Lecture 5 – Comparative Advantage and Gains from Trade

The Puzzle

Ms. Garcia and Mr. Lee each teach math and reading to their own 4th grade class. Ms. Garcia's students learn more in *both* subjects. The principal is considering departmentalizing, with one teacher on math and one on reading. Should she? Who should teach what?

Absolute vs. Comparative Advantage

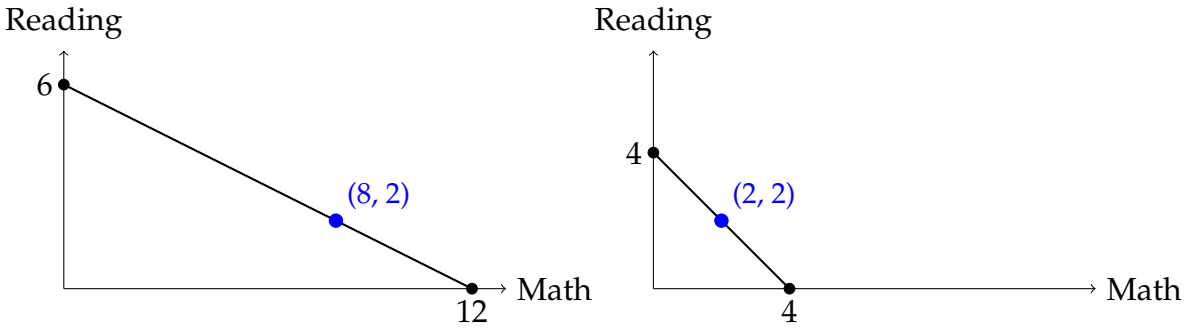
Units of learning each teacher produces in a week if they spend all their time on one subject:

	Math	Reading
Ms. Garcia	12	6
Mr. Lee	4	4

Ms. Garcia has an **absolute advantage** in both: she produces more of each with the same time.

What are their PPFs? (Assume learning is proportional to time.)

$$M_G + 2R_G = 12 \qquad\qquad M_L + R_L = 4$$



Ms. Garcia Mr. Lee

Each teacher's PPF. Blue points: what each chooses when working alone.

What does one unit of reading cost each teacher? Solve for M: $M_G = 12 - 2R_G$ and $M_L = 4 - R_L$. The slope is the opportunity cost.

	Cost of 1 math	Cost of 1 reading
Ms. Garcia	$\frac{1}{2}$ reading	2 math
Mr. Lee	1 reading	1 math

Whoever has the lower opportunity cost has the **comparative advantage**. Ms. Garcia has it in math and Mr. Lee has it in reading.

Can anyone have a comparative advantage in both? – *No. The costs are reciprocals, so if one is lower the other is higher.*

Gains from Specialization

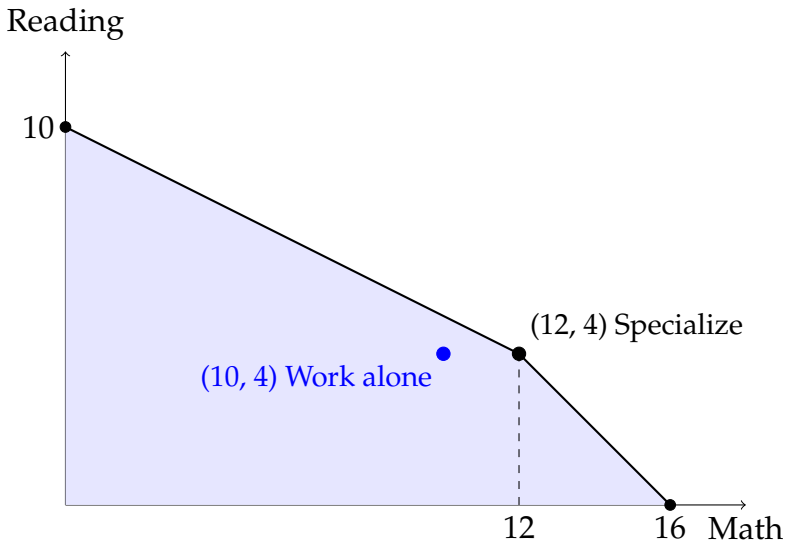
	Work alone	Specialize
Ms. Garcia	(8M, 2R)	(12M, 0R)
Mr. Lee	(2M, 2R)	(0M, 4R)
Total	(10M, 4R)	(12M, 4R)

Two more units of math learning, no less reading. Where did it come from? – *Each subject is taught by whoever gives up the least to teach it.* What if they specialized the wrong way?

The School's PPF

Start with both teaching reading: (0M, 10R). Who should switch to math first? Ms. Garcia, since math only costs her $\frac{1}{2}$ reading. Then Mr. Lee.

$$R = \begin{cases} 10 - \frac{1}{2}M & 0 \le M \le 12 \\ 16 - M & 12 \le M \le 16 \end{cases}$$



The school's PPF. Working alone leaves the school inside its frontier.

Why is the school's PPF bowed out when each teacher's is straight? Connect this to Lecture 1.

Beyond the Classroom

A principal is better than her AP at both coaching teachers and handling discipline. Should she handle discipline?

Should a small district hire its own speech pathologist or share one with a neighbor?

Where else do you see specialization in schools or universities?

What does the model leave out? Coordination costs (schedules, handoffs), relationships (50 students instead of 25), distribution (the total grows, but a badly designed schedule could leave one class worse off), and rising opportunity costs. The gains from specializing have to cover these costs.

Wrapping Up

Absolute advantage: who is more productive. **Comparative advantage**: who has the lower opportunity cost.

Everyone has a comparative advantage in something.

Specializing by comparative advantage moves you out to the PPF.

Practice Problems

1. Two high school counselors can do the following in a day:

	College applications	FAFSA forms
Ana	10	5
Ben	6	6

(a) Write each counselor's PPF as an equation and draw them.

(b) Who has the absolute advantage in each task?

(c) Find each counselor's opportunity cost of one FAFSA form and of one application. Who has the comparative advantage in each?

(d) If each splits the day evenly, what is the total output? If they specialize, what is the total?

2. Continuing Problem 1, draw the school's combined PPF. Where is the kink, and what is each counselor doing there? Is the even split from 1(d) on the frontier or inside it?

3. This problem gives *hours per task* instead of output. A principal takes 1 hour per teacher observation and 0.5 hours per discipline referral. Her AP takes 3 hours per observation and 1 hour per referral.

(a) Who has the absolute advantage in each task?

(b) What is each person's opportunity cost of one observation, measured in referrals?

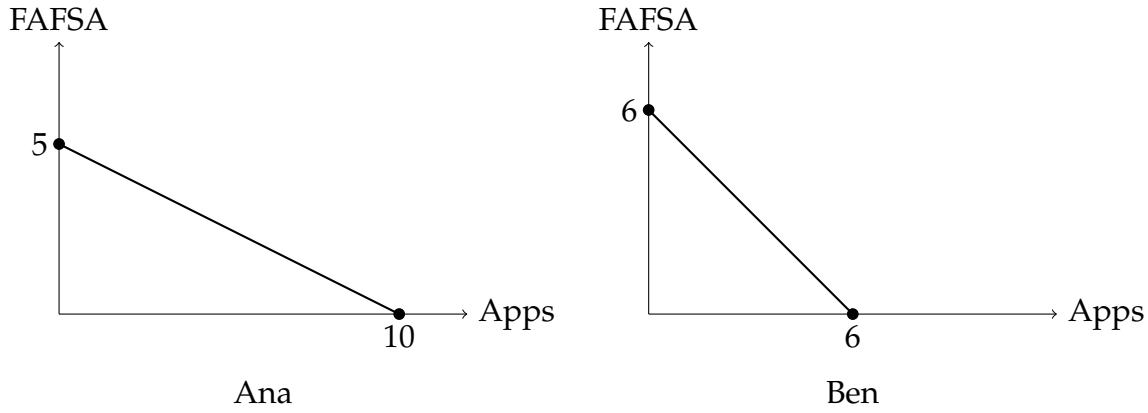
(c) Who should handle discipline? Why might the principal's instinct be to do it herself?

4. A campus is deciding whether to departmentalize 5th grade. Using today's model, make the case for it. Then give two reasons the gains in the model might not show up in practice.

Answer Key

1. Let A be applications and F be FAFSA forms.

(a) Ana: $A_A + 2F_A = 10$. Ben: $A_B + F_B = 6$.



(b) Ana has the absolute advantage in applications ($10 > 6$). Ben has the absolute advantage in FAFSA forms ($6 > 5$).

(c)

	Cost of 1 FAFSA	Cost of 1 application
Ana	2 applications	$\frac{1}{2}$ FAFSA
Ben	1 application	1 FAFSA

Ana has the comparative advantage in applications and Ben has it in FAFSA forms.

(d) Splitting evenly: Ana (5A, 2.5F) and Ben (3A, 3F), for a total of (8A, 5.5F). Specializing: Ana (10A, 0F) and Ben (0A, 6F), for a total of (10A, 6F). Specializing gives more of both.

2.

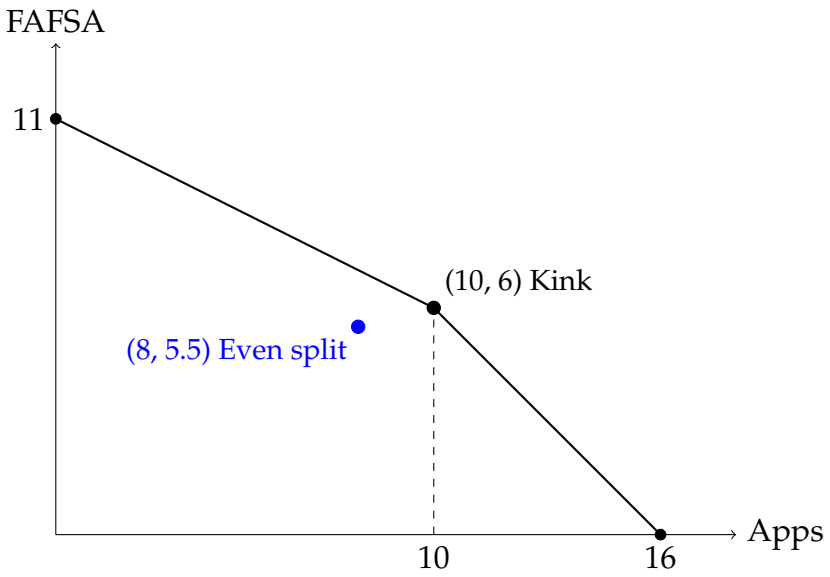
Start with both on FAFSA forms: (0A, 11F). Ana switches to applications first, since an application costs her only $\frac{1}{2}$ form.

$$F = \begin{cases} 11 - \frac{1}{2}A & 0 \le A \le 10 \\ 16 - A & 10 \le A \le 16 \end{cases}$$

The kink is at (10A, 6F), where Ana does only applications and Ben does only FAFSA forms. The even split (8A, 5.5F) is inside the frontier: at $A = 8$ the frontier gives $F = 7$.

3.

(a) The principal is faster at both tasks, so she has the absolute advantage in both.



(b) In one hour the principal can do 1 observation or 2 referrals, so one observation costs her 2 referrals. One observation takes the AP 3 hours, which could handle 3 referrals, so it costs the AP 3 referrals.

(c) The AP should handle discipline. One referral costs the AP $\frac{1}{3}$ of an observation and costs the principal $\frac{1}{2}$. The principal may want to do it herself because she is faster at it, which is confusing absolute advantage with comparative advantage.

4. Answers will vary.

The case for it: If each teacher has a comparative advantage in a different subject, assigning subjects that way moves the campus to its PPF and produces more total learning with the same teachers and time.

Reasons the gains might not show up:

Coordination costs, such as transitions between rooms and teachers aligning schedules, use up instructional time.

Each teacher sees twice as many students and knows each one less well.

Opportunity costs may rise. A teacher may be less effective in the fourth math block of the day than in the first.

The teachers may not have clear comparative advantages, so there is little to gain.

Distribution: a badly designed schedule could leave one class worse off even if the total rises.