Econ 230A: Public Economics
Lecture: Tax Incidence [1]

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[1] These lecture notes are partially based on lectures developed by Raj Chetty and Day Manoli. Many thanks to them for their generosity.

Outline of Lecture

1. What is tax incidence?
2. Partial Equilibrium Incidence
   - Theory: Kotlikoff and Summers, Handbook of Public Finance, Vol 2
   - Empirical Applications: Doyle and Samphantharak (2008), Hastings and Washington
3. General Equilibrium Incidence – WILL NOT COVER
4. Capitalization & Asset Market Approach
   - Empirical Application: Linden and Rockoff (2008)
5. Mandated Benefits
   - Theory: Summers (1989)
   - Empirical Application: Gruber (1994)

1. What is tax incidence?

- Tax incidence is the study of the effects of tax policies on prices and the distribution of utilities/welfare.
- What happens to market prices when a tax is introduced or changed?
- Examples:
  - what happens when impose $1 per pack tax on cigarettes? Introduce an earnings subsidy (EITC)? provide a subsidy for food (food stamps)?
  - effect on price –> distributional effects on smokers, profits of producers, shareholders, farmers,...
- This is positive analysis: typically the first step in policy evaluation; it is an input to later thinking about what policy maximizes social welfare.
- Empirical analysis is a big part of this literature because theory is itself largely inconclusive about magnitudes, although informative about signs and comparative statics.

1. What is tax incidence? (cont)

- Tax incidence is not an accounting exercise but an analytical characterization of changes in economic equilibria when taxes are changed.
- Key point: Taxes can be shifted: taxes affect directly the prices of goods, which affect quantities because of behavioral responses, which affect indirectly the price of other goods.
- If prices are constant economic incidence would be the same as legislative incidence.
- Knowing incidence is incredibly imporant for policy analysis.

1. What is tax incidence? (cont)

- Ideally, we want to know the effect of a tax change on utility levels of all agents in the economy.
- Realistically, we usually look at impacts on prices or income, rather than utility
- Useful simplification is to aggregate economic agents into a few groups.
  1. gas tax: producers vs consumers
  2. EITC: suppliers vs demanders of labor, recipients vs nonrecipients
  3. income tax: rich vs poor
  4. property tax: region or country
  5. social security: across generations

2. Theory: Partial Equilibrium Incidence

- Key reference: Kotlikoff & Summers (Hbk, Vol 2, 1987)
- Partial Equilibrium Model:
- Simple model goes a long way to showing main results.
- Two goods: x and y
  - Government levies an excise tax on good x
    - ★ DEF: excise taxes are levied on a quantity (gallon, pack, ton, ...). Typically fixed in nominal terms (therefore subject to declines in real terms)
    - ★ DEF: ad-valorem taxes are a fraction of prices (e.g. sales tax), marked automatically to inflation.
  - Let p denote the pretax price of x and $q = p + t$ denote the tax inclusive price of x.(statutory incidence is on demander)
  - Good y, the numeraire, is untaxed.

2. Theory: Partial Equilibrium Incidence

- Consumer has wealth Z and has utility $u(x, y)$.
- Price-taking firms use $c(S)$ units of the numeraire y to produce S units of x (Cost function is $c(S)$ and is expressed in units of the numeraire).
  - The marginal cost of production is weakly increasing: $c'(S) > 0$ and $c''(S) \geq 0$.
  - The representative firm's profit at pretax price p and level of supply S is $pS - c(S)$.
  - Assuming that firms optimize perfectly, the supply function for good x is implicitly defined by the marginal condition $p = c'(S(p))$. (price=marginal cost)

2. Theory: Partial Equilibrium Incidence

- Equilibrium condition: $Q = S(p) = D(p + t)$ defines an equation $p(t)$.
- We want to characterize $\frac{dp}{dt}$ – effect of a tax increase on price, which determines who bears effective burden of tax.
- Fully differentiating equilibrium condition wrt t and solving for $\frac{dp}{dt}$ gives

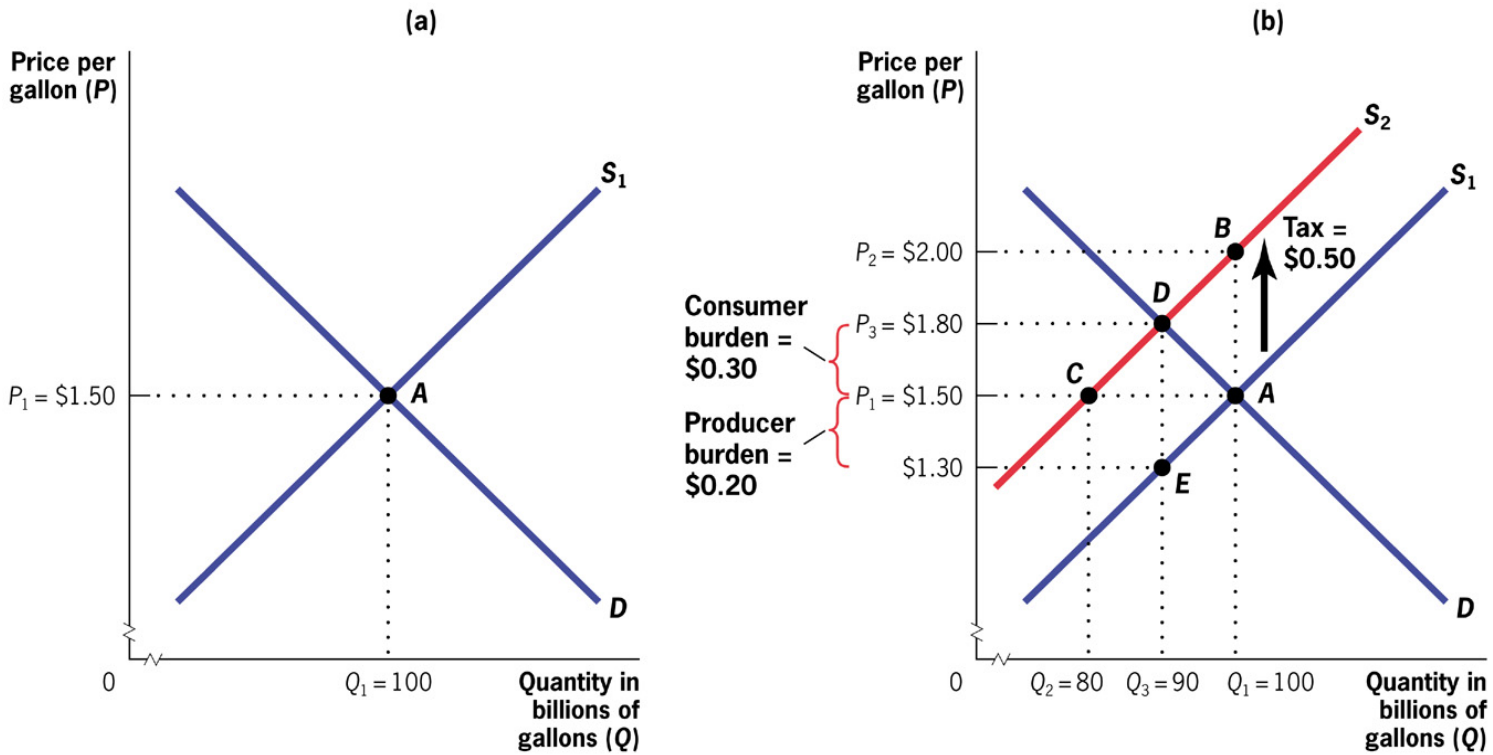
$$\frac{dp}{dt} = \frac{\frac{\partial D}{\partial p}}{(\frac{\partial S}{\partial p} - \frac{\partial D}{\partial p})}$$

2. Theory: Partial Equilibrium Incidence

- Converting partial equalibrium result to elasticities (handy since independent of scaling)
- Elasticity: percentage change in quantity when price changes by one percent
  - $\varepsilon_D = \frac{\partial D}{\partial p}\frac{q}{D(p)}$ denotes the price elasticity of demand.
    - ★ (consumer faces $q = p + t$)
  - $\varepsilon_S = \frac{\partial S}{\partial p}\frac{p}{S(p)}$ denotes the price elasticity of supply.
- $$\frac{dp}{dt} = \frac{\varepsilon_D}{(\varepsilon_S - \varepsilon_D)}$$
- Note: $-1 < dp/dt < 0$ and $\frac{dq}{dt} = 1 + \frac{dp}{dt}$

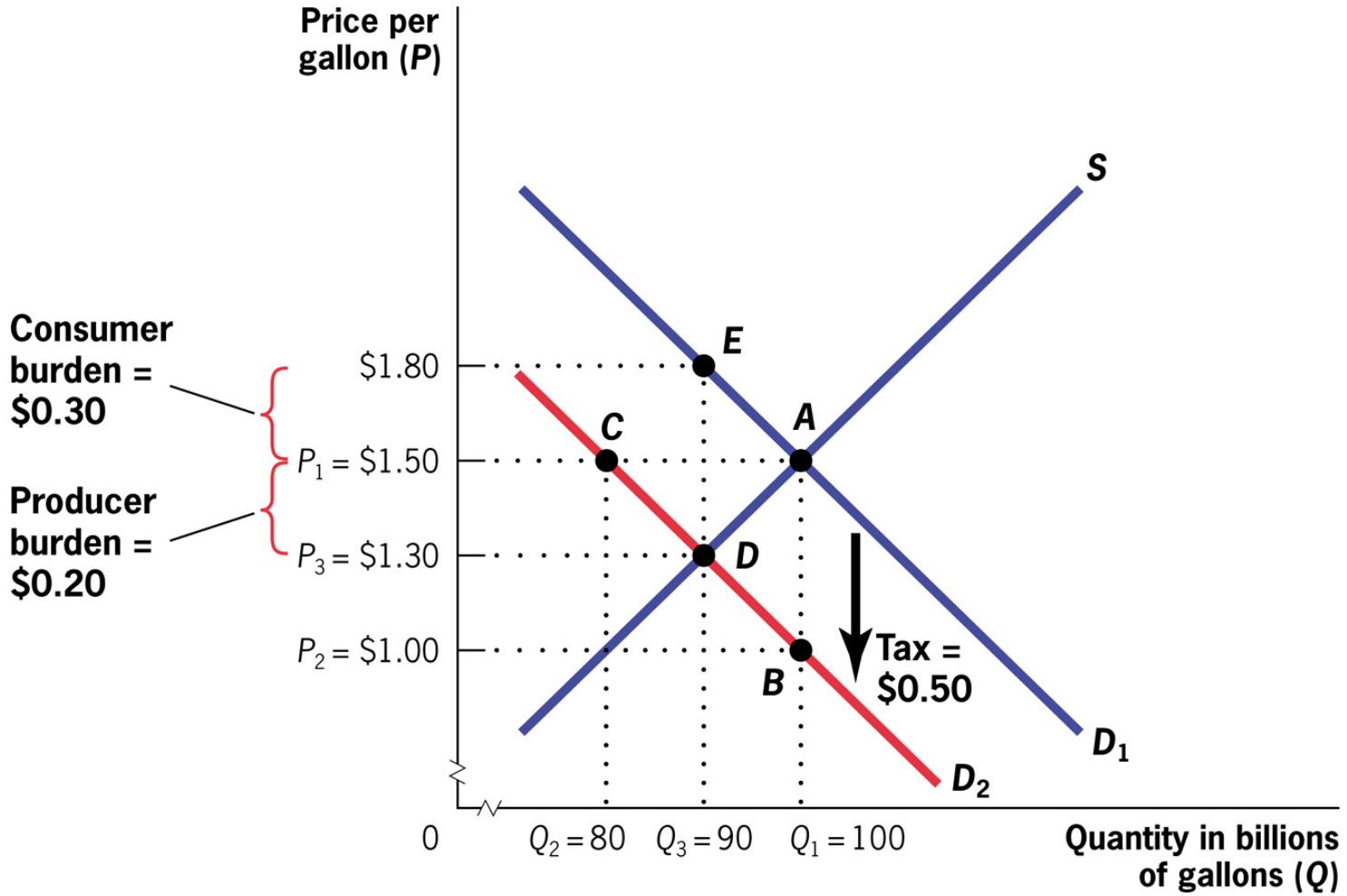
2. Theory: Partial Equilibrium Incidence

- Examples
  - Figure 1: Tax Levied on Producers (Gruber)



2. Theory: Partial Equilibrium Incidence

- Examples
  - Figure 2: Tax Levied on Consumers (Gruber)

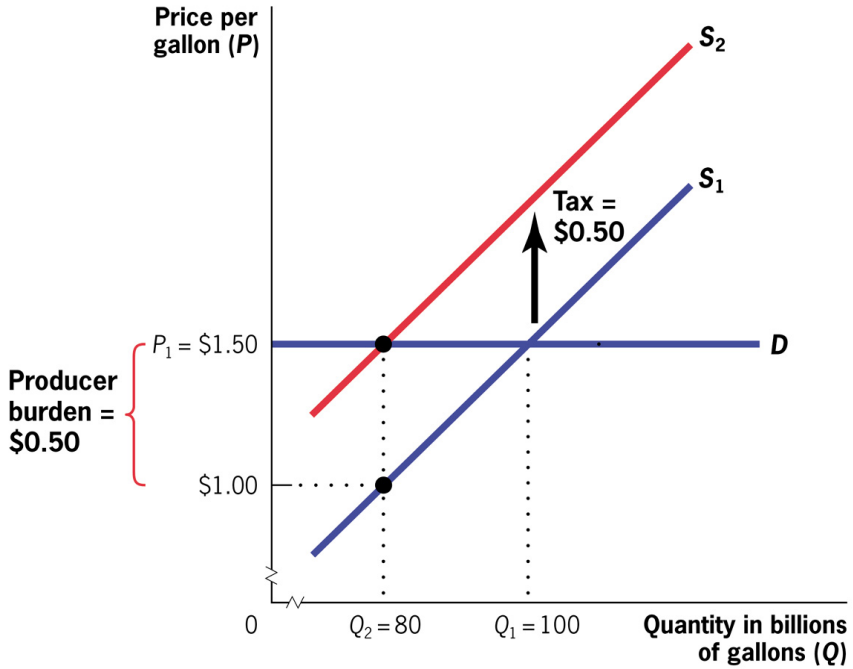


2. Theory: Partial Equilibrium Incidence

- $$\frac{dp}{dt} = \frac{\varepsilon_D}{(\varepsilon_S - \varepsilon_D)}$$
- When do consumers bear the entire burden of the tax?
  - $\varepsilon_D = 0$ [inelastic demand]
    - ★ example: short run demand for gas (need to drive to work)
  - $\varepsilon_S = \infty$ [perfectly elastic supply]
    - ★ example: perfectly competitive industry
- When do producers bear the entire burden of the tax?
  - $\varepsilon_S = 0$ [inelastic supply]
    - ★ example: fixed quantity supplied (housing)
  - $\varepsilon_D = -\infty$ [perfectly elastic demand]
    - ★ example: there is a close substitute, and demand shifts to this substitute if price changes.

2. Theory: Partial Equilibrium Incidence

- Examples (from Gruber)



2. Theory: Partial Equilibrium Incidence

- key intuitions:
  1. statutory incidence not equal to economic incidence
  2. equilibrium is independent of who nominally pays the tax
  3. more inelastic factor bears more of the tax
- These are robust conclusions that hold with more complicated models
- Extensions to partial equilibrium incidence:
  - Standard analysis assumes prices and taxes affect demand in the same way: $\frac{dx}{dt} = \frac{dx}{dp}$. Chetty, Looney & Kroft (AER 2008) generalize theory to allow for salience effects. We will talk about this paper later.
  - Market rigidities: Suppose there is a minimum or maximum price: then former analysis may not be correct.
    - ★ Example: minimum wage. Social security taxes 7.5% on employer and 7.5% on employee. In principle the share of each should not matter as long as total is constant but minimum wage is computed on net wage (gross wage - employer tax = net wage + employee tax).

2. Theory: Partial Equilibrium Incidence

- Extensions to partial equilibrium incidence (continued):
  - Imperfect competition such as monopoly (Salanie book). Possible to get an increase in after-tax price bigger than the level of the tax. Ad valorem and excise taxation are no longer equivalent.
  - Ignores effects on other markets:
    - ★ Example: Suppose tax on cigarettes increases, if people substitute cigarettes for cigars then price of cigars increases and part of the burden is shifted to the cigar market and cigarette demand curves will move.
    - ★ Revenue effects on other markets: tax increases, I am poorer, I have less to spend on other markets.
    - ★ For small, narrow markets such as cigarettes, partial eq. analysis is a reasonable approximation (although effects on substitutes could be important).

3. Empirical Applications

- Typical empirical evidence on incidence:
  - State panel data
  - Identification is variation across states over time in taxes
  - Challenge is whether tax changes are endogenous (do states make changes in response to current conditions?). Usual issue of validity of control group, common trends assumption, etc.

3. Empirical Applications: Gas Tax (Doyle and Samphantharak JPubE 2008)

- Question: who bears the burden of the gas tax?
- Setting: Gas prices spike above $2.00 in 2000, near election, political desire to provide tax relief
- Led to repeal and subsequent reinstatement of SALES tax in Indiana (and Illinois)
- What I like about the application:
  - Salient tax, setting where there is attention to prices and govt intervention
  - Fall and Rise in prices (assymmetry? bounds possible bias)
  - Govenor could act alone so policy changed quickly
- Note: This is the SALES tax that is changed not the EXCISE tax (of which there is a federal and state). Not all states even tax gasoline in the sales tax.

3. Empirical Applications: Gas Tax (Doyle and Samphantharak JPubE 2008)

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- What happened to taxes:
  - Indiana (IN) suspends 5% sales tax on gas starting July 1, reinstates on Oct 30
    - ★ extended on August 22 to September 15
    - ★ extended on September 13 to September 30
    - ★ extended September 28 to October 29
  - Illinois (IL) suspends 5% sales tax on gas starting July 1, reinstates on Dec 31
- reforms known to be temporary
- sales tax does not apply to certain excise taxes
  - sales tax applies to roughly 90% of the posted price in IL
  - sales tax applies to roughly 80% of the posted price in IN
- **full shifting therefore implies 4.5% change in price in IL & 4% change in prices in IN**

3. Empirical Applications: Gas Tax (Doyle and Samphantharak JPubE 2008)

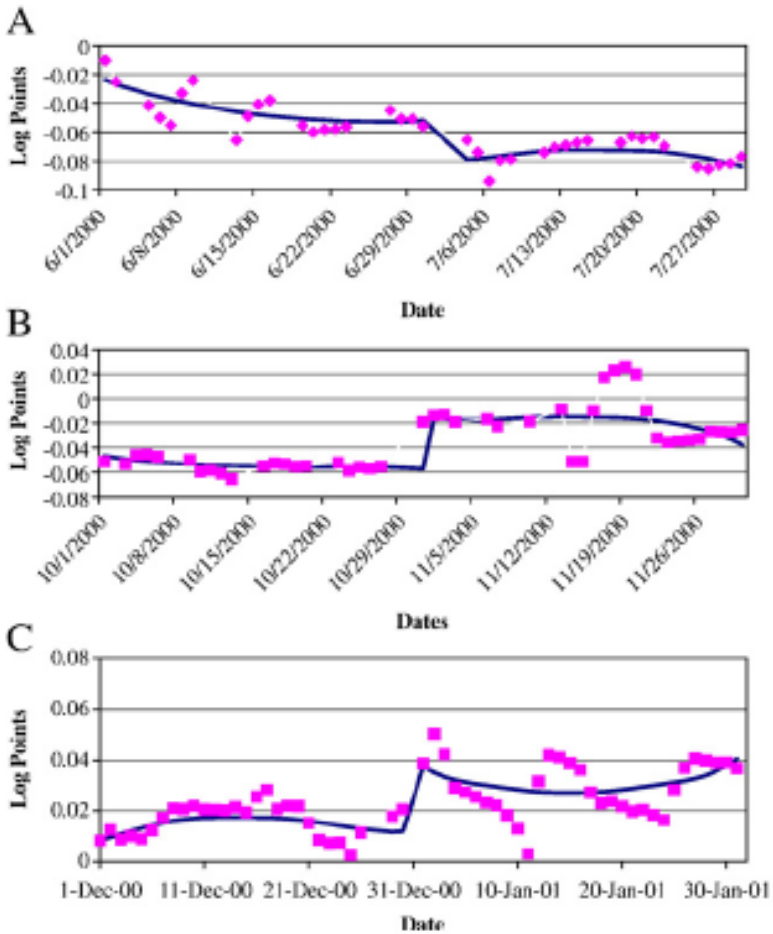
- Empirical approach in paper: DD, compare treated states with neighboring states (MI, OH, MO, IA, WI)
  - Flexible event time model; looking for sharp discontinuity
  - start with graphical evidence (unconditional, local linear regression)
  - next consider regression equation (controls for area characteristics, brand FE)
- s = station, b = brand, t = time

$$\begin{aligned}\ln(\text{Retail Price}_{sbt}) = \; & \gamma_0 + \gamma_1(\text{IL or IN}) + \gamma_2(\text{Post Reform}) \\ & + \gamma_3[(\text{IL or IN}) * (\text{Post Reform})] \\ & \gamma_4 \ln(\text{Wholesale Price}) + \gamma_5 X_s + \delta_b + \varepsilon_{sbt}\end{aligned}$$

- $\frac{\gamma_3}{.04}$ ($\frac{\gamma_3}{.045}$ for IL) measures incidence

3. Empirical Applications: Gas Tax (Doyle and Samphantharak JPubE 2008)

- Unconditional estimates: Local linear regression of difference (treated state - control state) in log price



3. Empirical Applications: Gas Tax (Doyle and Samphantharak JPubE 2008)

Table 2: Regression Results

A: July Tax Repeal

Dependent Variable:	Log(Retail Price)		
	(1)	(2)	(3)
Illinois or Indiana	-0.048	-0.013	-0.014
	(0.038)	(0.025)	(0.021)
Post July 1	-0.052	0.029	0.025
	(0.007)	(0.013)	(0.015)
(IL or IN)*Post July 1	-0.035	-0.029	-0.029
	(0.007)	(0.008)	(0.008)
Observations	29675	29675	29433
R-Squared	0.23	0.60	0.64
Mean of Dep. Var.	0.560	0.560	0.560
Controls:			
Wholesale Price	No	Yes	Yes
ZIP Codes Characteristics & Brand	No	No	Yes

Panel A: Prices observed June 27, June 28, July 5, July 6;
Standard errors are reported, clustered at the state level.

3. Empirical Applications: Gas Tax (Doyle and Samphantharak JPubE 2008)

- Interpreting estimated effects: imply a 70% passthrough rate (tax decrease leads to 70% reduction in price for consumers)
- The elasticity of demand is thought to range from -0.05 to -0.25. A pass-through rate of 70% implies that the supply elasticity would range from 0.1 to 0.6. A 80% pass-through would imply a supply elasticity ranging from 0.2 to 1.

3. Empirical Applications: Gas Tax (Doyle and Samphantharak JPubE 2008)

Table II: Regression Results

B: October Tax Reinstatement		C: January Tax Reinstatement	
Dependent Variable:	Log(Retail Price)	Dependent Variable:	Log(Retail Price)
	(3)		(3)
Indiana	-0.053	Illinois	-0.005
	(0.007)		(0.021)
Post Oct. 31	-0.009	Post Jan. 1	-0.020
	(0.006)		(0.004)
IN*Post Oct. 31	0.040	IL*Post Jan. 1	0.037
	(0.006)		(0.004)
Observations	21884	Observations	7071
R-Squared	0.26	R-Squared	0.39
Mean of Dep. Var.	0.456	Mean of Dep. Var.	0.303

Models include full controls. Standard errors are reported, clustered at the state level.
Panel B: Prices observed Oct. 26, Oct. 27, Oct. 31, Nov. 1
Panel C: Prices observed Dec. 29, Dec. 30, Jan. 2, Jan. 3.

3. Empirical Applications: Gas Tax (Doyle and Samphantharak JPubE 2008)

- competition across borders: are neighboring states a good comparison (control) group?
- neighboring states may have been affected by reforms
  - stations on borders in treated states may have had less pressure to reduce prices
  - stations on borders in control states may have had more pressure to reduce prices
    - ★ would expect smaller effects of tax changes near borders
  - evidence mixed; but mostly shows that effects are smaller near the border

3. Empirical Applications: Gas Tax (Doyle and Samphantharak JPubE 2008)

- main results:
  - 70% or tax reductions passed on to consumers in the form of lower prices
  - 80%-100% of tax reinstatements passed on to consumers in the form of higher prices
- Good features: clear graphs, non-parametric, show raw data; multiple "experiments"
  - graphical analysis combined with regression analysis is convincing
- Crtique:
  - they should show "event study" with Xs in model to see if pre-trends improve
  - short-run estimate only
  - common trends violated?
  - mixed results on border effects (but honest!)

3. Empirical Applications: Food Stamps (Hastings & Washington 2010)

- research question: who bears the burden of food stamps?
- Food stamps are subsidy; so subsidy (vs tax) incidence
- Food stamps typically dispersed once during month
  - Shapiro (2005) shows that food spending and calorie intake varies with time since food stamps received.
  - Evidence of impatience; We will read this paper later in the quarter
- In this study they push this further to examine
  - Do these predictable fluctuations in demand affect grocery store pricing?
  - how much of the food stamp benefit is taken by firms rather than consumers?
  - [they do more; separating impacts on quantitly vs quality, intensive vs extensive margin of buying]

3. Empirical Applications: Food Stamps (Hastings & Washington 2010)

- Research design:
  - Nevada: all FS checks received first of month (also cash welfare received on first)
  - Use scanner data from grocery stores in Nevada, some in high-poverty (high FSP users) areas and some in low-poverty areas (low FSP users).
  - have club card data on whether each individual used food stamps or other social welfare programs (e.g. WIC)
  - (Also have data from other states, where food stamps are staggered across month, and demonstrate that there are no cyclical patterns)
- Basic idea: FS benefits subsidy for the purchase of food. Demand fluctuates (predicably) over the month (when FS check is received). They examine store price response.
  - Expectation from incidence theory: raise prices procyclically as demand rises
  - After replicating Shapiro's results (first stage demand), they then examine incidence

3. Empirical Applications: Food Stamps (Hastings & Washington 2010)

- regression equation (cross-store evidence): p_{ts} denotes price at store s on day t, can run for different categories. model also includes store fixed effects. They run this for separate stores where the stores vary by fraction of consumers that are food stamp recipients. Not sure why they don't do a DD model??

$$\ln(price_{ts}) = \beta_1 + \beta_2 week\_2_{ts} + \beta_3 week\_3_{ts} + \beta_4 week\_4_{ts} + \varepsilon_{ts}$$

3. Empirical Applications: Food Stamps (Hastings & Washington 2010)

- main result: demand increases by 30% in first week, prices by about 3%.
  - Stores taking a bit of the food stamp expenditure, but not a lot.
- Overwhelming evidence in favor of their hypothesis.
  - Compelling because of multiple dimensions of tests: cross-individual, cross-store, cross-category, and cross-state.
- Weaknesses?
  - Not able to look at large products, where presumably there is more action (e.g. buying a new car or fridge).
  - Not able to look at spillover effects across stores
  - Interesting from a theoretical perspective: intuition that pooling with others can change incidence.

3. Empirical Applications: Other papers

- Rothstein (2010) EITC and wages
- Evans, Ringel and Stech (1999) cigarette taxes
  - lots of other papers on impacts of cigarette taxes and smoking, health.

4. General Equilibrium Incidence

- GE analysis: trace out full incidence of taxes back to original owners of factors; not interested in "producer" vs. consumer but rather capital owners vs. labor vs. landlords, etc.
- Harberger (1962): who bears the burden of the corporate income tax?
  - 2 sector and 2 factors of production, static model
- Many sectors, many factors of production model (Computational General Equilibrium) [not covered here]
- Dynamic Models [not covered here]

4. General Equilibrium Incidence (Harberger JPE 1962)

- In the partial equilibrium analysis, we did not consider any impacts on the rest of the economy. This might make sense if the sector is small. In general, however, the impacts on one sector will affect others.
- Standard GE approach with taxes is to consider a factor tax in one sector.
- 2 sector model
  - fixed total supply of labor L and capital K (short-run, closed economy).
  - CRS scale in both production sectors
  - Full employment of L and K
  - Firms are perfectly competitive
  - costless mobility of factors across sectors.
- $X_1 = F_1(K_1, L_1)$ production in sector 1.
- $X_2 = F_2(K_2, L_2)$ production in sector 2.
- resource constraints:
  - $K_1 + K_2 = K$
  - $L_1 + L_2 = L$

4. General Equilibrium Incidence (Harberger JPE 1962)

- Factors K and L are fully mobile across sectors so returns must the same over the two sectors:
  - $w = p_1 F_{1L} = p_2 F_{2L}$
  - $r = p_1 F_{1K} = p_2 F_{2K}$
- To close the model, need to specify demand functions for goods 1 and 2. Simple specification:
  - $X_1 = X_1(\frac{p_1}{p_2})$ and $X_2 = X_2(\frac{p_1}{p_2})$
  - Important assumption: all consumer homogenous, so redistribution of incomes by tax does not affect demand through a feedback effect
- This a system of ten equations and ten unknowns: K_i, L_i, p_i, X_i, w, r.

4. General Equilibrium Incidence (Harberger JPE 1962)

- Introduce a small tax $d\tau$ on K_2 (in sector 2). [Corporate Tax]
- This tax has small effects on all ten variables. Using expansion of the 10 equations around initial equilibrium (exactly as in partial eq. analysis), obtain a linear system of 10 equations in 10 unknowns (dp, ..).
- Can compute the effect of this small tax of all 10 variables dw, dr, dL_1, ...
- As labor income is wL with L fixed, and rK capital income with K fixed, change in prices $dw/d\tau$ and $dr/d\tau$ describes how tax is shifted from capital to labor.
- Changes in prices $dp_1/d\tau$, $dp_2/d\tau$ describes how tax is shifted from sector 2 to sector 1.
- Model is fairly rich and embodies many effects (which is why computations are fairly complicated).
- Kotlikoff and Summers state equations in terms of large number of elasticities (which are functions of substitution parameters in production and consumption).

4. General Equilibrium Incidence (Harberger JPE 1962)

- Intuitive description of main effects:
- 1. Substitution Effects: capital bears incidence
  - Tax on K_2 implies production in Sector 2 shifts away from K so aggregate demand for K goes down. Because total K is fixed, the net of tax price of K must go down. So K bears some of the burden.
- 2. Output effects: capital may not bear incidence
  - Tax on K_2 implies that sector 2 output becomes more expensive relative to sector one therefore this shifts demand toward sector 1.
- Case 1: $K_1/L_1 < K_2/L_2$ Untaxed sector (1) is less capital intensive so aggregate demand for K goes down:
  - substitution and output effect go in the same direction and K bears some burden of the tax.
- Case 2: $K_1/L_1 > K_2/L_2$ Untaxed sector (1) is more capital intensive, aggregate demand for K increases
  - substitution and output effects have opposite signs so labor may bear some or all the tax.

4. General Equilibrium Incidence (Harberger JPE 1962)

- Overshifting: bearing more than 100% of tax
- In case 1 ($K_1/L_1 < K_2/L_2$), can get overshifting of tax: $dr < -d\tau$ and $dw > 0$.
  - Capital bears more than 100% of the burden if output effect sufficiently strong.
- Intuition: suppose sector 1 is food (labor intensive), sector 2 is cars (capital intensive). Then taxing capital in sector 2 raises prices of cars, leading to more demand for food and less demand for cars. If consumer demand is very elastic (two goods are highly substitutable), then demand for labor rises sharply and demand for capital falls sharply –> capital loses more than direct tax effect and labor suppliers gain.
- In case 2 ($K_1/L_1 > K_2/L_2$), possible that capital is made better off by capital tax:
  - labor forced to bear more than 100% of incidence of capital tax in sector 2!
- Effects are very complicated – "anything goes."

4. General Equilibrium Incidence - Empirical

- What is a CGE model (Computable General Equilibrium)?
- Used precisely because theoretical results are not sharp
- Requires specifying functional forms for production, costs, demand.
- Uses parameters from the literature.
- Calibrated at current prices to current data.
- Simulate a tax
- Pioneered by Shoven and Whalley

5. Capitalization & Asset Market Approach (Summers NTA 1983)

- One partial solution to the complexity of estimating general equilibrium incidence: examine how asset prices change when taxes are introduced
  - If asset markets are efficient, should incorporate all the various effects on factors costs, costs of goods, etc.
- Advantage of looking at prices of assets is that they should adjust immediately in efficient markets, incorporating the full present-value of the changes.
- Asset price approach is particularly helpful in dynamic GE models.
  - Prices of flows generally take time to adjust because of adjustment costs
  - This is great for empirical work, because our methods are best at identifying short-run changes in variables.

5. Capitalization & Asset Market Approach (Summers NTA 1983)

- Limitation of the approach: can only be used to characterize incidence of policies on capital owners.
  - No markets for individuals (cannot invest in individuals – if you could e.g. own a share of an individual's earnings, could back out incidence of tax policy from change in that asset price)

5. Capitalization & Asset Market Approach

- Main research question: how does a tax affect the path of prices?
- Example: suppose a tax on labor is implemented in LA.
- What happens to house prices? What happens to stocks of local companies? This tells us incidence of tax on landowners and firms..
- Typical methodology in this literature is an "event study."
  - At time t^* there is a distinct event such as a tax increase or an announcement that a tax increase is going to happen at some point in the future.
  - Look at the pattern of prices, or returns over time. Graph the time pattern, do you see a spike/break at the event?
  - Problem: clean shocks are rare because big reforms do not happen suddenly and are always more or less expected. And without a clean break you need a control group, which can be hard.
- Empirical Applications
  - Early example: Rosen JPE 1982 on Prop 13 & house prices in CA
  - More recent example: Linden and Rockoff AER 2008

5. Capitalization & Asset Market Approach (Linden & Rockoff AER 2008)

- Question: what is the cost of bearing the risk of crime? Relevant for analyzing policies that reduce crime.
- Data: public records on sex offender's addresses, on date they move in, and on property values (in a NC county)
- Prior research uses cross sectional or time series variation; usual problems in identifying impact in presence of strong variation across areas and trends.
- They take a novel approach: using the timing and precise location of sex offenders. Allows for a DD strategy–differencing a property within some distance of a sex offender, before and after the sex offender moves in.
- Pretty cool idea; excellent data and use of GIS, etc.

5. Capitalization & Asset Market Approach (Linden & Rockoff AER 2008)

- Unconditional (graphical) evidence: Fig 2B show the pre- and post-distance gradient in housing price sales (local linear regression)

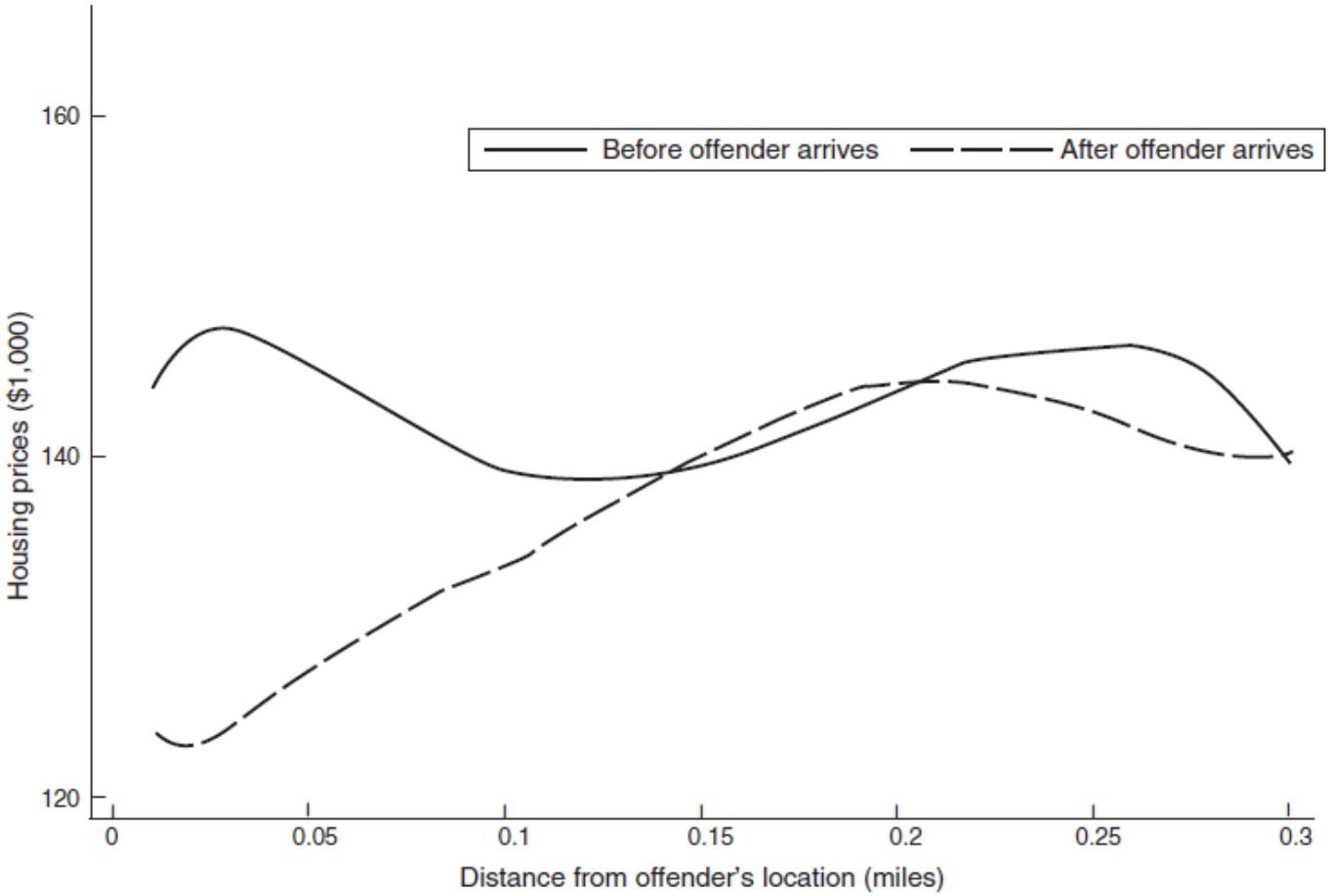


FIGURE 2B. PRICE GRADIENT OF DISTANCE FROM OFFENDER

5. Capitalization & Asset Market Approach (Linden & Rockoff AER 2008)

- Fig 3B shows the unconditional DD; comparing $<.1$ miles to 0.1-0.3 miles before and after the arrival. Pretty nice results.

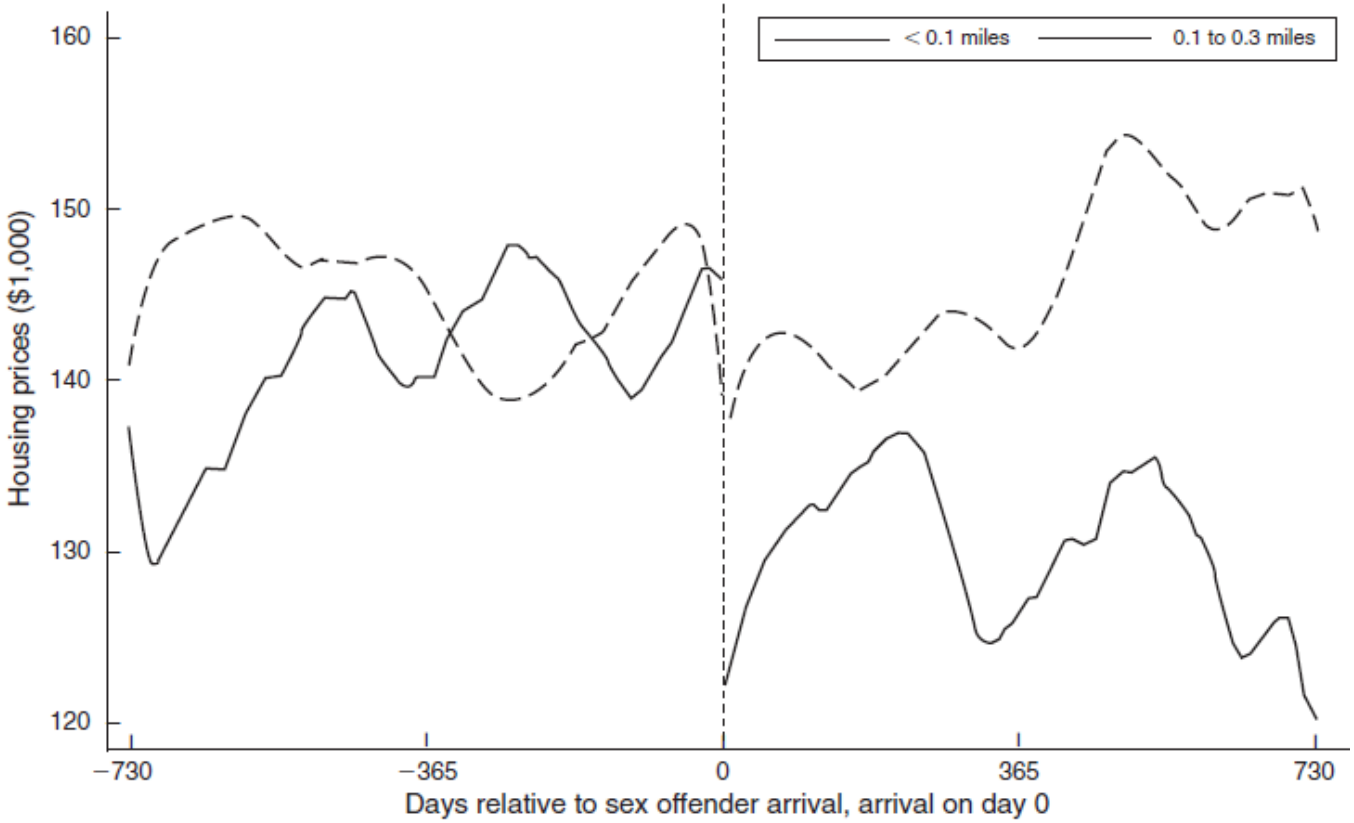


FIGURE 3B. PRICE TRENDS BEFORE AND AFTER OFFENDERS' ARRIVALS

5. Capitalization & Asset Market Approach (Linden & Rockoff AER 2008)

- What do the areas look like?

5. Capitalization & Asset Market Approach (Linden & Rockoff AER 2008)

- Table 2, Panel A: regress log(price), housing characteristics on <0.1 miles dummy. Why do this; what does it show?
- Table 2, panel B: Same but for all houses, not just those that sell

5. Capitalization & Asset Market Approach (Linden & Rockoff AER 2008)

- Conditional, regression, results (Table 3, DD model)

TABLE 3—IMPACT OF SEX OFFENDERS' LOCATIONS ON PROPERTY VALUE AND SALE PROBABILITY

	Log (sale price) pre-arrival		Log (sale price), pre- and post-arrival				Probability of sale†
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Within 0.1 miles of offender	−0.340 (0.052)*	−0.007 (0.013)	−0.007 (0.012)	<0.001 (0.013)	−0.006 (0.012)	−0.006 (0.012)	−0.029 (0.035)
Within 0.1 miles × post-arrival			−0.033 (0.019)+	−0.041 (0.020)*	−0.036 (0.021)+	−0.116 (0.059)+	0.126 (0.059)*
Dist*≤ 0.1 miles × post-arrival (0.1 Miles = 1)						0.107 (0.064)+	
Within 1/3 miles of offender				−0.010 (0.007)			
Within 1/3 miles × post-arrival				0.010 (0.010)	0.003 (0.016)	0.004 (0.016)	−0.055 (0.040)
H_0: within 0.1 miles × post-arrival = 0			*p-value* = 0.079	*p-value* = 0.0443	*p-value* = 0.0828	*p-value* = 0.0502	*p-value* = 0.0361
Housing characteristics		✓	✓	✓	✓	✓	✓
Year fixed effects	✓						
Neighborhood-year fixed effects		✓	✓	✓			
Offender area-year fixed effects					✓	✓	✓
Restricted to offender areas					✓	✓	✓
2 years pre- and post-arrival							
Standard errors clustered by…	*Neighbor-hood*	*Neighbor-hood*	*Neighbor-hood*	*Neighbor-hood*	*Offender area*	*Offender area*	*Offender area*
Sample size	164,993	164,968	169,557	169,557	9,086	9,086	1,519,364
R^2	0.01	0.84	0.83	0.83	0.75	0.75	0.01

5. Capitalization & Asset Market Approach (Linden & Rockoff AER 2008)

- Their main results:
  - house prices decline by about 4% ($5500) when a sex offender is located within 0.1 mile of the house.
  - sharp gradient, no impact at 0.3 miles
  - Implied cost of a sexual offense given probabilities of a crime: $1.2 million – far above what is used by DoJ.
- Table 4: falsification; what is this about?

5. Capitalization & Asset Market Approach (Linden & Rockoff AER 2008)

- My questions on their work:
  - why do they show the unconditional results (Figs 2, 3) for housing price levels and the conditional (regressions) using logs?
  - is straight-line distance the right metric? Should it be walking/driving distance instead?
  - Why does 0.1 miles matter but 0.3 miles do not?
  - what if offenders move into areas that are declining? this violates the common trends assumption
  - I think we want to see regressions like in Table 3 but with characteristics of house sold as LHS (endogenous composition). Also with number of sales as LHS variable.
- Caveat: are you really measuring true cost of crime or some behavioral (psychological) effect?

5. Capitalization & Asset Market Approach: other examples

- J. Friedman (2009) "The Incidence of the Medicare Prescription Drug Benefit: Using Asset Prices to Assess Its Impact on Drug Makers."
  - how much of expenditure is captured by drug companies in terms of higher profits?
  - event study of excess returns around FDA approval. Test to see if excess returns increase after FDA approval
  - drug companies capture about 1/3 of the total surplus of the program

6. Mandated Benefits (special example of incidence)

- Suppose that govt wants to insure that everybody has access to a good or benefit (education, health care). Two possibilities:
  1. Govt can provide that good out of tax revenue: public education, SS benefits.
  2. Govt can mandate that employers have to provide the benefits to all employees, or mandate persons to get the benefits themselves.
- Example: workers compensation for injuries on the job. Employers have to provide this benefit. This is called a "mandated benefit."
- Mandates are seen as attractive and cheap way for the government to provide benefits to workers.
  - Do not show up in government spending. Govt looks smaller with a mandate than with a publicly funded program.

6. Mandated Benefits (Summers AER 1989)

- Traditionally, economists thought of mandates as additional taxes that employers had to bear $->$ further deadweight loss and inefficiency.
- Summers' key insight: mandates are a *tax* on the employer but a *benefit* for the worker, so efficiency cost depends on benefits workers get from the program. Could end up having no effect on employment and only have an incidence effect (reduced wages for workers).

6. Mandated Benefits (Summers AER 1989)

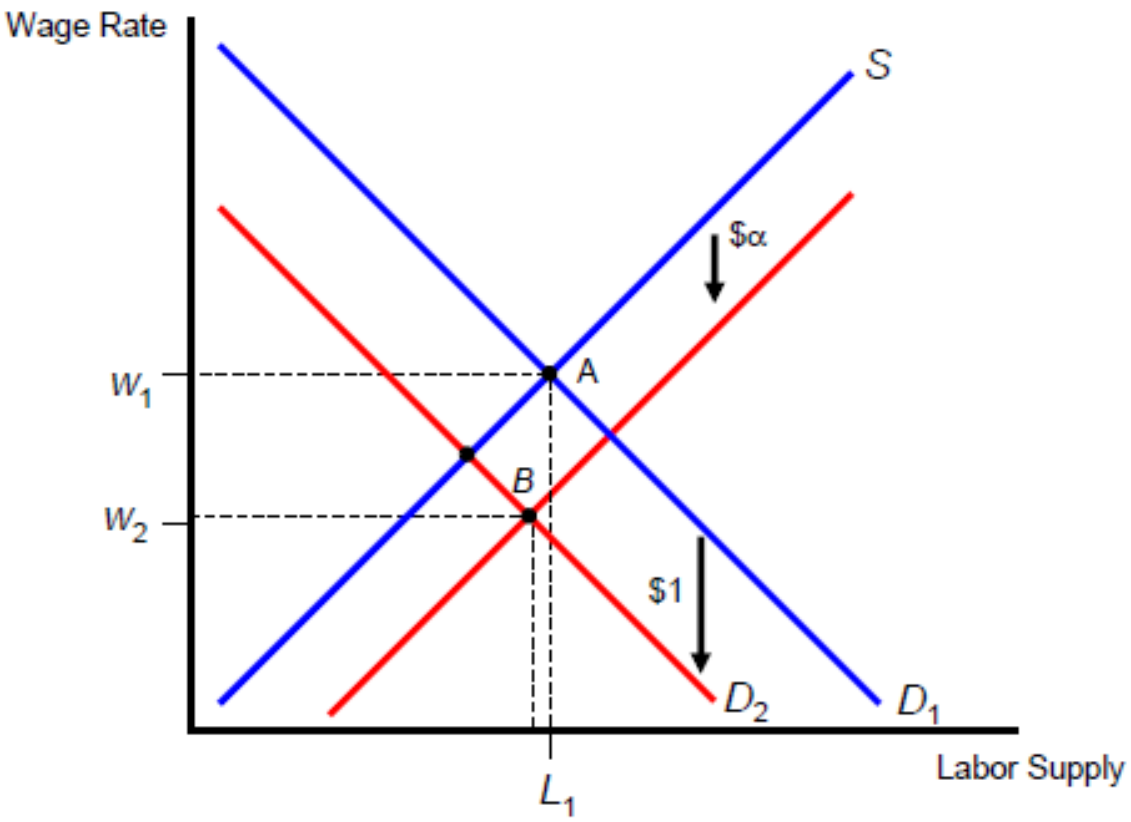
- Suppose that govt mandates firms to provide HI benefit of \$1.
  - This raises the labor cost by \$1 and thus reduces demand but it is also an additional benefit to workers who are then willing to work for a lower wage.
- Suppose that workers value the benefit at α dollars.
  - Presumably $0 < \alpha < 1$ but $\alpha > 1$ possible if HI private market is not working well.
- Demand and supply for labor: $D(w_0) = S(w_0)$ initial equilibrium.
- Mandate a benefit that costs t : Labor cost $w + t$, effective wage $w + \alpha t$.
- New equilibrium: $D(w + t) = S(w + \alpha t)$

6. Mandated Benefits (Summers AER 1989)

- Analysis for a small t: linear expansion around initial equilibrium.
- $$\frac{dw}{dt} = -1 + \frac{(1-\alpha)\eta_S}{(\eta_S - \eta_D)}$$
- Possibilities
  - *Employee values benefit at cost* ($\alpha = 1$): full cost shifting (w falls, $dw/dt = -1$) and no effect on employment.
  - *Employee values at less than full cost* ($0 < \alpha < 1$): wages and employment falls but by less than full tax; equivalent to a tax $1 - \alpha$. Usual incidence and efficiency effects.
- Called tax-benefit linkage in public finance
  - Why no tax-benefit linkage with government provision? People paying taxes and people getting benefits are different; no linkage.

6. Mandated Benefits (Summers AER 1989)

- So incidence depends on how benefits are valued by workers.
- Figure (Gruber):



6. Mandated Benefits (Summers AER 1989)

- Problems with this reasoning:
  - Wage rigidities: minimum wage cannot go down, wage cannot go down and this might create unemployment.
  - Benefit costs might be different for different employees. HI more expensive for elder employees than young employees. If wages cannot adjust by groups, employment effect on the aged.

6. Mandated Benefits (Gruber AER 1994)

- Contribution of paper: 1st empirical investigation of Summer's hypothesis
- Key to reducing DWL from the mandate is wage adjustment. Wage adjustment requires (1) full valuation of benefits, and (2) no wage rigidities.
  - In Gruber's case we may have wage rigidities because the mandate is group-specific (women) and anti-discrimination laws may limit wage adjustment
  - Illustrates more general point that mandates that are group specific may not have efficiency gains as advanced in Summers.
  - Also, for women with wages near minimum there is no scope for adjustment

6. Mandated Benefits (Gruber AER 1994)

- Research Design: Standard state DD model
  - Analyze 1975-1978 period with state law changes
  - DD: Compare states with and without mandated maternity benefit laws
  - DDD: add affected vs. unaffected workers
- Policy variation
  - Pre-1975: Coverage for pregnancy limited
  - 1975-1979: 23 states passed laws outlawing treating pregnancy differently
  - October 1978 - Federal law covered (opportunity for reverse experiment)
- Outcomes: hours, wages, labor force participation using CPS

6. Mandated Benefits (Gruber AER 1994)

- Treated: Married women ages 20-40, married men 20-40, single women 20-40
- Control: Men, Women $>$ 40, single men 20-40
- Things to think about:
  - Are these good control groups?
  - Do these demographic groups have similar trends?
  - Identification comes from differential trends by demographic group within states.
  - What fraction of married women were working then? What if treatment leads to increases in employment rates? Selection and interpreting effects on wages?
  - Interpretation: need to compare wage effect to estimated cost of adding coverage (Table 1)

6. Mandated Benefits (Gruber AER 1994)

- Results Table 3: Unconditional DDD, 5.4% fall in wages for married women (nice example of unconditional DDD table)

TABLE 3—DDD ESTIMATES OF THE IMPACT OF STATE MANDATES ON HOURLY WAGES

Location/year	Before law change	After law change	Time difference for location
A. *Treatment Individuals: Married Women, 20–40 Years Old:*			
Experimental states	1.547 (0.012) [1,400]	1.513 (0.012) [1,496]	−0.034 (0.017)
Nonexperimental states	1.369 (0.010) [1,480]	1.397 (0.010) [1,640]	0.028 (0.014)
Location difference at a point in time:	0.178 (0.016)	0.116 (0.015)	
Difference-in-difference:	−0.062 (0.022)		
B. *Control Group: Over 40 and Single Males 20–40:*			
Experimental states	1.759 (0.007) [5,624]	1.748 (0.007) [5,407]	−0.011 (0.010)
Nonexperimental states	1.630 (0.007) [4,959]	1.627 (0.007) [4,928]	−0.003 (0.010)

6. Mandated Benefits (Gruber AER 1994)

- Table 4: Conditional DDD, 4,1% fall in wages for married women.

TABLE 4—TREATMENT-DUMMY RESULTS ACROSS DEMOGRAPHIC GROUPS

Group	Log hourly wage	Log hours/week	Employment (probit)	Percentage changes in labor input
Married women, ages 20–40	−0.043	0.049	−0.047	1.40
	(0.023)	(0.022)	(0.048)	
			[−0.016]	
Single women, ages 20–40	−0.042	−0.014	−0.095	−5.95
	(0.026)	(0.024)	(0.064)	
			[−0.030]	
Married men, ages 20–40	−0.009	0.030	−0.139	−1.08
	(0.018)	(0.015)	(0.072)	
			[−0.038]	
All treatments	−0.023	0.027	−0.079	−0.88
	(0.015)	(0.014)	(0.039)	
			[−0.024]	

6. Mandated Benefits (Gruber AER 1994)

- Overall results: full or more than full cost shifting. Surprising this could be so large ...
- My thoughts:
  - Seems like they "hand picked" the control states which is a little suspect
  - Need to present graphs that illustrate DD findings
  - limit to FT workers since PT workers often do not have insurance?
  - pre treatment trends? Placebo?