Lecture 10 – Incidence: Who Really Gets the Financial Aid?

The Puzzle

Congress raises the maximum Pell Grant by $1,000. A student who was going to pay $9,000 now has $1,000 of federal money in hand. Does she pay $8,000?

Not necessarily. Her college may raise tuition. It may cut the institutional grant it was already giving her. More students may apply, and the seats may not grow. By the time the dust settles, the $1,000 may be split between her and the college in almost any proportion — and which proportion it is depends on the slopes of the supply and demand curves.

Two Different Questions

Statutory incidence: who the law says gets the money (or pays the tax).
Economic incidence: who is actually better off (or worse off) once prices adjust.

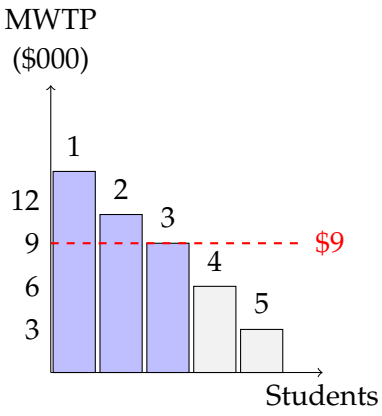
These are different questions, and only the second one matters. The law can name a recipient. It cannot stop the market from repricing around that recipient.

Policy	Statutory	Economic
Pell Grant	Student	Student *and* college
Teacher loan forgiveness	Teacher	Teacher *and* district
Private school voucher	Family	Family *and* school
Per-student state subsidy	College	College *and* student

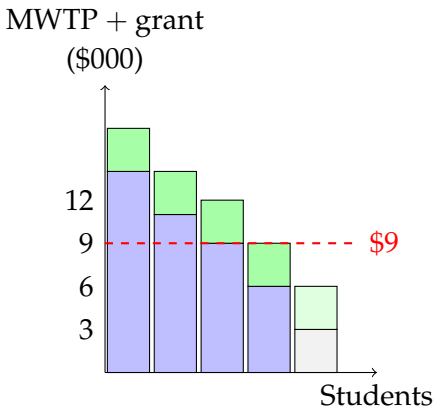
The central claim of this lecture: *the statutory side is almost irrelevant.* Who ends up with the money is determined by the slopes of supply and demand, not by whose name is on the check.

Start Concrete: Five Students

Five students have marginal willingness to pay of $14,000, $11,000, $9,000, $6,000, and $3,000. Tuition is $9,000, so three enroll. Now give every student a $3,000 grant.



No aid: three enroll



$3 grant: four enroll

The grant (green) raises every bar by $3,000. Student 4 crosses the tuition line. Students 1–3 would have enrolled anyway.

Two things happened, and keeping them apart is the whole lecture.

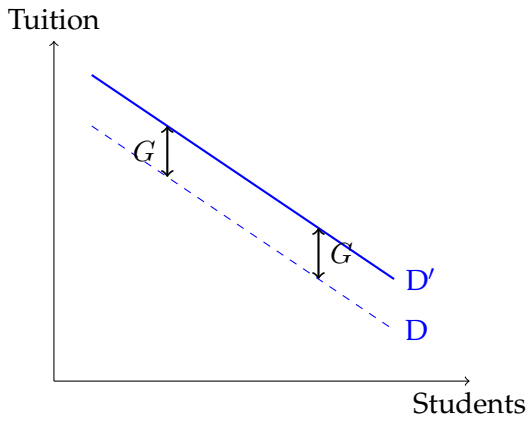
> **Behavior.** One student changed what she did. The policy worked *at the margin*.
>
> **Transfer.** Three students got $3,000 for doing what they were already doing. That is not a failure — it may be the point — but it is a transfer, not a behavioral response.

The program costs $12,000 and moves one student. If you count only behavior, aid looks expensive. If you count only enrollment, you miss that most of the money went to *inframarginal* students. Hold both.

And notice what this figure quietly assumes: tuition stayed at $9,000. The rest of the lecture asks when that is true.

How Aid Shifts a Curve

Shifts are usually described sideways: "demand rises by 2 at every price." A grant is different. A $\$G$ grant shifts demand **straight up by exactly $\$G$**, because a student willing to pay $9,000 out of pocket will face a sticker price of $9,000 $+G$ once the government covers $\$G$ of it.



A grant is a vertical shift: the same $\$G$ at every quantity. It is not a fixed number of extra students.

Why it matters. How many *more* students that vertical shift buys depends on how flat demand is. The same $1,000 moves many community college students and few flagship students. Vertical shift, horizontal response.

In equations, replace the price in the demand curve with the price the student actually pays:

$$Q_D = 30 - 2P \quad \longrightarrow \quad Q'_D = 30 - 2(P - G) = 30 + 2G - 2P$$

With $G = 4$, the student pays $P - 4$:

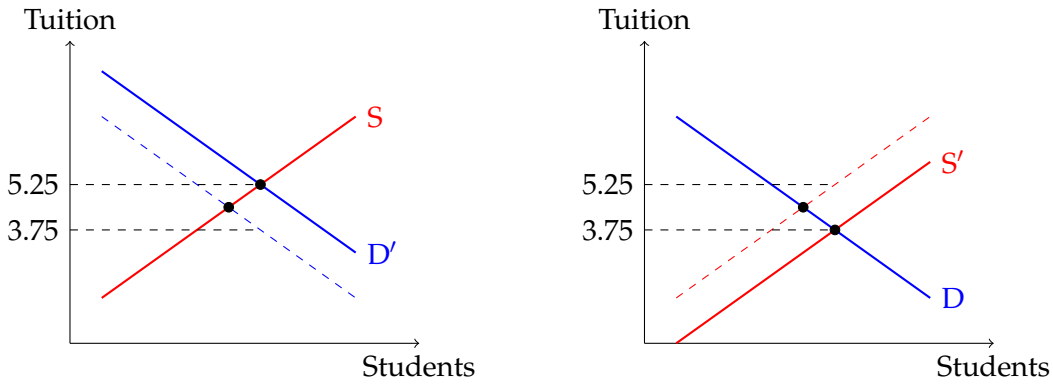
$$Q'_D = 30 - 2(P - 4) = 30 - 2P + 8 = 38 - 2P$$

At every sticker price, 8 more students now want a seat. At $P = 10$, for example, demand was $30 - 20 = 10$ and is now $38 - 20 = 18$.

A tax works the same way in reverse. A $\$T$ per-student tax on colleges shifts supply *up* by T: $Q_S = 10 + 2(P - T)$.

It Does Not Matter Who Gets the Check

Give the $\$G$ to students, and demand shifts up by G. Give the same $\$G$ to colleges per student enrolled, and supply shifts *down* by G. Draw both.



Aid to students

Aid to colleges

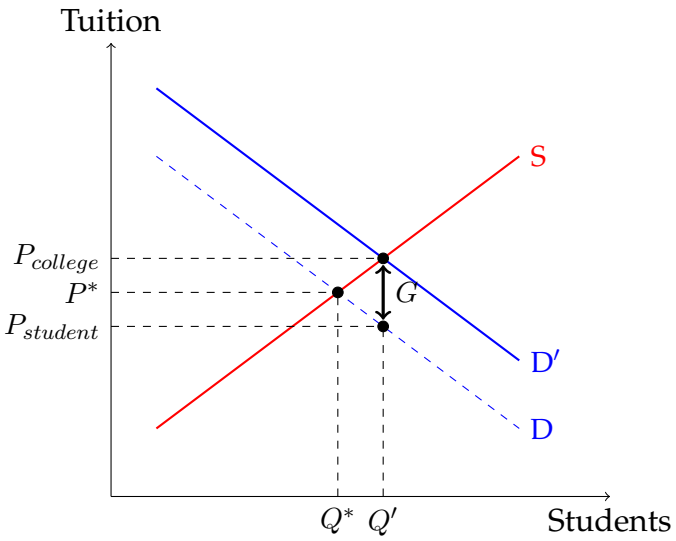
Same enrollment, same \$3.75 out of the student's pocket, same \$5.25 into the college's. Only the posted sticker price differs.

In both panels the student pays \$3.75, the college receives \$5.25, and the gap between them is the grant. The *posted* tuition is \$5.25 on the left and \$3.75 on the right — the sticker price is a bookkeeping artifact of who was named in the statute.

Policy translation. Arguments about whether to fund students (vouchers, Pell, tax credits) or institutions (appropriations, per-FTE formulas) are rarely arguments about incidence. They are arguments about choice, targeting, and accountability. Those are real. "The money reaches students instead of bureaucracies" usually is not.

Splitting the Grant: Why the Slopes Decide

Look again at the left panel. The grant was \$1.50. Tuition rose from \$4.50 to \$5.25 and the student's net price fell from \$4.50 to \$3.75. The student captured half; the college captured half.



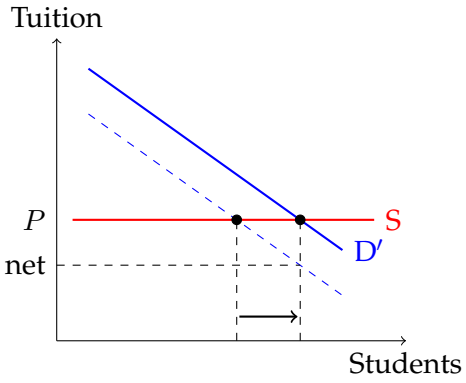
One grant, two prices. The college's price rises, the student's falls, and the vertical distance between them is G. How that distance splits above and below P^* is the incidence.

The rule. The steeper curve captures more of the grant. In the figure the two lines are equally steep, so the $1.50 splits evenly.

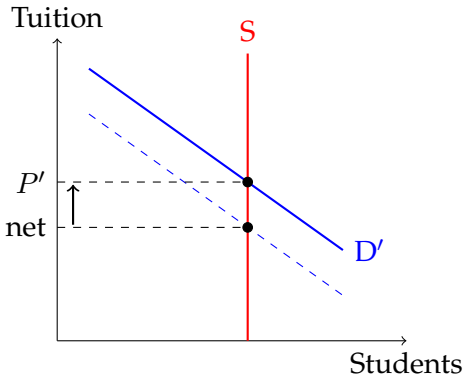
Now make supply steeper — seats are hard to add. The shifted demand curve meets it almost straight above Q^*, so tuition does nearly all the moving and the college keeps most of the grant. Make supply flatter — seats are easy to add. Now enrollment does the moving, tuition barely rises, and the student keeps most of it. Demand works the same way from the other side: if students would enroll at almost any price, demand is steep, and the students keep more. The next section takes each case to its limit.

Equivalently: **whoever can walk away does well.** If a college can fill its seats without you, it keeps your grant. If a dozen colleges are competing for you, you keep it.

The Two Extremes



Elastic supply: student keeps it



Fixed seats: college keeps it

Left: price cannot rise, so the whole grant becomes a lower net price and enrollment jumps. Right: enrollment cannot rise, so the whole grant becomes higher tuition and the net price is exactly what it was.

The right-hand panel is the uncomfortable one. Enrollment is unchanged, the student is no better off, and every dollar of a federal program has become revenue for an institution. Nothing went wrong mechanically — that is simply what a subsidy does to a market that cannot expand. The claim that federal aid is always captured dollar for dollar in higher tuition is this panel asserted as a universal law. Sometimes it is close to right. Usually it is not, and the model tells you how to sort the cases in advance.

Which institutions look like which panel?

> *Close to flat supply:* open-admission community colleges, online programs, for-profits with room to grow. They expand rather than reprice.
>
> *Close to vertical supply:* selective flagships, elite privates, any campus at capacity or facing an enrollment cap.
>
> *In between:* most regional publics, which can absorb some growth before it gets expensive.

Doing It with Equations

Take a market for college seats, with P and Q in thousands:

$$Q_D = 30 - 2P \qquad Q_S = 10 + 2P$$

No aid: $30 - 2P = 10 + 2P$, so $P^* = 5$ and $Q^* = 20$.

A $4,000 grant to students. Replace P with $P - 4$ in demand:

$$Q'_D = 30 - 2(P - 4) = 30 - 2P + 8 = 38 - 2P$$

$$38 - 2P = 10 + 2P \;\Rightarrow\; P' = 7, \quad Q' = 24$$

	Before	After
Sticker tuition	\$5	\$7
Student pays	\$5	\$3
College receives	\$5	\$7
Enrollment	20	24

Of the \$4: the student saves \$2 and the college gains \$2. The slopes are 2 and 2, so the split is even. Program cost: $4 \times 24 = \$96$ million.

Same grant, paid to colleges. Replace P with $P + 4$ in supply: $Q'_S = 18 + 2P$. Then $30 - 2P = 18 + 2P$ gives $P' = 3$ and $Q' = 24$. The student pays \$3, the college receives \$7, enrollment is 24. Identical to the table above.

Same grant, fixed seats. Suppose $Q_S = 20$ regardless of price. Then $38 - 2P = 20$ gives $P' = 9$. The student's net price is $9 - 4 = \$5$: exactly what she paid before. Enrollment is unchanged at 20. The college captures all \$80 million.

Same grant, flat supply. Suppose the college supplies any number of seats at \$5. The net price falls to \$1 and enrollment is $38 - 10 = 28$. The student captures all of it, and 8,000 more students enroll.

Four runs of the same program, three completely different answers, one input changed: the slope of supply.

The recipe.

1. Which market, and what is the price?
2. Write the grant into the curve of whoever receives it: $P - G$ in demand, $P + G$ in supply.
3. Solve for the new equilibrium price as usual.
4. Back out *both* prices: what the student pays and what the college receives. They differ by G.
5. Compare each to the original price. That is the incidence.

How Colleges Actually Capture Aid

Raising sticker tuition is the obvious channel, and the least common. Watch for the quieter ones.

Cutting institutional grant aid. The college was already discounting her $3,000. Federal aid arrives, the discount shrinks, net price barely moves, and no tuition increase appears anywhere. Because need-based institutional aid is calculated *after* federal aid, this can happen automatically.

Crowding out appropriations. Legislatures see federal money flowing to their campuses and fund them less.

Fees. Tuition is politically visible; mandatory fees are not.

Selectivity. With seats fixed, excess demand shows up as higher admissions standards. The marginal applicant is shut out rather than priced out.

So "tuition did not rise, therefore no capture" is not an argument. Look at the *net price students pay*, which is the only price in the model.

Incidence Beyond Financial Aid

The tool is general. It works in labor markets as well as markets for seats, it works on costs as well as subsidies, and the subsidized side is not always the side that gains.

Vouchers and private school tuition. A state creates an $8,000 education savings account usable at any private school. Demand shifts up by $8,000. But private seats do not appear in a year — buildings, teachers, and accreditation take longer than that — so in the short run supply is close to vertical and tuition absorbs much of the $8,000. The families already enrolled capture it, and few students switch. Whether the program eventually moves anyone depends on how fast new schools can open, which is a question about the slope of supply, not about parental demand.

Teacher loan forgiveness. The federal government forgives $4,000 a year for teaching in a high-need district. The teacher receives the check, so surely the teacher gains. But this is a subsidy to the *seller* in a labor market: it lowers the salary at which people are willing to teach there, shifting labor supply out. The district can then fill its jobs at a lower salary, and part of the forgiveness turns into district budget savings. Subsidize one side and the other side may walk off with it.

Certification requirements. A state adds a required exam and a year of supervised practice. No money goes to the state, but this is a tax on entering the profession, paid by the candidate in fees and time. Supply shifts left by the cost. Salaries rise and the number of teachers falls, so districts pay part of a cost that candidates nominally bear — and the remainder is paid by the students in the rooms that stay unfilled.

Beyond the Classroom

A state offers a $2,000 scholarship usable only at in-state publics, where tuition is set by the legislature. Who captures it? What if it is usable anywhere?

A university announces it will "meet full need." What does that do to the incidence of a federal grant increase for its students?

A city passes a large teacher pay raise. Housing supply near the schools is fixed. Who ends up with the raise?

Wrapping Up

Statutory incidence is who gets the check. **Economic** incidence is who ends up better off. Only the second matters.

A $\$G$ grant shifts the recipient's curve by $\$G$ *vertically*. In equations: $P - G$ in demand, $P + G$ in supply.

After the grant there are two prices — what the student pays and what the college receives — and they differ by exactly G.

It does not matter who receives the check. Equilibrium quantity and both real prices are identical.

The inelastic side captures more. Students keep aid when supply is elastic; colleges keep it when seats are fixed.

Capture usually runs through institutional aid, fees, and selectivity, not sticker price. Measure *net price*.

Aid to inframarginal students is a transfer; aid to marginal students changes behavior. A program does both, and you should say which you are counting.

Practice Problems

1. Label each as statutory or economic incidence, and say who you think actually bears or captures it.

(a) The FAFSA lists the Pell Grant as paid to the student.

(b) After a Pell increase, a private college reduces its own grants by $400 per recipient.

(c) A district pays the full "employer" share of health insurance.

(d) A state's new $1,500 scholarship is followed by a $1,500 tuition increase at the flagship.

2. A market for college seats (P and Q in thousands):

Tuition	Q_D	Q_S
$4	22	14
$5	20	16
$6	18	18
$7	16	20
$8	14	22

(a) Graph the two curves. Find the equilibrium tuition and enrollment.

(b) A $2,000 grant is given to every student. Build the new demand column and find the new equilibrium.

(c) What is the new sticker tuition? What does the student pay? What does the college receive?

(d) Split the $2,000: how much to the student, how much to the college? Why that split?

(e) What does the program cost? How much of that cost shows up as additional enrollment?

3. Now with equations: $Q_D = 40 - 2P$ and $Q_S = 10 + 3P$.

(a) Find P^* and Q^*.

(b) A $5,000 grant goes to students. Write the new demand curve and solve.

(c) Report the sticker price, the student's net price, and the college's receipts. Split the $5,000.

(d) Instead pay the $5,000 to colleges per student enrolled. Write the new supply curve and solve. Compare with (c).

(e) Graph both curves with price on the vertical axis. Which is steeper? Use that to predict whether the student or the college keeps more than half of the grant. Does it match (c)?

(f) What does the program cost?

4. Same \$5,000 grant, different supply. Demand is $Q_D = 40 - 2P$ throughout.

(a) Seats are fixed at 28. Find the new tuition, the net price, and enrollment.

(b) Supply is perfectly elastic at \$6. Find the net price and enrollment.

(c) Which case is a selective flagship? An open-access community college? An online program?

(d) In which case is the grant the best use of \$5,000 per student? What else would you need to know before answering?

5. Two institutions in the same state receive the same new federal grant. Alpha Community College admits everyone and has empty classrooms. Beta University admits one in six applicants and has no room to build.

(a) Sketch both markets and show the grant in each.

(b) Where does enrollment rise? Where does net price fall?

(c) A legislator finds that neither institution raised its sticker price and concludes there was no capture anywhere. What has she missed?

(d) What single number would you ask for to settle it?

6. Explain, in a sentence each, why these are wrong.

(a) "Aid should go to students, not institutions, so that the money reaches the people who need it."

(b) "Tuition did not go up, so the grant was not captured."

(c) "Only 1 student in 12 enrolled because of the grant, so the program failed."

(d) "Making college free removes the cost barrier for everyone."

7. A federal program forgives \$6,000 a year in loans for teaching in a high-need district. The district's teacher market is $Q_D = 100 - 2w$ and $Q_S = 4w - 80$, with w in thousands.

(a) Find the salary and the number of teachers before the program.

(b) The forgiveness goes to teachers. Which curve shifts, which way, and by how much? Write the new curve and solve.

(c) What happens to the salary the district pays? To the number of teachers?

(d) A teacher's total compensation is salary plus forgiveness. Did it rise by the full \$6,000? Who got the rest, and why that much?

(e) The district is locked into a salary schedule at the original salary and cannot lower it. Redo (c) and (d). Who captures the forgiveness now, and what happens to the number of applicants per opening?

8. A state creates an \$8,000 education savings account usable at any private school. Private seats and tuition are in thousands: $Q_D = 30 - P$.

(a) In the short run, supply is fixed at 12,000 seats. Find tuition before and after the ESA. What do families pay net? How many switch?

(b) In the long run, new schools can open and supply is $Q_S = P - 6$. Check that the tuition before the ESA is the same as in (a), then find the new equilibrium.

(c) Who captures the \$8,000 in each case, and why does the answer differ?

(d) A legislator says the program will let 10,000 new families choose private school. What would have to be true for that to happen?

Answer Key

1.

(a) Statutory. It says only who receives the funds.

(b) Economic, and it is capture: the college takes \$400 of each federal dollar by shrinking its own aid. Net price falls by less than the grant.

(c) Statutory. Economically, the contribution shifts labor demand down and teachers bear part of it through lower wages.

(d) Economic, and close to full capture: the student's net price is unchanged. Expect this where seats are fixed.

2.

(a) \$6,000 and 18,000 students.

(b) Demand shifts up by \$2, so each Q_D entry moves up two rows: at \$4, 26; \$5, 24; \$6, 22; \$7, 20; \$8, 18. Supply is unchanged, so \$7,000 and 20,000 students. (Equivalently $Q'_D = 34 - 2P$ against $Q_S = 6 + 2P$.)

(c) Sticker \$7,000. The student pays $7 - 2 = \$5,000$. The college receives \$7,000.

(d) The student saves \$1,000 and the college gains \$1,000 — an even split, because the curves have the same slope (2 per \$1,000 in each direction), so neither side can move more easily than the other.

(e) Cost is $\$2{,}000 \times 20{,}000 = \$40$ million. Enrollment rose by 2,000, so the other \$36 million is a transfer — partly to students who would have enrolled anyway, partly to the college.

3.

(a) $40 - 2P = 10 + 3P \Rightarrow P^* = 6$, $Q^* = 28$.

(b) $Q'_D = 40 - 2(P - 5) = 50 - 2P$. Then $50 - 2P = 10 + 3P \Rightarrow P' = 8$, $Q' = 34$.

(c) Sticker \$8,000. Student pays $8 - 5 = \$3,000$, down from \$6,000. College receives \$8,000, up from \$6,000. The student captures \$3,000, the college \$2,000.

(d) $Q'_S = 10 + 3(P + 5) = 25 + 3P$. Then $40 - 2P = 25 + 3P \Rightarrow P' = 3$, $Q' = 34$. The student pays \$3,000, the college receives $3 + 5 = \$8,000$, enrollment is 34,000. Identical in every respect that matters; only the posted price differs.

(e) Demand is steeper: a \$1,000 change in price moves 2 students along demand but 3 seats along supply. The steeper side keeps more, so the student should keep more than half. It matches: in (c) the student keeps \$3,000 of the \$5,000.

(f) $\$5{,}000 \times 34{,}000 = \$170$ million.

4.

(a) $50 - 2P = 28 \Rightarrow P' = 11$. Net price $11 - 5 = \$6,000$, exactly the original. Enrollment stays 28,000. The college captures all $140 million.

(b) Price stays $6,000, so the net price is $1,000 and enrollment is $50 - 12 = 38{,}000$. The student captures all of it and 10,000 more students enroll.

(c) Fixed seats is the selective flagship. Perfectly elastic is the online program, with the community college close to it. The upward-sloping case in Problem 3 is a regional public that can grow, but not for free.

(d) Case (b), where it buys both enrollment and lower net prices. But "best use" needs more: the marginal benefit of those extra students completing, whether they would have enrolled somewhere else anyway, and what the money would have bought if spent on something other than price.

5.

(a) Alpha: flat supply, demand shifts up by the grant, quantity rises along the flat line. Beta: vertical supply, demand shifts up, price rises by the full grant.

(b) Enrollment rises at Alpha, and net price falls at Alpha. At Beta neither enrollment nor net price moves — the money becomes institutional revenue.

(c) Sticker price is the wrong variable. Beta can capture the grant by cutting its own institutional aid or raising fees, and with fixed seats it rations by selectivity rather than price, so the excess demand never appears as a price at all.

(d) Average net price paid by students — sticker minus all grant aid from every source — before and after.

6.

(a) Incidence does not depend on who gets the check. If supply is inelastic the institution captures it either way. The real arguments for student-side funding are choice, portability, targeting, and accountability.

(b) Capture runs mostly through institutional aid, fees, and selectivity. The relevant price is the net price students pay.

(c) That confuses the behavioral effect with the whole program. The other 11 received a transfer, which may be a legitimate goal — less debt, less hardship, fewer work hours. Judge the behavior and the transfer separately, each on its own terms.

(d) It removes the *price*, not the cost: the opportunity cost of time is still there, and if seats do not expand the rationing shifts to admissions, which generally disadvantages exactly the students the policy targets.

7.

(a) $100 - 2w = 4w - 80 \Rightarrow w^* = 30$, $Q^* = 40$. A salary of \$30,000 and 40 teachers.

(b) Supply, and it shifts out: teachers will now take the job for \$6,000 less in salary. $Q'_S = 4(w + 6) - 80 = 4w - 56$. Then $100 - 2w = 4w - 56 \Rightarrow w' = 26$, $Q' = 48$.

(c) The salary falls from \$30,000 to \$26,000. Teachers rise from 40 to 48.

(d) No. Total compensation is $26+6 = \$32,000$, up only \$2,000. The district captured the other \$4,000 through the lower salary. The split follows the slopes: teacher supply is the flatter curve (4 teachers per \$1,000 against 2 for demand), so the district, on the steeper side, captures the larger share — \$4,000 of the \$6,000.

(e) At a fixed \$30,000, demand is still 40 teachers, so the district hires 40 — employment does not rise. Supply at that salary is now $4(30) - 56 = 64$. Teachers keep the full \$6,000, because the only channel the district had for capturing it was the salary. The surplus shows up instead as 64 people competing for 40 jobs: hard-to-staff openings become easy to fill. A rigid salary schedule blocks capture and converts the subsidy into applicants rather than into savings.

8.

(a) Before: $30 - P = 12 \Rightarrow P = \$18{,}000$. After: $Q'_D = 30 - (P - 8) = 38 - P$, and $38 - P = 12 \Rightarrow P = \$26{,}000$. Families pay $26 - 8 = \$18{,}000$ net, exactly what they paid before. Nobody switches. The schools capture all \$96 million.

(b) Before: $30 - P = P - 6 \Rightarrow P = \$18{,}000$ and $Q = 12{,}000$, the same starting point. After: $38 - P = P - 6 \Rightarrow P = \$22{,}000$ and $Q = 16{,}000$. Net price $22 - 8 = \$14{,}000$, and 4,000 families switch.

(c) Short run, the schools take all of it; long run, an even split of \$4,000 each. Nothing about families changed — only whether seats could be added. With supply vertical, price is the only thing that can adjust; with supply and demand equally responsive, they share the adjustment.

(d) It cannot happen. Even if supply were perfectly elastic at the original \$18,000, enrollment would reach only $38 - 18 = 20{,}000$, a gain of 8,000. An \$8,000 ESA cannot move 10,000 families at any supply elasticity; that would take a larger ESA or more price-sensitive families. Note also that the legislator's number is a claim about supply — how fast schools can be built — dressed up as a claim about demand.