New Evidence on Impact of Social Health Insurance from Eastern Europe and Central Asia

by

Adam Wagstaff (World Bank)
and
Rodrigo Moreno-Serra (University of York)

Brookings, November 7, 2007

Background

- 90% of OECD countries finance majority of health expenditures publicly
  - Half use general revenues
  - The other half have SHI systems, using dedicated earnings-related contributions for formal-sector workers, and a mixture of income-related contributions and general revenues for informal sector workers and the non-employed
- Among the non-OECD countries, 56% finance a majority of health spending publicly, and only 20% have SHI
- SHI in the news a fair bit recently
  - Old SHI countries reducing their reliance on payroll contributions
  - Concerns over labor market impacts in LAC
  - Many developing countries with SHI struggling to achieve universal coverage—OECD countries took decades
  - Some very poor countries looking at SHI, or already going ahead

The research opportunities ECA's SHI experiment provides

- Staggered and incomplete adoption of SHI in ECA countries during 1990s provides an opportunity to assess some of the aggregate effects of SHI adoption
- Study design similar to multiple U.S. studies in many fields that exploit staggered and incomplete policy roll-out across the 50 states
- Country-level analysis permits aggregate effects to be estimated. So, capture effects on all the relevant actors in the health system, including new ones (e.g. new SHI agency, new entrants into provider market, etc.)

Questions the study tries to get at

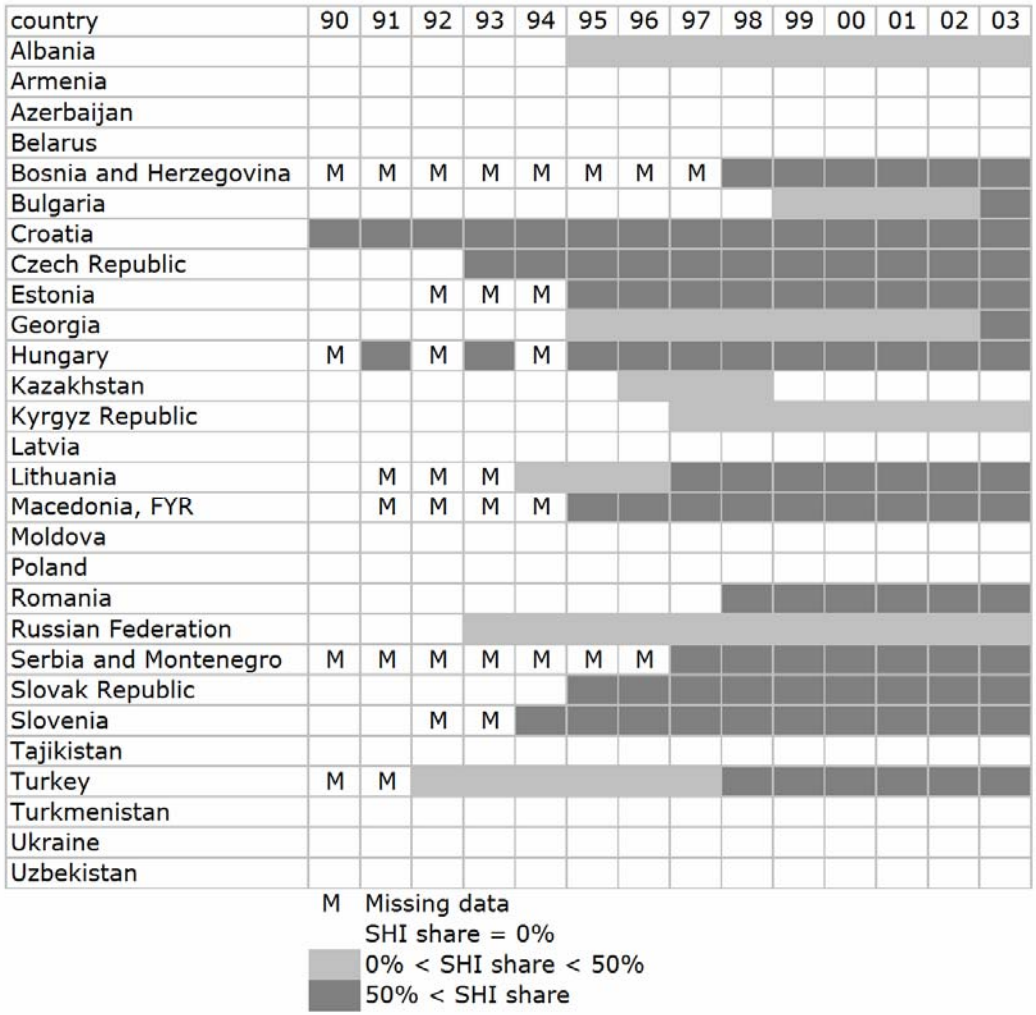
- Does SHI adoption lead to higher health spending?
  - People more willing to contribute if revenues earmarked?
  - But evasion and underreporting are commonplace. And MOF may reduce govt. spending on health in line with theoretical SHI revenues
- Are SHI systems better at translating money into health outcomes?
  - SHI permits easy separation between provision and purchasing of health care, perhaps allowing for a more efficient health system
  - But some SHI agencies corrupt, “captured’ by provider interests (non-competitive and overly generous contracts?). And SHI likely to be administratively costly
- Negative effects on labor market?
  - SHI thought to reduce employment in W. Europe and to contribute to informality in LAC
  - But evidence is v. limited

SHI adoption in ECA: A quick history—i

- 1945-1990, most ECA countries financed health care through general revenues and delivered it though centrally-planned Semashko model
- In early 1990s, as they shifted from Communism, many countries looked to SHI to help solve several emerging problems:
  - Dramatic decline of govt. revenues as share of GDP, compounded by falling GDP in some countries. Led to big reductions on govt. budgets for health. Thought that SHI would offer extra and more stable revenues, and would allow health sector salaries to recover!
  - SHI thought likely to lead to better health delivery system. SHI agency would sit at arms' length from MOH and MOF, would develop purchasing capacity, promote competition within public sector and between it and private sector

Who adopted SHI when?

And what share of spending was financed through SHI?

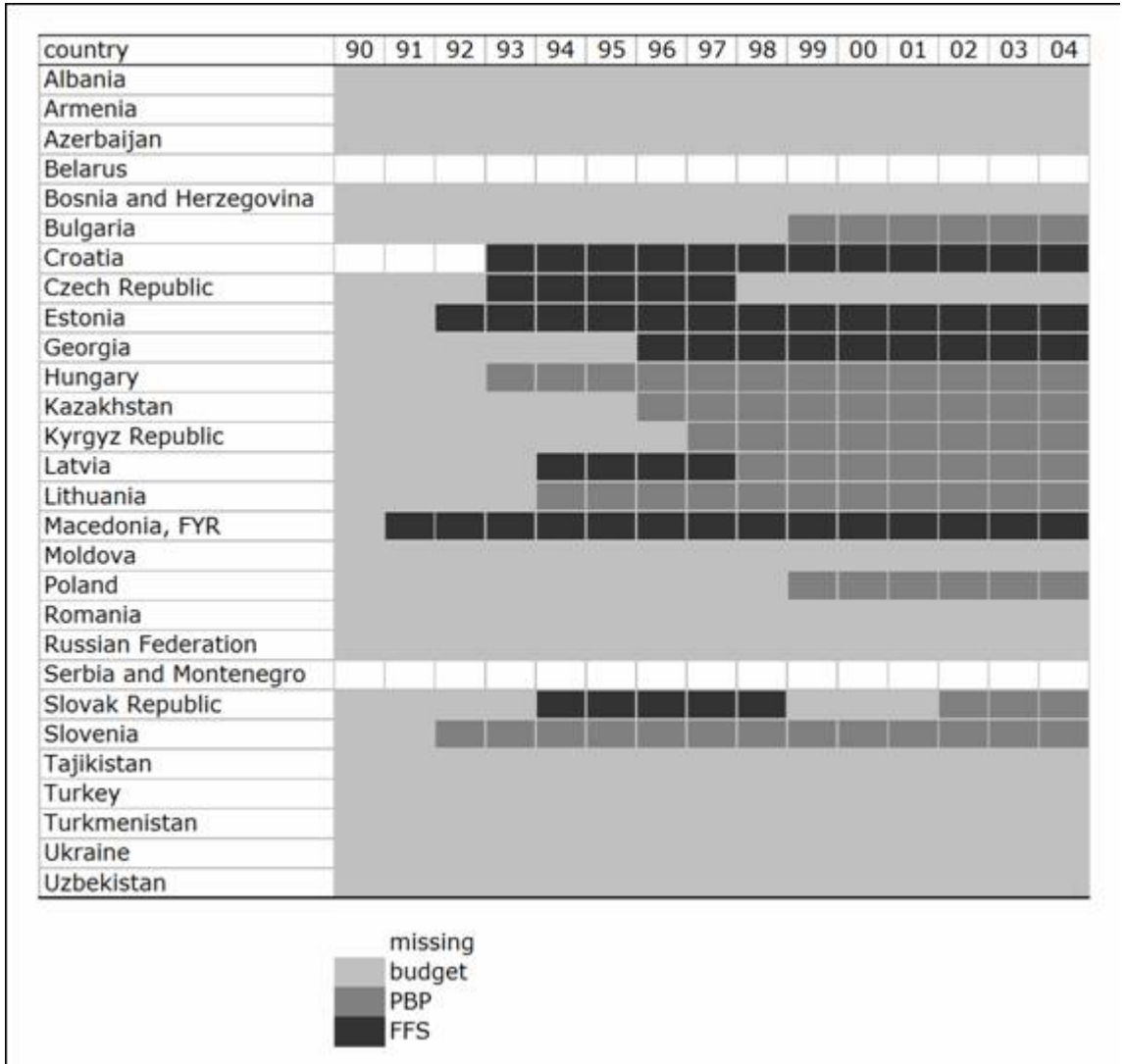


Source: HiTs and World Health Reports, various years

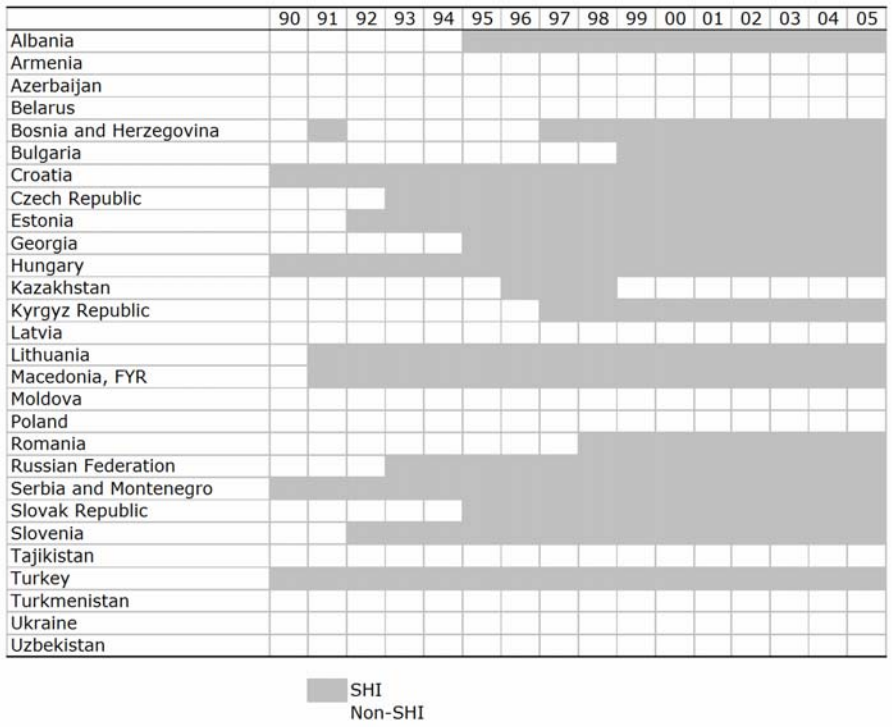
SHI adoption in ECA: A quick history—ii

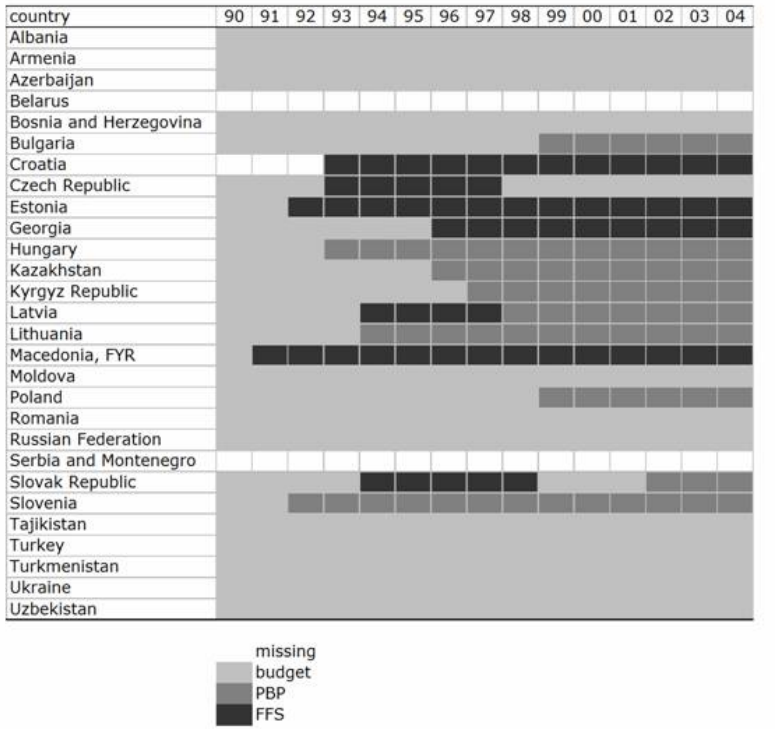
- SHI makes up a bigger share of revenues in E European countries, where contribution rates are high
- Most countries do have a SHI agency, but so too do Poland and Latvia which use income taxes or general revenues
- Often MOH still transfers some funds to providers, and SHI agency contracts have taken time to emerge, are often not competitive, and often do not involve private sector
- SHI has tended to lead to switch from budgets to FFS or patient-based payments (e.g. DRGs)

SHI adoption often led to shift from budget to FFS or PBP (e.g. DRGs)



But typically with a lag. And some non-adopters shifted as well





Basic regression model

$$y_{it} = \alpha + z_{it}\gamma + \delta SHI_{it} + e_{it}$$

- i is countries (I=28), t is years (1990-2004),
- y_{it} is outcome of interest for country i in year t,
- z_{it} are covariates that influence y_{it},
- SHI_{it}=1 if country i has SHI at time t and 0 otherwise,
- e_{it} is an error term

- Our interest is in δ which gives SHI's impact on y_{it}

Econometric problem #1

- Error term e_{it} likely to be subject to autocorrelation
- In many published studies using similar methods, autocorrelation has been shown to be positive, which—if not allowed for—results in standard errors that are too small, and t-statistics that are too large
- Our standard errors are corrected for any autocorrelation. They're also robust to heteroskedasticity

Econometric problem #2

- Error term e_{it} likely to be correlated with SHI_{it}, i.e. SHI likely to be endogenous. This will lead to biased estimates of its impact on the outcome
- We use two approaches to get round this:
  1. Estimate allowing for for unobservables that could be correlated with SHI_{it}. We include:
     a) a time-specific unobservable common to all countries,
     b) a country-specific unobservable that follows a linear trend—i.e. not a constant. So a random trend model, not a (pure) fixed-effect model
  2. Estimate using Instrumental Variables (IV)
- In each case, use tests to assess validity of estimates

Approach #1 to endogeneity

$$y_{it} = \theta_t + z_{it}\gamma + \delta SHI_{it} + \alpha_i + g_i t + u_{it}$$

- Taking first differences gives:

$$\Delta y_{it} = \xi_t + \Delta z_{it}\gamma + \delta \Delta SHI_{it} + g_i + \Delta e_{it}$$

  so we have a country-specific effect in the first-difference, capturing country *i*'s unobserved trend in y_{it}
- Model generalizes the differences-in-differences (DID) estimator through inclusion of Δz_{it} and g_i
- Can estimate equation by fixed effects or by differencing it, giving triple-differences

Approach #1 to endogeneity (contin.)

- Confidence in validity from the fact that for most health outcomes:
  - Coefficient on a lead SHI dummy (will SHI be adopted next year?) is insignificant in almost all health models
  - A significant coefficient would have pointed towards causality running from the outcome to SHI adoption
- For some of our labor outcomes, approach #1 works less well—the lead SHI dummy test suggests approach #1 doesn't completely tackle the endogeneity of SHI

Approach #2 to endogeneity

- We have two sets of instruments:
  1. Lagged values of SHI: we use SHI lagged one period only. The assumption is $SHI_{it\text{-}1}$ is uncorrelated with e_{it}
  2. Traditional instruments: we use a variable indicating whether the country had SHI prior to the Communist takeover in 1945. The assumption is that SHI_{i1944} is uncorrelated with e_{it}
- Tests indicate our instruments to be relevant, strong, and valid (models are over-identified)
- Estimation by 2SLS and the more efficient GMM

Health sector outcome variables

	Variables	Sources
Health spending & resources	Total health spending per capita; salaries as % spending; physician numbers	WDI; WHO-Health-for-All
Hospital throughput & capacity	LOS; bed occupancy rate; # beds; inpatient admissions	WHO-Health-for-All
Hospital discharges	By diagnosis	WHO-Health-for-All
Immunization	By type	WHO-Health-for-All
Mortality	Life expectancy; U5MR & IMR; MMR; standardized death rates	WHO-Health-for-All; UNICEF TransMONEE
Avoidable deaths (quality proxy)	Deaths from appendicitis, hernia, surgery infections	WHO-Health-for-All
Disease incidence	By diagnosis	WHO-Health-for-All

Health outcomes dataset is 77% non-missing. (69 outcome variables. 28 countries. 16 years. Maximum # observations = 30912. Actual # observations on health outcomes = 23680.)

Labor market outcome variables

	Variables	Sources
Wage rate	Total annual wages and salaries in constant PPP averages for the employed population aged 15-59	Own calculations based on data from WDI and UNICEF TransMONEE
Unemployment	Unemployment rate; registered unemployed; long-term unemployed	ILO
Employment	% working-age population and population aged 15-59 employed	ILO; UNICEF TransMONEE
Informal economy	Based on discrepancy between growth of GDP and electricity demand	Own calculations, based on Johnston et al. method
Informal employment	Self-employment; agricultural employment	ILO
Labor force participation	Whole population; women only	ILO

Labor market outcomes dataset is only 55% non-missing. (8 outcome variables. 28 countries. 16 years. Maximum # observations = 3584. Actual # observations on health outcomes = 1987.)

z variables

	Variables	Sources
GDP	GDP per capita, PPP (constant 2000 international US$)	WDI
Public share of health spending	Health expenditure, public (% of total health expenditure)	WDI
Elderly population*	Population ages 65 and above (% of total)	WDI
Urban population*	Urban population (% of total)	WDI
Health spending$	Total health spending per capita	WDI
Hospital payment method#	FFS, patient-based method (e.g. DRG). Budget is omitted category	HiTs

* Excluded from labor models. $ Excluded from health models. # Excluded from basic health model

Basic model: SHI impacts on spending and hospitals

	Dependent variable	SHI impact (%)	p-value	# transitions
Health spending	Health expenditures - Total	***12%***	***0.098***	11
	Health expenditures - Government	**15%**	**0.037**	11
	Health expenditures - Private	2%	0.859	11
	Salaries (%)	**16%**	**0.009**	3
	Physicians	1%	0.41	13
Hospital activity & throughputs	Length of stay (total)	***-2%***	***0.081***	14
	Length of stay (acute care)	-1%	0.524	10
	Bed occupancy rate	**3%**	**0.039**	9
	Hospital beds	-3%	0.238	13
	In-patient admissions	***2%***	***0.061***	14
	Acute care admissions	**4%**	**0.014**	10
	Hospital discharges - infectious	10%	0.108	13
	Hosp discharges – cancers	3%	0.238	13
	Hosp discharges – heart	2%	0.145	13
	Hosp discharges – circulatory	2%	0.244	13
	Hosp discharges – cerebrov	***4%***	***0.073***	13
	Hosp discharges – respiratory	4%	0.224	13
	Hosp discharges – digestive	1%	0.699	13
	Hosp discharges – musculo	2%	0.227	13
	SDR appendicitis	-16%	0.405	13
	SDR hernia & intestinal	-8%	0.111	13
	SDR adverse effects	-1%	0.983	6
	Surgical infection rate	**-149%**	**0.006**	3

Basic model: SHI impacts on life expectancy and mortality

	Dependent variable	SHI impact (%)	p-value	# transitions
Life expecancy & mortality	Life expectancy	0%	0.297	13
	Life expectancy (male)	0%	0.316	13
	Life expectancy (female)	0%	0.286	13
	Under-5 MR (TransMONEE)	-1%	0.896	14
	Under-5 MR (WHO)	4%	0.241	13
	Infant MR (WB)	***9%***	***0.074***	7
	Infant MR (TransMONEE)	1%	0.859	14
	Infant MR (WHO)	2%	0.446	14
	Perinatal MR	2%	0.598	13
	Neonatal MR	6%	0.348	10
	Postneonatal MR	***-8%***	***0.056***	10
	Maternal MR	10%	0.206	13
	Maternal MR (3-year)	5%	0.199	13

Basic model: SHI impacts on cause-specific mortality

	Dependent variable	SHI impact (%)	p-value	# transitions
Cause-specific death rates	SDR all causes	1%	0.659	13
	SDR infeccious diseases	8%	0.446	13
	SDR tuberculosis	18%	0.245	13
	SDR diarrhoea (under 5)	9%	0.625	13
	SDR ARI (under 5)	2%	0.683	12
	SDR heart disease	1%	0.735	13
	SDR liver diseases	-1%	0.828	10
	SDR diabetes	6%	0.509	13
	SDR circulatory diseases	0%	0.903	13
	SDR cerebrovascular diseases	1%	0.816	13
	SDR neoplasms	1%	0.38	13
	SDR female breast cancer	0%	0.844	13
	SDR respiratory diseases	3%	0.276	13
	SDR bronchitis	12%	0.334	13
	SDR digestive diseases	0%	0.953	13
	SDR alcohol causes	-1%	0.802	11
	SDR smoking causes	0%	0.943	11

Basic model: SHI impacts on disease incidence & immunization

	Dependent variable	SHI impact (%)	p-value	# transitions
Disease incidence	Tuberculosis incidence rate	-4%	0.430	14
	Hepatitis incidence rate	23%	0.281	14
	Hepatitis B incidence rate	5%	0.440	12
	Measles incidence rate	-55%	0.395	14
	Mumps incidence rate	7%	0.663	14
	Syphilis incidence rate	21%	0.474	14
	Congenital syph incidence rate	-11%	0.482	7
	Pertussis incidence rate	23%	0.402	14
	Diphteria incidence rate	-9%	0.850	14
	Tetanus incidence rate	22%	0.264	14
	Cancer incidence rate	0%	0.994	14
C-section & immunization	Caesarean sections	-1%	0.370	10
	Tuberculosis immunization rate	1%	0.559	14
	DPT immunization rate	0%	0.846	14
	Measles immunization rate	0%	0.737	14
	Polio immunization rate	2%	0.360	14
	Mumps immunization rate	10%	0.248	10
	Rubella immunization rate	10%	0.233	6

Effects on SHI impacts of including provider-payment reforms variables

		Basic	With Provider Paymnt vbls		
	Dependent variable	SHI impact (%)	SHI Impact (%)	FFS Impact (%)	PBP Impact (%)
Health spending	Health expenditures – Total	***12%***	5%	**17%**	3%
	Health expenditures – Government	**15%**	**11%**	12%	-3%
	Health expenditures – Private	2%	-14%	**34%**	19%
	Salaries (%)	**16%**	18%	4%	-6%
	Physicians	1%	1%	-1%	1%
Hospitals	Length of stay (total)	***-2%***	-1%	-2%	-2%
	Length of stay (acute care)	-1%	1%	**-3%**	-3%
	Bed occupancy rate	**3%**	**4%**	1%	-3%
	Hospital beds	-3%	-1%	-1%	**-5%**
	In-patient admissions	***2%***	1%	**4%**	0%
	Acute care admissions	**4%**	**3%**	**3%**	0%
	Hospital discharges - infectious	10%	***8%***	5%	3%
	Hosp discharges - cancers	3%	3%	4%	-6%
	Hosp discharges - heart	2%	1%	5%	4%
	Hosp discharges - circulatory	2%	-2%	**8%**	10%
	Hosp discharges - cerebrov	***4%***	2%	6%	0%
	Hosp discharges - respiratory	4%	2%	***9%***	1%
	Hosp discharges - digestive	1%	-1%	***6%***	1%
	Hosp discharges - musculo	2%	1%	***6%***	-2%
	SDR appendicitis	-16%	-16%	-13%	20%
	SDR hernia & intestinal	-8%	-7%	***-9%***	5%
	SDR adverse effects	-1%	-10%	-44%	46%
	Surgical infection rate	**-149%**	**-145%**	-4%	

SHI impacts on labor market outcomes

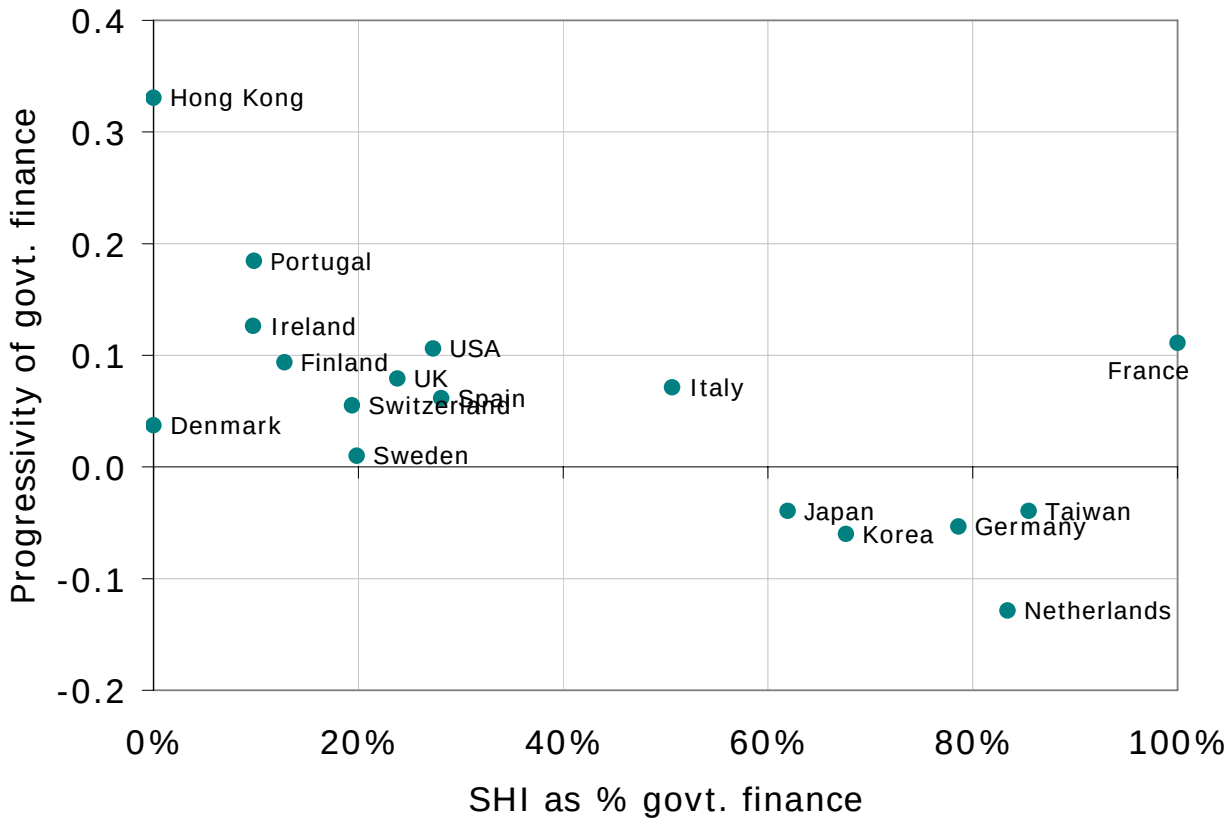
Dependent variable (log)	Random trend		2SLS		GMM	
	Coef	p-value	Coef	p-value	Coef	p-value
Gross wage	**20%**	**0.008**				
Unemployment	2%	0.692				
Registered unemployment	17%	0.373	**100%**	**0.014**	**104%**	**0.009**
Empl-to-pop – ILO	-1%	0.581				
Empl-to-pop – TransMONEE	2%	0.172	***-10%***	***0.082***	-8%	0.107
Informal economy	0%	0.985	1%	0.983	2%	0.950
Self-employment	2%	0.787				
Employment in agriculture	-2%	0.410				

Conclusions of ECA study

- Health sector estimates suggest that SHI adoption in ECA led to:
  - 10-15% increases in (govt.) health spending
  - 2-4% increases in hospital admissions
  - No impacts on mortality or disease incidence
  - These are pure SHI effects, not due to contemporaneous changes in provider-payment methods (which largely had the anticipated effects)
- Labor market estimates consistent with SHI adoption causing:
  - Higher wages in the economy as a whole
  - Lower employment (and higher unemployment)
  - But study finds no impacts on informal economy

Looking beyond the ECA study
Equity in raising revenues

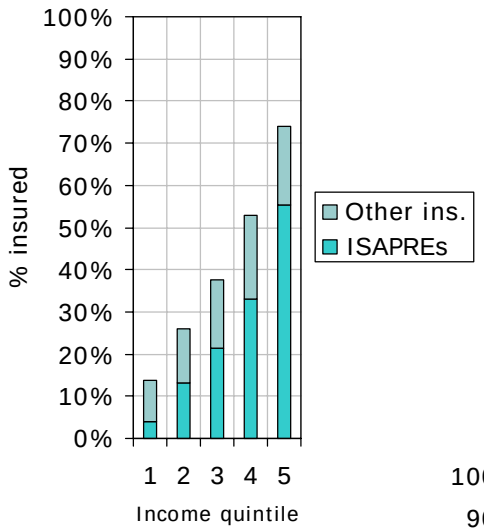
- SHI less equitable than tax finance



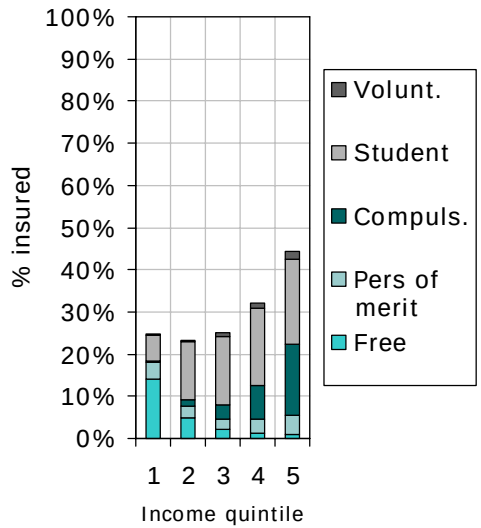
Looking beyond the ECA study

Gaps in coverage under SHI

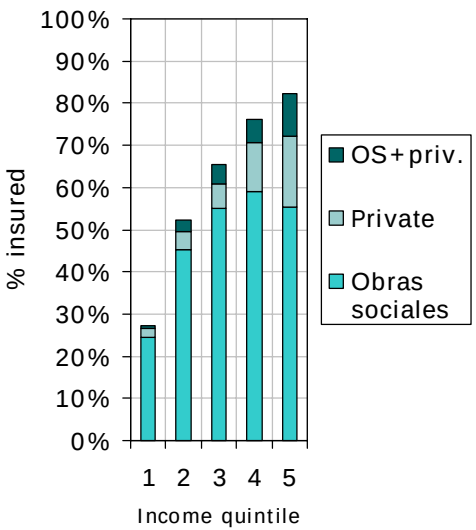
Chile, 1998



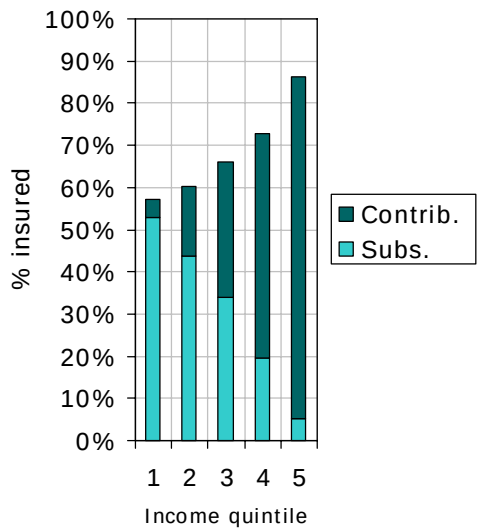
Vietnam, 2004



Argentina, 1996/7



Colombia, 2005



Looking beyond the ECA study
Consequences of gaps in coverage

- Issue is differential coverage, rather than non-coverage, because people not covered by SHI typically covered by some govt. program—e.g. FONASA in Chile.
- Coverage typically more generous for those in SHI scheme
- Studies mostly find (SHI) insurance raises utilization
- In several countries, insurance found to reduce risk of catastrophic out-of-pocket payments
  - Mexico, Colombia, Vietnam, …
  - But not in all countries (Chile, China) because insured get more care and/or more sophisticated care with higher copayments
- Factors influencing financial protection provided by insurance scheme likely to be:
  - Benefit package
  - How providers are paid, and how rates are set
  - How closely providers are regulated—charging, and what care is delivered

Conclusions

- Raising revenues: SHI vs. taxes
  - SHI revenues may be lower than expected, less predictable
  - SHI less equitable than tax finance
- SHI and the labor market
  - SHI likely to raise (gross) wages, and decrease employment and formal sector
- Coverage
  - Gaps often occur under SHI—often among poor or near-poor
  - Issue is differential coverage, rather than non-coverage
  - More generous SHI coverage may encourage greater utilization. But not necessarily lower out-of-pocket payments or better health outcomes
  - Benefit package and delivery arrangements are key issues
- Health care delivery
  - SHI not necessary or sufficient for separation of purchasing & provision
  - SHI raises costs, apparently. Which ones? Do the additional expenditures translate into better health?