

The Effect of Prices on Fixed and Mobile Telephone Penetration: Using Price Subsidies as Natural Experiments

Glenn A. Woroch
University of California @ Berkeley

“Wireless Technologies: Enabling Innovation and Economic Growth”
Georgetown Center for Business & Public Policy
17 April 2009



Ascendancy of mobile

- Spectacular Growth
 - Developed and developing nations.
 - All strata and segments of the population.
 - Multiple mobiles per household.
 - Expanding usage for voice and data.
- Substitution of Mobile for Fixed
 - Fixed growth is zero or negative
 - Push back with xDSL & video after losing fax, dialup
 - “Cutting the cord” continues, now about 17.5%

FMS is everywhere ...
but neglected in Universal Service policy

- Both contribute to USF
 - Bill line item for interstate calling
 - Fixed gets lion share of payout
- Both provide access and usage but ...
 - Substitutes or complements?
 - For low income? For under served areas?

Lifeline Assistance Program

- Targeted subsidy
 - Federal program implemented by all 50 states.
 - Household eligibility based on means tests that vary across states.
 - Discount off bill set by FCC but supplemented by states.
- Household eligibility
 - Below some % Federal Poverty Guidelines (FPGs).
 - Alternatively, household participates in a federal assistance program.
 - Household must “self certify” each year.

Lifeline Assistance (cont'd)

- Implementation
 - Eligible Telecommunications Carriers give discount.
 - Discount varies by state, ranging from \$6.75 to \$14.78 with an average of \$11.
 - Composed of federal SLC (\$6.75), plus state match, plus federal 50% match (up to \$1.75).
 - Only one fixed or mobile line covered per household.
- Participation
 - 6M participants from 19M eligible.
 - ETCs conduct verification, but many needy households do not participate and some high income households do

Lifeline Assistance (cont'd)

State	State & Federal Subsidy	Income Eligibility as % of FPGs	No. of Participants	Avg. Annual Subsidy	% HHs Participating	Est'd Participation Rate
California	\$12.00	150%	3,196,657	\$128.32	27.79%	119.2%
Connecticut	\$8.50	150%	64,745	\$88.99	4.97%	32.3%
Florida	\$12.00	125%	134,281	\$130.21	2.12%	13.5%
Illinois	\$10.85	125%	57,816	\$94.40	1.26%	9.0%
Massachusetts	\$14.50	175%	165,519	\$160.96	6.77%	15.11%
Michigan	\$9.75	150%	141,541	\$103.92	3.74%	3.62%
New Jersey	\$6.75	150%	29,095	\$69.62	0.95%	4.26%
New York	\$10.74	150%	586,660	\$115.87	8.31%	14.48%
Ohio	\$6.75	150%	167,213	\$76.81	3.76%	5.15%
Pennsylvania	\$10.50	150%	48,975	\$110.92	1.03%	2.48%
Rhode Island	\$12.00	175%	47,412	\$129.64	11.61%	18.76%
Texas	\$12.00	125%	258,812	\$121.19	3.50%	1.68%

Identifying Price Effects using the Lifeline Subsidy

- Lifeline participants face lower fixed-line fees.
- Compare fixed prices and mobile subscriptions for participants and non-participants → cross price elasticity.
- Participation is non-random so some of effect may be due to income, not price.
- But controlling for income & demo's, Lifeline has no incremental effect on HH purchase of cable, PCs, Internet → pure price effect on mobile subscription.

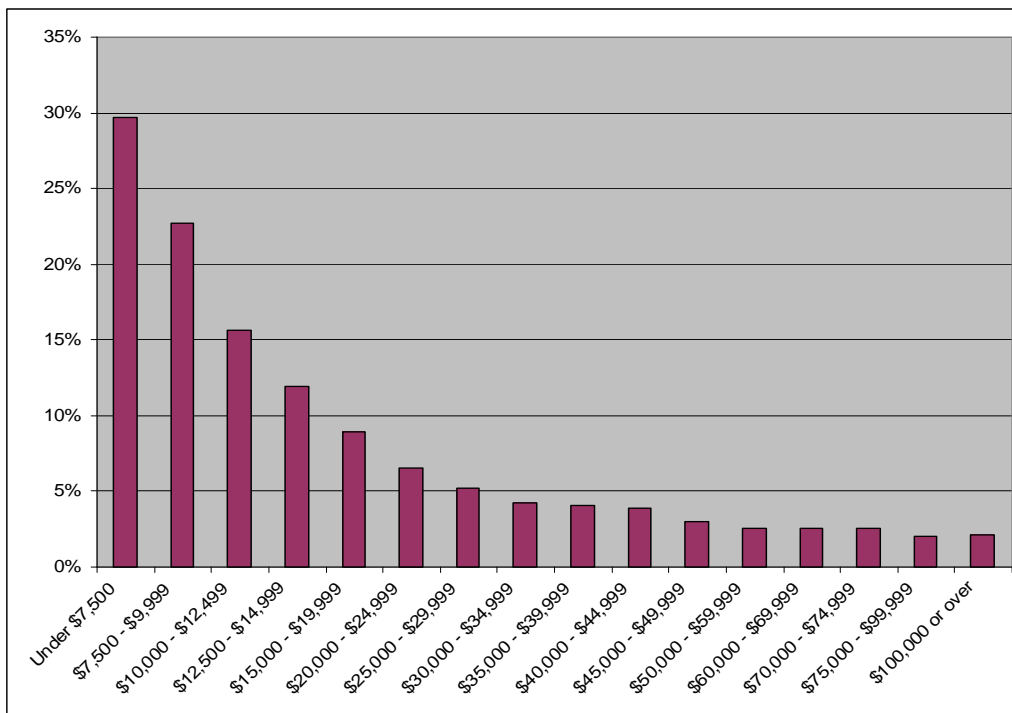
Household Panel

- TNST's ReQuest Market Monitor[®] Database
 - Nationwide, 30K+ per quarter, 10 quarters (3Q99-4Q01).
 - Survey responses and demographics from omnibus.
 - Lots of groups for demographics (e.g., 17 income groups)
- TNST's Bill Harvesting[®] Database
 - Fixed and mobile bill harvesting (~ 25% response rate).
 - Not a panel but some re-sampling (~ 10% of bill submitters).
- Sampling Problems
 - Households, not individuals.
 - Some sample bias.
 - Voluntary bill submission causes data headaches.
 - Bills mask valuable information.

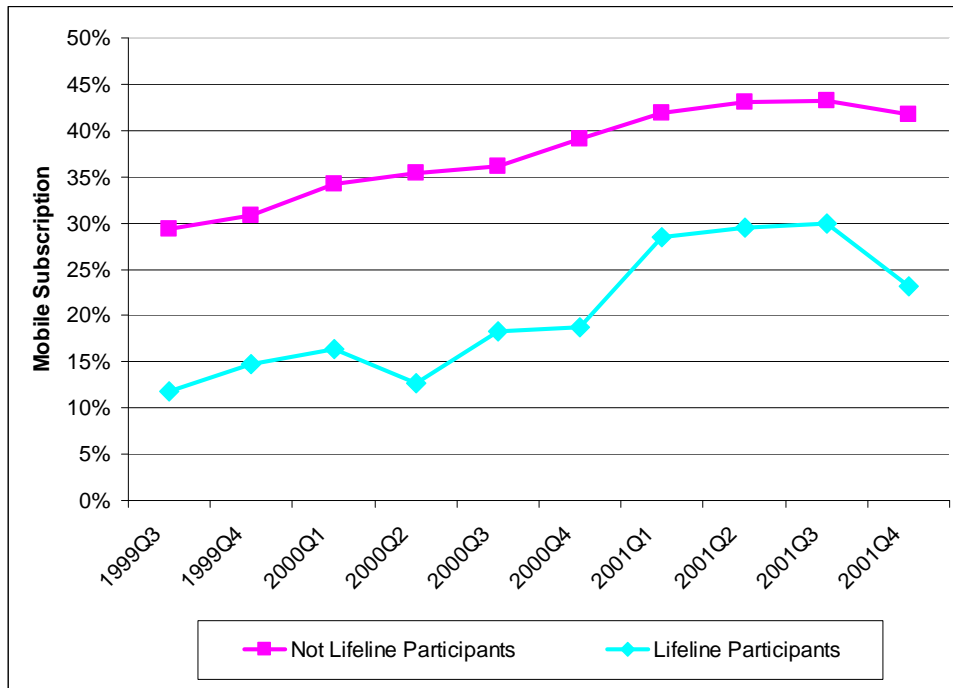
Lifeline participation

- Identified by service designation on fixed line bill.
- Lowest income group participation rate ~30%, gradually falls with income to 2% for highest group.
- Lifeline also related to:
 - Marital Status
 - Size of household
 - Composition of household
 - Ages of children
 - Race

LLA participation by income



Lifeline vs mobile subscription



Lifeline and fixed-line price

OLS Regressions

	Local Bill	Ln(Local Bill)
Constant	33.01* (0.23)	3.3704* (0.0057)
Lifeline Dummy	-11.10* (0.27)	-0.5318* (0.0068)
Quarter Dummies	Significant	Significant

Lifeline and mobile subscription

Probit Regressions – Marginal Effects Reported

	Mobile	Mobile
Lifeline Dummy	-0.1786* (0.0056)	-0.0309* (0.0079)
Time Period	Significant	Significant
State Dummies	Significant	Significant
Income Dummies		Significant
Age Dummies		Significant
HH Composition Dummies		Significant
HH Size Dummies		Significant
Children Dummies		Significant
Moved Recently Dummies		Significant
Married Dummies		Significant
Race Dummies		Significant
Hispanic Dummy		Significant

X-elasticity calculation

- Avg bills \approx \$34 & $\Delta P \approx$ -\$11/-13 \rightarrow $\% \Delta P = -33\%/-41\%$
- Mobile sub rate \approx 36% & $\Delta Q \approx$ 3.1% \rightarrow $\% \Delta Q = -8.5\%$
- X-price elasticity: $\eta_{mf} = \% \Delta Q / \% \Delta P \approx + 0.21 / 0.27$

Lifeline and Other IT Adoption

Probit Regressions – Marginal Effects Reported

	CATV	CATV	PC	PC	ISP	ISP
Lifeline Dummy	-0.0676* (0.0067)	0.0006 (0.0071)	-0.1654* (0.0064)	-0.0054 (0.0079)	-0.1553* (0.0060)	-0.0092 (0.0081)
Time period	Significant	Significant	Significant	Significant	Significant	Significant
State	Significant	Significant	Significant	Significant	Significant	Significant
Income and other demographics		Mostly Significant		Mostly Significant		Mostly Significant

- Income and demo's eliminate Lifeline effects for three other IT products where Lifeline should have only an income effect.
- Assuming they also eliminate income effects for mobile subscription, our Lifeline effect is purely due to price.

Are Lifeline Participants Representative?

- They may have revealed themselves to be more price sensitive by enrolling in Lifeline.
 - We don't address this difference.
- They tend to be poorer which could make them more price sensitive.
 - We address this difference by stratifying sample by low income (<\$25,000) and high (>\$25,000).

Income stratification

	Income under \$25,000			Income over \$25,000		
	Local Bill	Log Local Bill	Mobile	Local Bill	Log Local Bill	Mobile
Lifeline Dummy	-9.98* (0.29)	-0.5382* (0.0084)	-0.0277* (0.0067)	-6.61* (0.55)	-0.2805* (0.0127)	-0.0344* (0.0145)
Time period	Significant	Significant	Significant	Significant	Significant	Significant
State			Significant			Significant
Income and other Demographics			Mostly Significant			Mostly Significant

Income Stratified Results

- Price difference smaller for higher income group.
- Quantity difference larger higher income group
 - Smaller % ΔQ because more subscribe on average.
- Lower income: $\eta_{mf} \approx +0.35$ to $+0.44$.
- Higher income: $\eta_{mf} \approx +0.29$ to $+0.36$.
- Price sensitivity falls with income ... but not much.

Conclusions

1. FMS is increasingly important to telecoms policy, and Universal Service in particular.
2. We exploit Lifeline program's price subsidy as a natural experiment.
3. Use consumption behavior for related IT services to argue for a pure price effect.
4. We found modest subscription substitution during the 1999-2001 period.