a representative household in country n , then $\text{cor}(p - p^a, t^n) \geq 0$
- ▶ Since $(y^n, v^n) \in \Omega^n$ the definition of r implies: $p^a y^n \leq r(p^a, v^n)$
- ▶ Since $u^n(c^n) = u^n$, the definition of e implies: $p^a c^n \geq e(p^a, u^n)$
- ▶ The two previous inequalities imply: $p^a t^n \leq r(p^a, v^n) - e(p^a, u^n)$
- ▶ Since $u^n \geq u^{an}$, $e(p^a, \cdot)$ increasing implies $e(p^a, u^n) \geq e(p^a, u^{an})$

DEARDORFF'S "GENERALIZED" LAW OF COMPARATIVE ADVANTAGE

▶ Combining previous inequalities: $p^a t^n \leq r(p^a, v^n) - e(p^a, u^{na}) = 0$

▶ by market clearing under autarky

▶ Balanced trade implies: $p t^n = 0$ and hence $(p - p^a) t^n \geq 0$

▶ By definition + rearranging:

$$\text{cov}(p - p^a, t^n) = \sum_g (p_g - p_g^a - \bar{p} + \bar{p}^a)(t_g^n - \bar{t}^n) = (p - p^a) t^n - G(\bar{p} - \bar{p}^a) \bar{t}^n$$

▶ Given price normalization:

$$\text{cov}(p - p^a, t^n) = (p - p^a) t^n \geq 0$$

SOURCES OF COMPARATIVE ADVANTAGE

- ▶ Countries trade what they have comparative advantage in.
- ▶ Potential sources of comparative advantage
 - ▶ Technology (+amenity!) differences
 - ▶ Home Market Effects
 - ▶ **Factor Endowment Differences**

TESTING FOR THE COMPARATIVE ADVANTAGE IDEA

- ▶ CA is a fundamental idea in economics yet hard to test!
 - ▶ *Problem 1*: Principle version is too weak to test in real world
 - ▶ *Problem 2*: Measurement problem – “law” based on *trading* behavior at *autarky* prices
 - ▶ *Problem 3*: Periods of Autarky rarely observed
- ▶ Solutions:
 - ▶ Put some structure (Deardorff), but P2+3 remain...
 - ▶ Put a lot of structure to learn about “fundamentals” today then simulate autarky.
 - ▶ Tests then joint test of CA and structure!

TESTING FOR THE COMPARATIVE ADVANTAGE IDEA

- ▶ If we knew the equilibrium price vector p^a and the vector t of net export we could test whether: $p^a \cdot t \leq 0$
 - ▶ Never observed both autarky prices and vector of net exports at the same time
 - ▶ Even if, prediction is very low powered
 - ▶ BUT if you do observe autarky price it is a summary statistic for all demand and supply features of the economy

BERNHOFEN AND BROWN JPE 2004

- ▶ Bernhofen and Brown exploit that Japan was effectively a closed economy in 1858 and then opened up in 1859
 - ▶ Natural Experiment to test for Law of Comparative Advantage
 - ▶ Almost closed economy in 1858 means p^a is approximately observed.
- ▶ Other advantages of the setting:
 - ▶ Relative simple production technologies at the time
 - ▶ Opening up forced upon Japan by...USA

BERNHOFEN AND BROWN JPE 2004

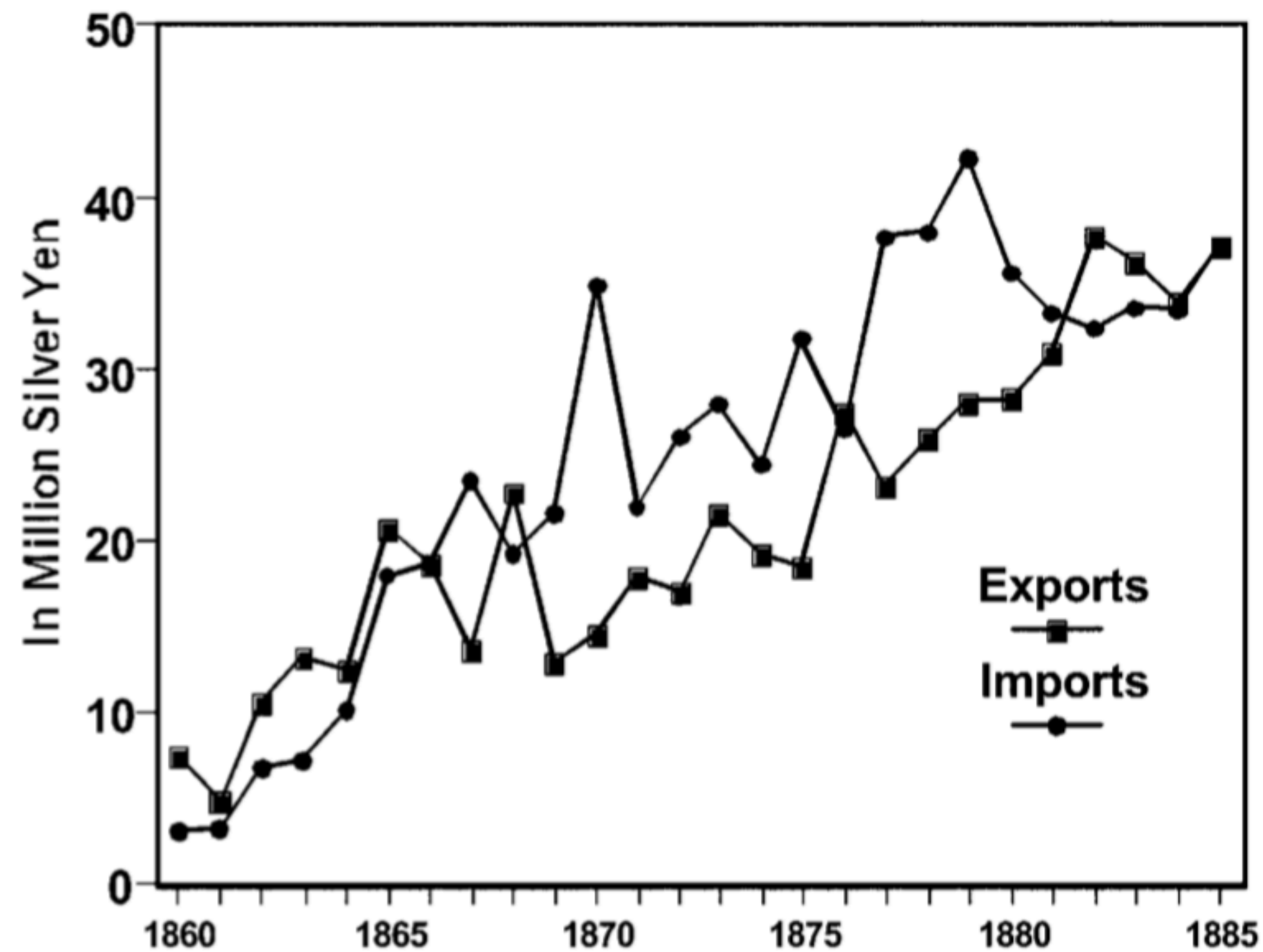


FIG. 3.—The development of Japan's external trade, 1860–85. Source: Sugiyama (1988, table 3-4).

BERNHOFEN AND BROWN JPE 2004

- ▶ Authors observe p_{1858} and t_{1859} (or around those years)
- ▶ They can hence compute $p_{1858} \cdot t_{1859}$ and check its sign!
- ▶ This would be a valid test if the following assumptions held:
 - ▶ Perfect competition under autarky and when trade (Japan = price taker)
 - ▶ No distortions (e.g., export subsidies)
 - ▶ Autarky prices from 1858 are the same they would have been in 1859!
 - ▶ i.e., technology and tastes are constant

BERNHOFEN AND BROWN JPE 2004

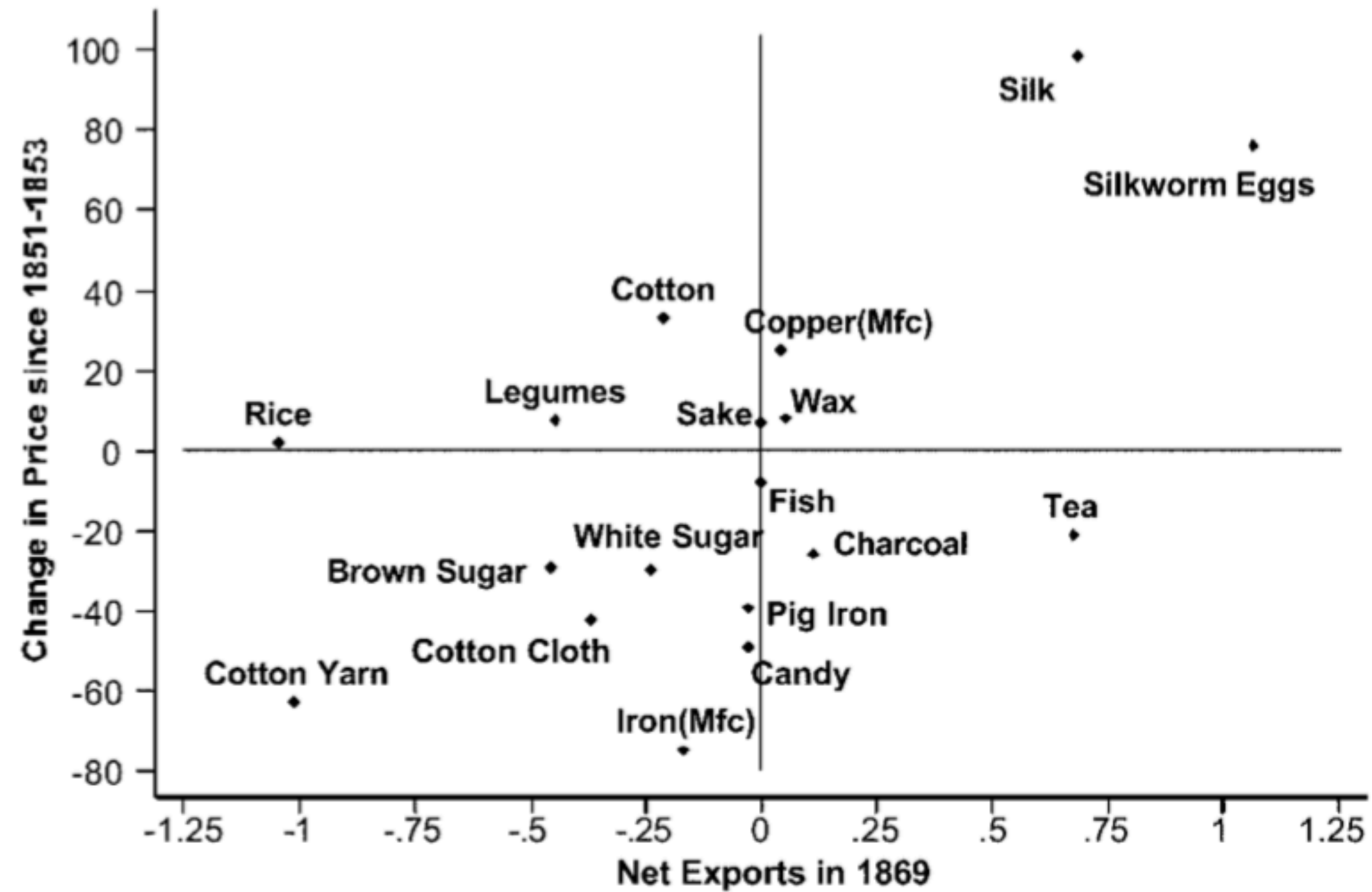


FIG. 4.—Net exports and price changes for 1869. Source: Japan Bureau of Revenue (1893) for trade data and Kinyu Kenkyukai (1937), Miyamoto (1963), Ono (1979), Yamazaki (1983), and Mitsui Bunko (1989) for price data.

BERNHOFEN AND BROWN JPE 2004

TABLE 2
APPROXIMATE INNER PRODUCT IN VARIOUS TEST YEARS (Millions of Ryō)

COMPONENTS	YEAR OF NET EXPORT VECTOR							
	1868	1869	1870	1871	1872	1873	1874	1875
1. Imports with observed autarky prices	-2.24	-4.12	-8.44	-7.00	-5.75	-5.88	-7.15	-7.98
2. Imports of woolen goods	-.98	-.82	-1.29	-1.56	-2.16	-2.50	-1.56	-2.33
3. Imports with approximated autarky prices (Shinbo index)	-1.10	-.95	-.70	-.85	-1.51	-2.08	-1.60	-2.65
4. Exports with observed autarky prices	4.07	3.40	4.04	5.16	4.99	4.08	5.08	4.80
5. Exports with approximated autarky prices (Shinbo index)	.09	.03	.07	.07	.15	.07	.11	.10
Total inner product (sum of rows 1-5)	-.18	-2.47	-6.31	-4.17	-4.28	-6.31	-5.11	-8.06

SOURCE.—For sources of price data, see Sec. IVB and n. 17. For rows 3 and 5, current silver yen values are converted to values of 1851-53 by deflating them with the price indices for exports and imports found in Shinbo (1978, table 5-10).

NOTE.—All values are expressed in terms of millions of ryō. The ryō equaled about \$1.00 in 1873 and was equivalent to the yen when it was introduced in 1871. The estimates are of the approximation of the inner product ($\tilde{\mathbf{p}}_i^a \mathbf{T}$) valued at autarky prices prevailing in 1851-53. An explanation of the assumptions underlying the approximation is contained in the text.

HARRIGAN ON BERNHOFEN AND BROWN JPE 2004

- ▶ Harrigan in Handbook chapter on Empirical Trade:

“I think I can speak for many economist who have taught this theory with great fervor when I say ‘thank goodness’.”