Local Impact Analyses in the Context of US Forest Economics Evolution

(With Some Occasionally Practical New Analytics)

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Troy, Idaho USA
population 808

Who is This Person?

- Mixed Education
  - Forest Management BS
  - Applied Physics MF
  - Tropical Ecology PhC
  - Economics PhD
- U of Idaho 25 years
  - Forest Econ courses
  - Extension Economist
- International Consultant
  - 4 Asian countries
  - 4 Latino countries
- Forest Econ Sr. Analyst
  - Wood market forecasts
  - Investment analyses
  - Valuation
  - Optimization modeling
  - Policy impacts
- Certified Forester
- Private Forest Owner
- Logger
- Fire Control Officer
- Commercial Pilot
- Antiques Appraiser

And What is He Going to Tell Me?

- Private/Public Divergence in US forestry & in the applications of forest economics
- Increasing uses of social/economic impact analyses
  - Legal requirements
  - Input-Output modeling
  - Problems with rural open economies
- Spatially Disaggregated Input-Output analysis
  (A “new frontier” not in Zurich IUFRO on 4/26)
- Local impact analysis lessons learned:
  - Data & modeling
  - Non-intuitive impact patterns
  - Questions of relevance

US Forestry Sector—
Two Ownerships Behaving Differently

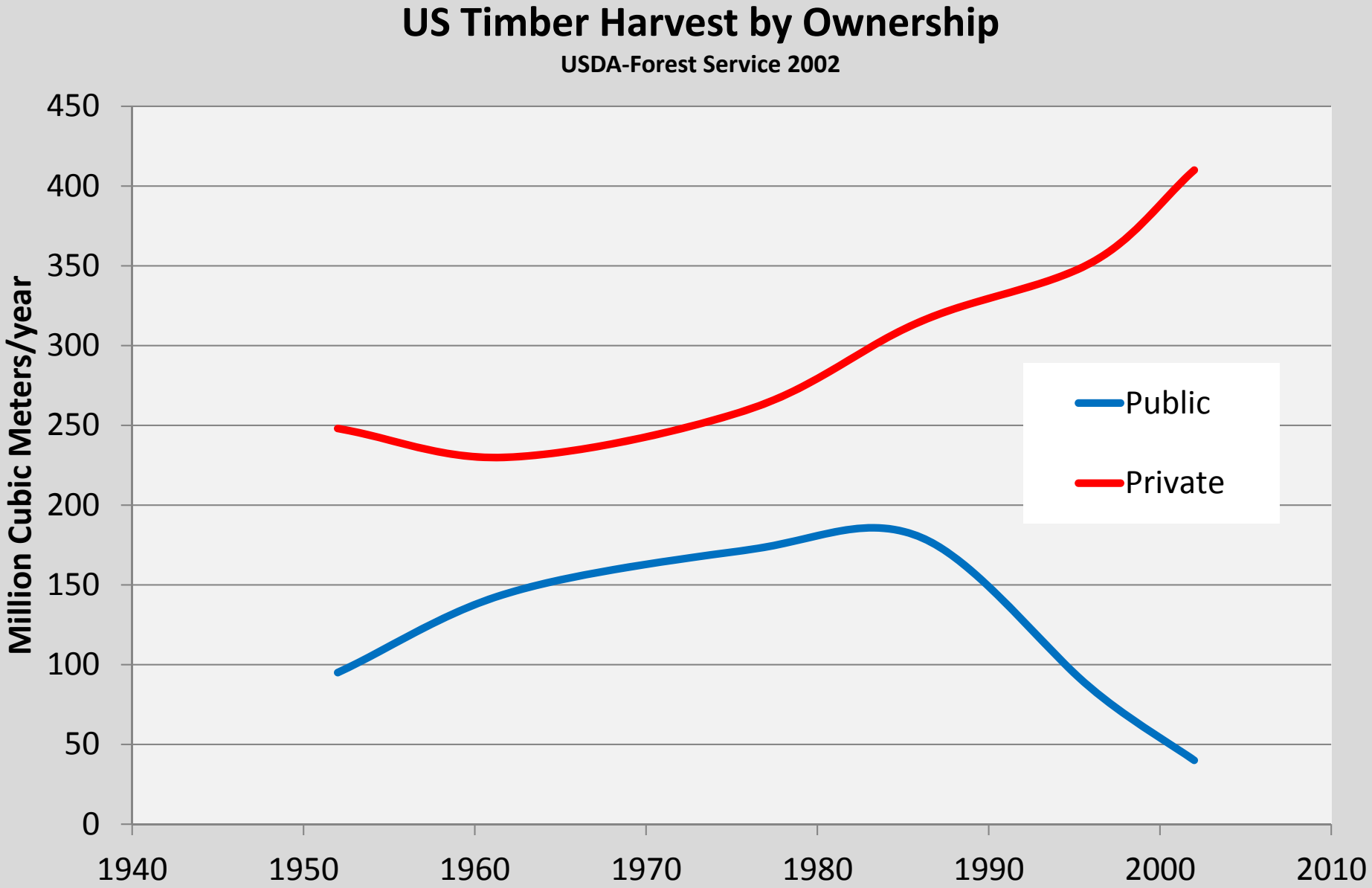
Industrial & Family Forests

- Forest area
  - 174.1 x 10^6 ha
- Timberland area
  - 144.3 x 10^6 ha
  - 83% productive
- Inventory
  - 14.3 x 10^9 m^3
  - 99.1 m^3 / hectare
- Annual Changes
  - Net growth 0.50 x 10^9 m^3/yr
  - Removals 0.41 x 10^9 m^3 /yr
  - Inventory turnover 2.9%/yr
- Economic contribution
  - GDP US $102 x 10^9
  - Jobs 2.6 x 10^6

Federal & Other Public Forests

- Forest area
  - 129.3 x 10^6 ha
- Timberland area
  - 59.6 x 10^6 ha
  - 46 % productive
- Inventory
  - 9.9 x 10^9 m^3
  - 166.5 m^3 /hectare
- Annual Changes
  - Net growth 0.17 x 10^9 m^3 /yr
  - Removals 0.04 x 10^9 m^3 /yr
  - Inventory Turnover 0.4%/yr
- Economic contribution
  - GDP US $ 13 x 10^9
  - Jobs 0.3 x 10^6

As Forest Philosophies Diverge
So Do Annual Timber Harvest Volumes



History of US Forest Decision Influences

- 1800's US Westward Expansion
- World War II wood demand
- 1957 Gaffney rediscovers Faustmann
- Environmental movement & regulations
  - 1969 Environmental Protection Act
  - 1970 & 1972 Clean Air & Clean Water Acts
  - 1973 Endangered Species Act
  - 1976 National Forest Management Act
  - Numerous state forest practices acts
- 1979 inflationary housing boom 1981 bust
- 2006 over-stimulated housing boom 2007 bust

Forest Economics Applications: An Evolutionary Schism

Industrial & Family Forests

- Liquidation & conversion
- Intensive timber culture optima
- Financial Forest regulation
  - "Max-Millions" era
  - "FORPLAN" variants
- FPA constrained spatial optimization
  - "Woodstock" era
- Bilateral spatial monopoly
  - Gaming models

Federal & Other Public Forests

- Classical forest regulation
- Timber stand improvement
- Multiple-use regulation
  - "FORPLAN" era
- Ecosystem management
  - "SPECTRUM" era
- Sector planning
  - "TAMM/FASOM" era
- Policy impacts analysis
  - "IMPLAN" era
  - "SDIO" era

Why Public Policy Impact Analyses?

- Sustained Yield Forest Management Act (1944) 1944 assigns forests for **"community stability"**
- Multiple-Use Sustained-Yield Act (1960) directs management for "the greatest good" & **requires economic and social analysis**
- National Environmental Policy Act (1969). Calls for integrated assessment of **"impacts on the human environment"**
- National Forest Management Act of 1976 requires **social assessments**

Input Output Analysis Logic

from Miernyk 1965

TABLE 2–1

Hypothetical Transactions Table

Industry Purchasing

Industry Producing / *Payments Sector* — Outputs[1] / Inputs[2]	*Processing Sector* (1) A	(2) B	(3) C	(4) D	(5) E	(6) F	*Final Demand* (7) Gross inventory accumulation (+)	(8) Exports to foreign countries	(9) Government purchases	(10) Gross private capital formation	(11) Households	(12) Total Gross Output
(1) Industry A	10	15	1	2	5	6	2	5	1	3	14	64
(2) Industry B	5	4	7	1	3	8	1	6	3	4	17	59
(3) Industry C	7	2	8	1	5	3	2	3	1	3	5	40
(4) Industry D	11	1	2	8	6	4	0	0	1	2	4	39
(5) Industry E	4	0	1	14	3	2	1	2	1	3	9	40
(6) Industry F	2	6	7	6	2	6	2	4	2	1	8	46
(7) Gross inventory depletion (−)	1	2	1	0	2	1	0	1	0	0	0	8
(8) Imports	2	1	3	0	3	2	0	0	0	0	2	13
(9) Payments to government	2	3	2	2	1	2	3	2	1	2	12	32
(10) Depreciation allowances	1	2	1	0	1	0	0	0	0	0	0	5
(11) Households	19	23	7	5	9	12	1	0	8	0	1	85
(12) Total Gross Outlays	64	59	40	39	40	46	12	23	18	18	72	431

[1]Sales to industries and sectors along the top of the table from the industry listed in each row at the left of the table.
[2]Purchases from industries and sectors at the left of the table by the industry listed at the top of each column.

Canned Input-Output Modeling (e.g. IMPLAN)

Advantages

- Standardized I/O model
- Widely used
  - Easy to download & run
  - Little I/O training needed
  - Prepackaged data
  - Rarely any field work
- Credible regional, state & county resolutions
- Standard output formats
- Prepackaged reporting

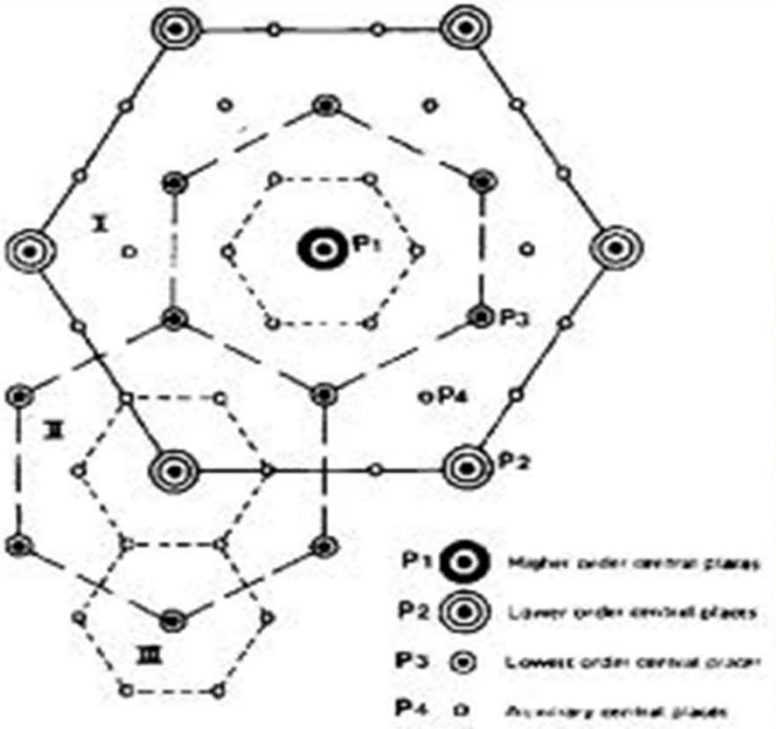
Disadvantages

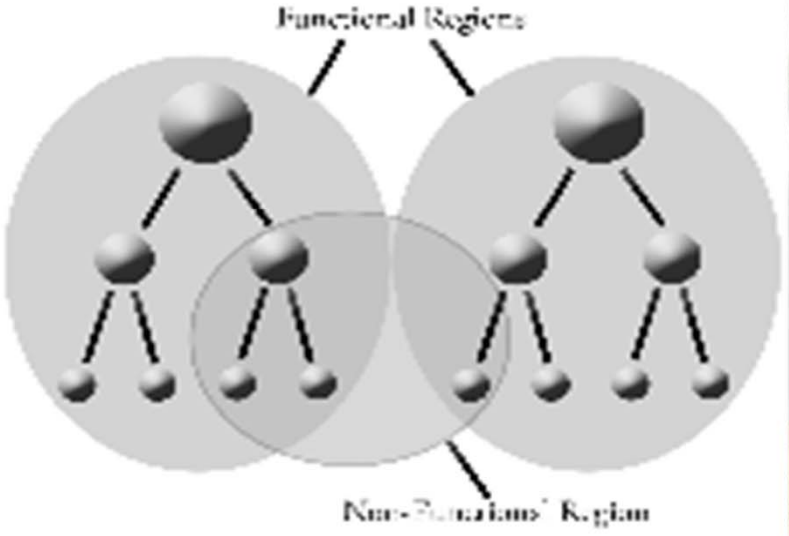
- SAM's not transparent
- National average coefficients
- Error-laden local data matrices
- Awkward to modify
- Political, not economic, spatial definition
  - Lumps unlike local economies
  - Dilution of local impacts
  - Ignores commuting
- Functional economy assumption
- Phantom linkages
- Government sector exogenous
- Tourism over-estimated
- Misinterpretation common
- Limited utility for subsequent analyses
  - Cluster analysis
  - Trade hierarchies
  - Development strategies
  - Social ROR estimation

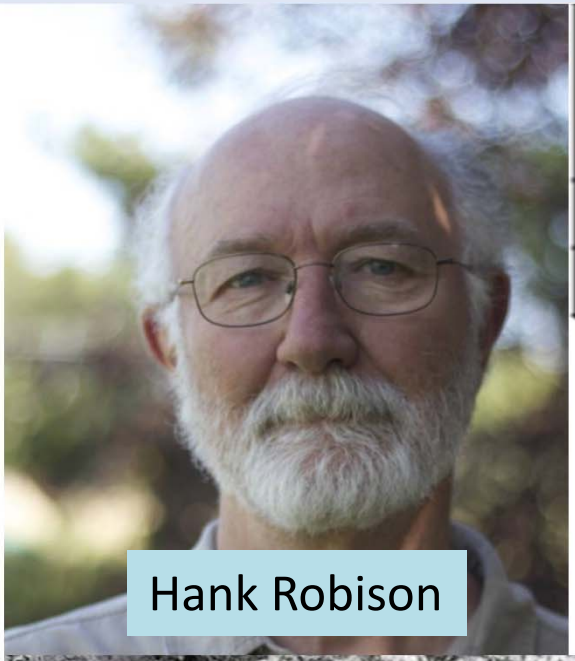
Regional Trade Hierarchy Example

- Trade Center Dominance
  - Size gravity
  - Transport net
  - Not political
- Where are the functional economy boundaries?
- Resource-based communities?
  - Remote
  - Scattered
  - Specialized
  - Open economies

Central Place Theory, Trade Hierarchies and Solving the Open Rural Economies Problem






Hank Robison

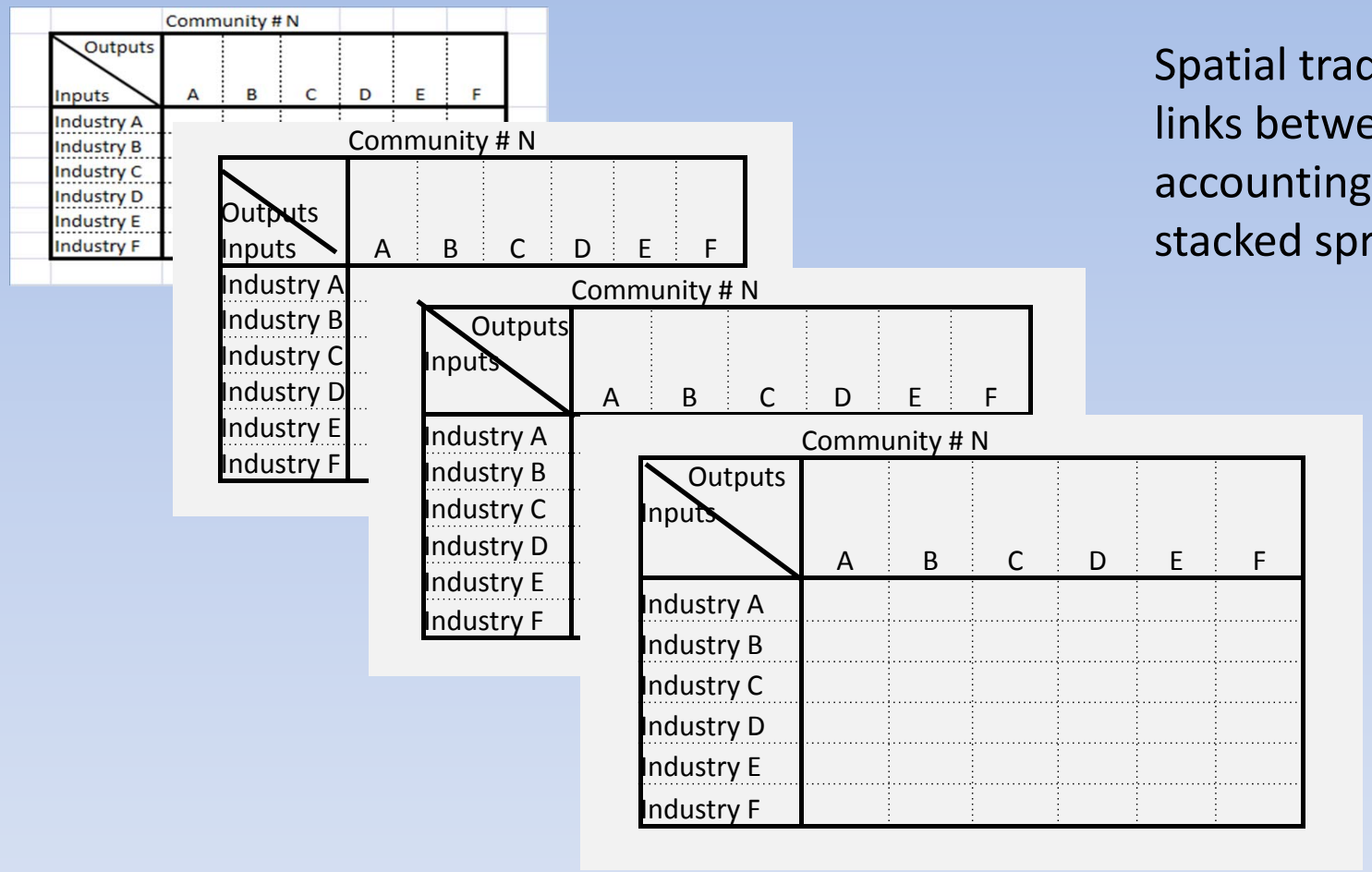

Dan & Maryann Green

Hamlet	Small town	City	Metro area	
x	x	x	x	Post office
x	x	x	x	Restaurant/tavern
	x	x	x	Bank
	x	x	x	Mortuary
	x	x	x	Weekly newspaper
	x	x	x	Grocery store
	x	x	x	Radio station
		x	x	Hospital
		x	x	Supermarket
		x	x	Department store
		x	x	Daily newspaper
		x	x	Scheduled air service
			x	University
			x	Large shopping malls
			x	National/Int'l air service
			x	High-rise buildings

Spatially Disaggregated I/O (SDIO)

1. Resolution finer than functional economy
2. Designed for open rural trade hierarchies
3. Rural area social accounting has an individual community focus.
4. Household sector defined to capture openness of local community economies.
5. Models must close to assess community economic base.
6. Models include estimates of intercommunity trade, and intercommunity multiplier effects.
7. Transparent quantification of local social accounting matrices interpretable by untrained citizenry.

Spatially Disaggregated Model Logic



Spatial trade coefficient links between sparse social accounting matrices of stacked spreadsheets

Allows generation of hierarchical tradeflows & estimation of intercommunity multipliers

Each individual community spreadsheet becomes an interpretable snapshot of local economic structure

Why Field Data Calibration?

- Data from published sources
  - Census county business patterns
  - Rural economic information system (REIS)
  - Bureau of Economic Analysis
  - Bureau of Labor Stats (ES-202 data)
  - State employment services
- Is often wrong!
  - Unreported activity
  - Underreported sectors
  - Reporting errors
  - Imputed production coefficients
  - Categorization incompatibility
- & frequently non-disclosed
- Local resolution:
  - Requires census reliability
  - Not statistical approximation

Community	logging % error	forestry % error	sawmill % error
Riggins	-9%		
Grangeville	-7%	-21%	-59%
Warren			
Weiser			
Cambridge	-33%		
New Meadows	-7%		-1900%
Council	-7%	-14%	
Mtn. Home			50%
Lowman			
Garden Valley	-60%		
Horseshoe Bend	-59%	-33%	
Idaho City		-33%	
Emmett	-23%	50%	
McCall	-38%	-32%	
Cascade	-100%	-32%	
Yellow Pine			
Big Creek			
Elgin			58%
La Grande	3%	-19%	
John Day	-37%	-58%	-76%
Total	-15%	-24%	-44%

Statistics for Open Economies

- Distribute Aggregate Statistics
  - Count firms & proportion published data
  - Identify firms & collect firm resolution data
  - Websites replacing phonebook references
  - Hoover & Manta data engines
- Rapid rural appraisal
  - More census than sample
  - Observed correction of secondary data
  - Key informants know local structure
  - Stakeholders know potential effects
  - Survey for local/export trade splits
- Analyst boots on the ground
  - Improves analyst's vision of economic structure
  - Adds to credibility of estimated effects
  - But hard to avoid going native

Or use published data

And You Might Get Lucky

Case Studies & Lessons Learned

1. Idaho Custer/Lemhi Counties
2. Wallowa-Whitman NF harvest reductions
3. SW Idaho Ecogroup plan revisions
4. NC Idaho Pacfish Impacts
5. Western Oregon BLM plan revision
6. Siskiyou Co, California land use regulation
7. Hell's Canyon white water conflicts

- Useless political boundaries
- Not functional economic units
- Unlike local economies
- Specialized/undiversified
- Locally concentrated impacts
- Seasonal employment leakage
- Low local multipliers
- High trade leakage
- Large government presence

Typical Findings:

Idaho Custer/Lemhi Counties

Jobs by Political Boundaries

Industry	Jobs	Job %
Agriculture	1,096	24.2%
Mining	850	18.7%
Timber	314	6.9%
Visitors	1,030	22.7%
ROI links	228	5.0%
Government	939	20.7%
Other	78	1.7%
Total Jobs	**4,535**	**100.0%**

Jobs by Local Economy Boundaries

Local Economy	Total Jobs	Dominant Industry	Dominant Jobs %
Challis	1,199	Mining	55.4%
Stanley	192	Visitors	78.7%
Mackay	405	Agriculture	50.7%
Salmon*	2,304	Visitors	24.8%
Pasimeroi	80	Agriculture	85.1%
Leadore	181	Agriculture	76.7%
Northfork	177	Visitors	63.4%
Total Jobs	**4,535**		

* = regional trade center

Wallowa-Whitman Harvest Reduction

- Mill resilience algorithm predicts 5 of 7 mill closures in order
- Separating local vs. tourist recreation
- Extreme recreation expenditure leakages
- Reject amenity/ commodity substitution hypothesis
- Reject labor substitution assumptions

SW Idaho Ecogroup EIS

- Public land dominance historically defined local economic structure
- Endless nature of policy revisions—its about process not optimality
- Public planning ignores dependence on private infrastructure
- Irreversible policy influences
- Failures of new mill investment projections

More SW Idaho EIS

- Hierarchies of widely scattered resource communities
- Recreation algorithm to spatially assign RVD spending
- Measuring local effects of a single agency on a single use
- Visibly dominant sectors may not really be

3 SW Idaho National Forest Recreation Linkages

Community	Total Jobs	FS based RVD jobs	% of Total
Cascade	878	151	17.2%
Challis	1,220	285	23.4%
Council	1,103	33	2.9%
Crouch-Garden Valley	632	216	34.2%
Emmett	5,366	53	1.0%
Fairfield	642	132	20.6%
Gooding	3,338	48	1.4%
Hailey-Bellevue	4,607	169	3.7%
Idaho City	724	34	4.7%
McCall	4,403	601	13.7%
New Meadows	679	61	9.0%
Oakley	421	2	0.5%
Raft River Valley	643	9	1.4%
Riggins	643	106	16.4%
Stanley	256	206	80.5%
Sun Valley-Ketchum	10,812	495	4.6%
Weiser	4,333	94	2.2%
Total	**40,700**	**2,695**	**6.6%**

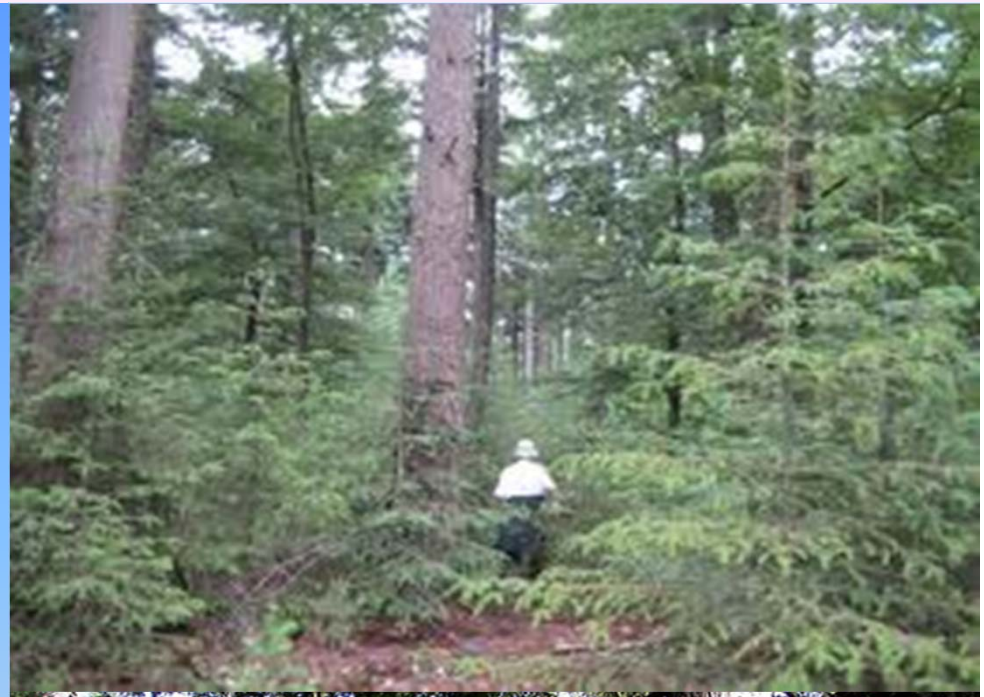
NC Idaho Pacfish Impacts

Latah, Lewis, & Idaho Counties

- Unlikely tourism
- 85% public land
- Public vs private forest production
- Economic mill closure criteria vs tenacity
- Job & Income spatial effects displacement

W. Oregon BLM increased harvests

- Effects responses differ:
  - Negatives certain & quick
  - Positives uncertain & slow
- Econometric log-to-mill spatial projection model
- Restructured non-timber economy permanence
- Highly resource dependent trade center w/o local resource sector
- Local government finance dependence problem
- Compensatory finance
  - Taxes vs. export industry
- The missing loggers problem
- Log trucks misrepresented in secondary data



Siskiyou Land Use Regulations

Multiple Unrelated Policy Changes

1. Federal timber harvest stops to protect owls
2. Wildlife Service diverts water from irrigation to salmon runs
3. State dairy & feedlot water quality restrictions

Lead to interesting Effects

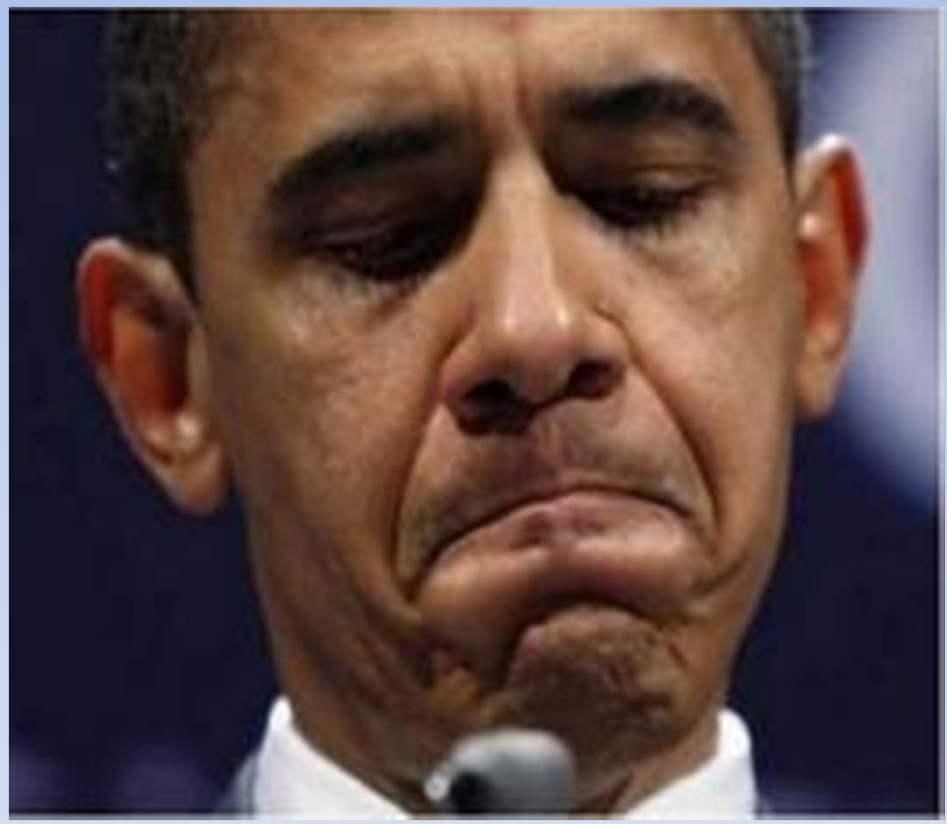
- Direct effects
  - Sawmill closure & layoffs
  - Forage unavailability
  - Irrigated ag crops end
  - Cattle move to Idaho
- Indirect/induced effects
  - Implement factory closes
  - Dairy equip factory closes
  - Construction ebbs
  - Service sector closures
  - Local tax base shrinks
  - Local government layoffs
  - Retirees displace workers
  - Empty fields subdivided
  - E-bay & pot leading sectors
- Multiple changes magnify & accelerate indirect & induced impacts beyond I/O models' marginal change assumption

Hell's Canyon Whitewater Conflicts

- Recreation type differences are large
  - RVD demand
  - Spending patterns
  - Economic linkages
  - Leakage
- Water conflicts
  - Hydropower vs RVD's
  - Quiet vs noisy RVD's
- Community profile errors: resorts vs welfare
- Policy choice biases

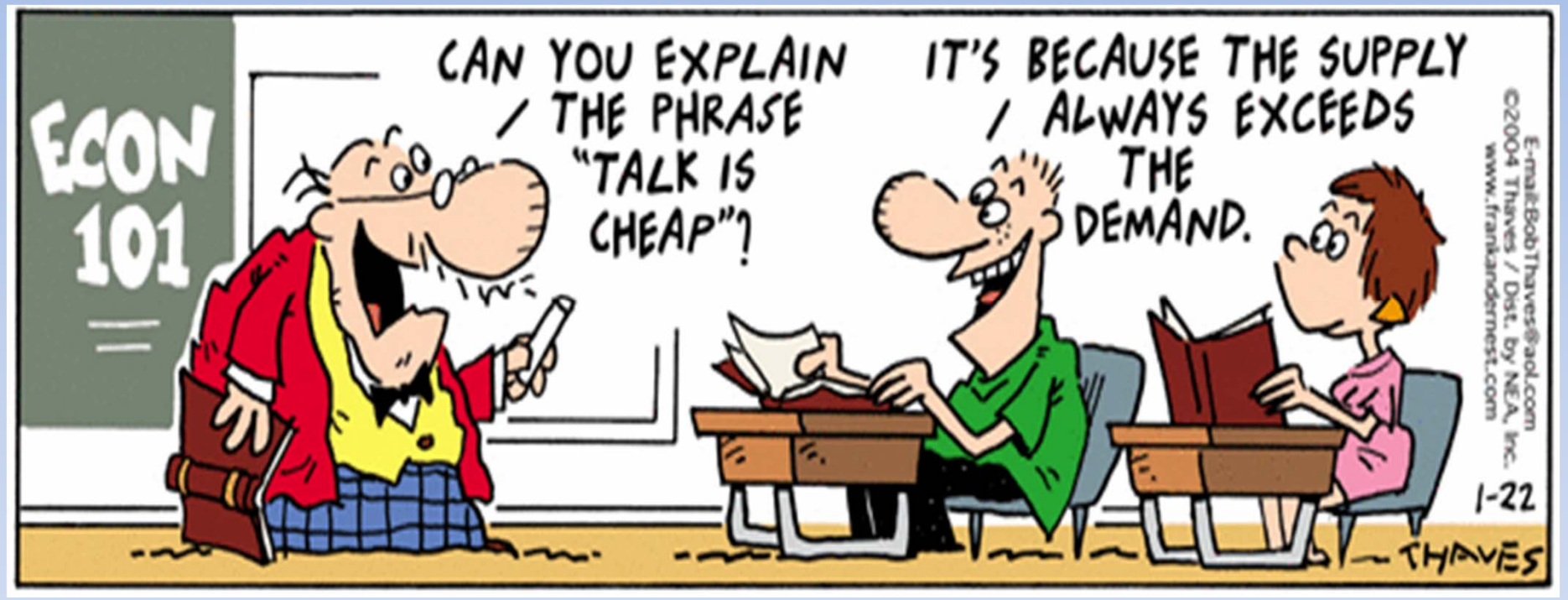
The Saddest Lesson of All

- Social Impact Analysis is required for public policy changes
- SDIO provides amazing insights into local human economies
- Social/Economic policy impacts can be frequent & large
- Impacts tend to concentrate in small undiversified resource communities
- BUT…little evidence that jobs & income changes influence public resource decisions
- SO…SDIO is often an analytical investment with lower order societal returns



My President weeping for job losses

Have I Driven the Price Down Further?



Or are there any questions?

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