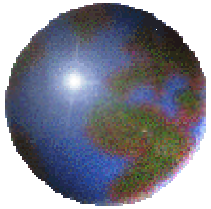




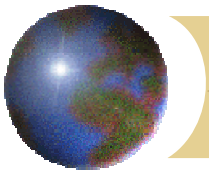
Is Trade Good For Your Health?



Ann L. Owen

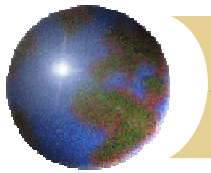
Stephen Wu

Hamilton College



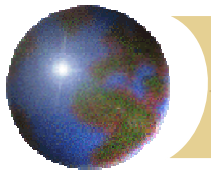
Outline

- ⊕ Background and related literature
- ⊕ Empirical Strategy
- ⊕ Overall correlation
- ⊕ Reasons for correlation
- ⊕ Conclusion



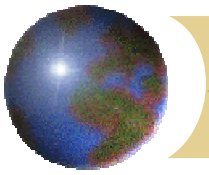
Questions to answer

- ⊕ What are the overall effects of openness to trade on health outcomes?
- ⊕ Do these effects vary with a country's income?
- ⊕ What channels help explain the linkages between trade and health?



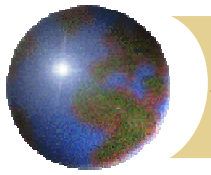
Summary of main conclusions

- ✚ Increased trade is associated with better health outcomes in developing countries
- ✚ Good policy and trade related
- ✚ Knowledge spillovers



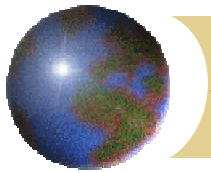
Related literature

- ✚ Trade and income growth
- ✚ Trade, income growth, institutions, and geography
- ✚ Trade and the environment
- ✚ Economic activity and health



Possible reasons for linkages between openness and health

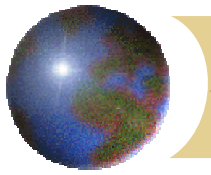
- Knowledge spillovers
- Better access to medical inputs
- Trade and institutions develop endogenously
- Transfer of disease, increased pollution, unhealthy consumer goods



Empirical specification

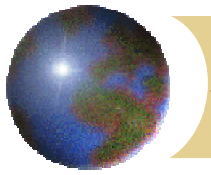
⊕ Fixed-effects model

$$h_{i,t} = \beta_0 + \beta_1 \ln(GDP_{i,t-1}) + \beta_2 \ln(open_{i,t-1}) + \beta_3 \ln(GDP_{i,t-1}) * \ln(open_{i,t-1}) \\ + \beta_4 X_{i,t} + \alpha_i + \lambda_t + \varepsilon_{i,t}$$



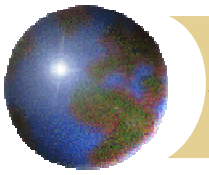
Measuring openness: Volume based measures

- ⊕ $(\text{exports} + \text{imports})/\text{GDP}$
- ⊕ $\text{Imports}/\text{GDP}$
- ⊕ $\text{Health-weighted imports}/\text{GDP}$



Measuring openness: Policy based measures

- ⊕ Sachs-Warner index
- ⊕ Black market premium



Data description

- Data for 219 countries
- 5-year intervals between 1960-1995
- Health Outcomes: Infant Mortality, Life Expectancy
- Secondary Schooling, Population Growth
- Data Sources: Penn World Tables, World Bank Development Indicators, UN COMTRADE data base

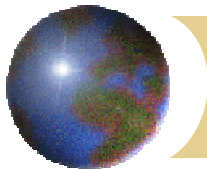


Table 1: Summary Statistics

<u>Variable</u>	<u>Mean</u>	<u>Standard Deviation</u>
Real Per Capita GDP (1985 dollars)	3771.63	4119.98
Population Growth	0.02	0.01
Secondary Schooling Enrollment Rates (%)	37.12	29.88
Male Life Expectancy	56.22	11.70
Female Life Expectancy	60.09	13.10
Infant Mortality (per 1,000 births)	81.78	55.83
[(Exports + Imports)/GDP]*100	67.11	45.44
(Imports/GDP)*100	38.07	25.29
(Health Adjusted Imports/GDP)	0.96	1.41
Black Market Premium	47.19	126.22
Sachs-Warner Index (0 or 1)	0.40	0.49

Notes: Data is taken from the World Bank Development Indicators and the Penn World Tables, Mark 5.6 Observations are taken for 219 countries representing the years 1960-1995 at five-year intervals.

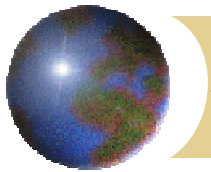


Table 2: Openness and Health Outcomes
Fixed Effects Models

Explanatory Variable	Dependent Variable					
	<u>Life Exp (Male)</u>		<u>Life Exp (Female)</u>		<u>Infant Mortality</u>	
	(1)	(2)	(1)	(2)	(1)	(2)
<u>Openness=(Exports+Imports)/GDP</u>						
Ln(Per Capita GDP)	4.749** (1.128)	4.316** (1.089)	4.919** (2.035)	4.657** (2.100)	-36.950** (6.440)	-31.431** (6.364)
Ln(Openness)	7.438** (1.735)	5.800** (1.692)	8.600* (3.128)	7.643** (3.262)	-72.778** (9.906)	-59.712** (9.887)
Ln(Per Capita GDP)*Ln(Openness)	-0.948** (0.240)	-0.757** (0.234)	-0.999** (0.433)	-0.886** (0.451)	9.572** (1.372)	7.871** (1.366)
Ln(Population Growth)	...	0.284* (0.168)	...	0.188 (0.324)	...	-2.203** (0.981)
Ln(Sec. Schooling Enrollment)	...	1.248** (0.241)	...	1.039** (0.465)	...	-10.474** (1.413)
N	760	705	761	706	759	704

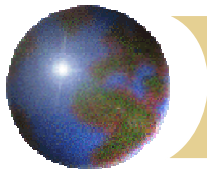


Table 2: Openness and Health Outcomes
Fixed Effects Models

Explanatory Variable	Dependent Variable					
	<u>Life Exp (Male)</u>		<u>Life Exp (Female)</u>		<u>Infant Mortality</u>	
	(1)	(2)	(1)	(2)	(1)	(2)
<u>Openness=Black Market Premium</u>						
Ln(Per Capita GDP)	0.103 (0.536)	0.278 (0.542)	0.616 (0.578)	0.735 (0.584)	4.218 (2.845)	3.387 (2.946)
Ln(Openness)	-2.035** (0.593)	-1.922** (0.597)	-2.504** (0.640)	-2.454** (0.643)	15.215** (3.173)	15.012** (3.271)
Ln(Per Capita GDP)*Ln(Openness)	0.264** (0.081)	0.246** (0.082)	0.326** (0.087)	0.318** (0.088)	-2.043** (0.434)	-2.017** (0.448)
Ln(Population Growth)	...	0.189 (0.330)	...	-0.207 (0.356)	...	-1.726 (1.804)
Ln(Sec. Schooling Enrollment)	...	-0.036 (0.360)	...	-0.634* (0.389)	...	-4.342** (1.965)
N	464	439	464	439	467	442

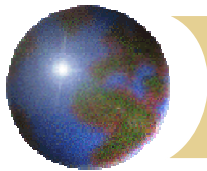


Table 2: Openness and Health Outcomes
Fixed Effects Models

Explanatory Variable	Dependent Variable					
	<u>Life Exp (Male)</u>		<u>Life Exp (Female)</u>		<u>Infant Mortality</u>	
	(1)	(2)	(1)	(2)	(1)	(2)
<u>Openness=Sachs-Warner Index</u>						
Ln(Per Capita GDP)	1.560** (0.394)	1.750** (0.396)	2.208** (0.722)	2.459** (0.750)	-5.787** (2.320)	-6.902** (2.324)
Openness	9.115** (2.433)	7.463** (2.537)	13.181** (4.451)	13.504** (4.802)	-136.541** (14.315)	-122.923** (14.893)
Ln(Per Capita GDP)*(Openness)	-1.189** (0.317)	-0.965** (0.330)	-1.782** (0.579)	-1.839** (0.625)	17.838** (1.863)	16.013** (1.939)
Ln(Population Growth)	...	0.318** (0.162)	...	0.227 (0.306)	...	-1.780* (0.950)
Ln(Sec. Schooling Enrollment)	...	0.730** (0.257)	...	0.438 (0.486)	...	-8.684** (1.513)
N	725	679	726	680	727	681

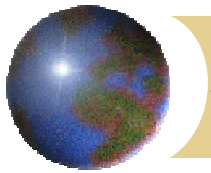
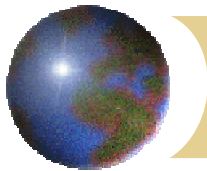
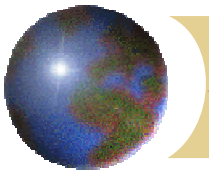


Table 2: Openness and Health Outcomes
Fixed Effects Models

Explanatory Variable	Dependent Variable					
	<u>Life Exp (Male)</u>		<u>Life Exp (Female)</u>		<u>Infant Mortality</u>	
	(1)	(2)	(1)	(2)	(1)	(2)
<u>Openness=Imports/GDP</u>						
Ln(Per Capita GDP)	2.968** (0.966)	3.061** (0.939)	3.408** (1.733)	3.549** (1.805)	-25.482** (5.526)	-21.811** (5.504)
Ln(Openness)	5.308** (1.719)	4.380** (1.690)	6.658** (3.086)	6.280** (3.248)	-62.772** (9.840)	-50.691** (9.910)
Ln(Per Capita GDP)*Ln(Openness)	-0.627** (0.236)	-0.546** (0.232)	-0.731* (0.423)	-0.704* (0.445)	8.064** (1.350)	6.560** (1.358)
Ln(Population Growth)	...	0.273* (0.168)	...	0.170 (0.324)	...	-2.100** (0.989)
Ln(Sec. Schooling Enrollment)	...	1.275** (0.242)	...	1.056** (0.467)	...	-10.621** (1.426)
N	760	705	761	706	759	704

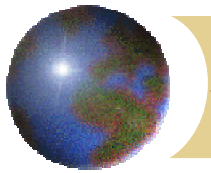


Explanatory Variable	Dependent Variable					
	<u>Life Exp (Male)</u>		<u>Life Exp (Female)</u>		<u>Infant Mortality</u>	
	(1)	(2)	(1)	(2)	(1)	(2)
<u>Openness=Health Adjusted Imports/GDP</u>						
Ln(Per Capita GDP)	-4.029** (0.678)	-3.418** (0.723)	-6.253** (2.092)	-5.346** (2.173)	55.286** (3.996)	51.877** (4.275)
Ln(Openness)	4.695** (0.743)	3.986** (0.811)	8.150** (2.294)	7.087** (2.436)	-56.356** (4.384)	-51.925** (4.788)
Ln(Per Capita GDP)*Ln(Openness)	-0.650** (0.073)	-0.562** (0.083)	-0.887** (0.226)	-0.790** (0.250)	6.977** (0.432)	6.429** (0.491)
Ln(Population Growth)	...	0.152 (0.146)	...	0.216 (0.438)	...	-0.207 (0.862)
Ln(Sec. Schooling Enrollment)	...	0.914** (0.412)	...	0.945 (1.239)	...	-6.199** (2.440)
N	434	415	434	415	435	416



Impact

- ❖ One standard deviation increase in the log of openness for poorest country results in
 - ❖ a decrease in infant mortality of 7 deaths per 1,000, (14 per 1,000 using health adjusted imports)
 - ❖ an increase of female life expectancy of 1.349 years (3 years using health adjusted imports), and
 - ❖ male life expectancy of 0.84 years



Is this correlation robust?

- ⊕ Including income inequality
- ⊕ Female secondary school enrollment rates
- ⊕ Civil wars
- ⊕ Split Sample

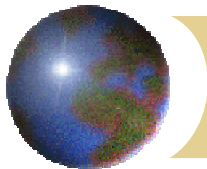


Table 4: Openness and Health Outcomes, Fixed Effects Models--Split Sample

Explanatory Variable	Dependent Variable					
	<u>Life Exp (Male)</u>		<u>Life Exp (Female)</u>		<u>Infant Mortality</u>	
	(1)	(2)	(1)	(2)	(1)	(2)
Developed Countries						
<u>Openness=(Exports+Imports)/GDP</u>						
Ln(Per Capita GDP)	-0.399 (0.490)	-0.545 (0.403)	-1.251 (1.373)	-1.681 (1.433)	10.619** (3.030)	13.235** (2.746)
Ln(Openness)	-0.640 (0.444)	-0.261 (0.364)	0.891 (1.246)	1.657 (1.298)	-0.097 (2.750)	-3.754 (2.488)
Ln(Population Growth)	...	0.161 (0.123)	...	0.190 (0.436)	...	-1.067 (0.836)
Ln(Sec. Schooling Enrollment)	...	3.094** (0.285)	...	3.526** (1.016)	...	-20.342** -1.947
N	402	365	403	366	403	366

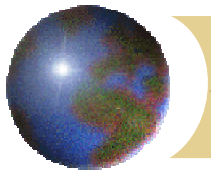
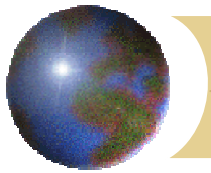


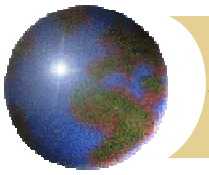
Table 4: Openness and Health Outcomes
Fixed Effects Models -Split Samples

Explanatory Variable	Dependent Variable					
	<u>Life Exp (Male)</u>		<u>Life Exp (Female)</u>		<u>Infant Mortality</u>	
	(1)	(2)	(1)	(2)	(1)	(2)
Developing Countries						
<u>Openness=(Exports+Imports)/GDP</u>						
Ln(Per Capita GDP)	2.308** (0.653)	2.662** (0.634)	2.385** (0.726)	2.823** (0.708)	-11.331** (3.315)	-13.516** (3.330)
Ln(Openness)	1.109** (0.440)	0.858** (0.431)	1.500** (0.489)	1.330** (0.481)	-4.411** (2.235)	-3.457 (2.261)
Ln(Population Growth)	...	0.830* (0.469)	...	0.087 (0.524)	...	-5.628** (2.463)
Ln(Sec. Schooling Enrollment)	...	-0.543 (0.398)	...	-0.935** (0.444)	...	3.214 (2.101)
N	358	340	358	340	356	338



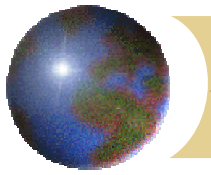
More robustness checks

- ⊕ Dropped countries with largest change in health outcomes
- ⊕ Dropped OPEC countries
- ⊕ Dropped transition economies
- ⊕ Regress openness on lagged health outcomes



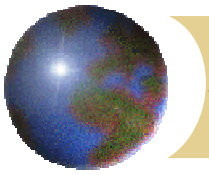
Why does this correlation exist?

- Knowledge spillovers
- Openness and policy regime
- Importation of medical resources
- Openness and development aid



Knowledge spillovers

- Health-adjusted imports stronger
- Health-adjusted “residual imports”



Openness and policy regime

- Export volume and policy-based measures

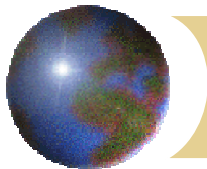
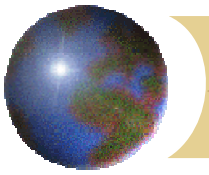


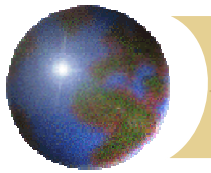
Table 6: Multiple Measures of Openness, Fixed Effects Models

	<u>Life Exp (Male)</u>	<u>Life Exp (Female)</u>	<u>Infant Mortality</u>
Ln(Per Capita GDP)	4.814** (1.145)	5.082** (2.263)	-34.351** (6.481)
Ln((Exports+Imports)/GDP)	6.433** (1.857)	7.303** (3.668)	-53.820** (10.508)
Ln(Per Capita GDP)*Ln(Openness)	-0.844** (0.257)	-0.806 (0.508)	7.072** (1.455)
Sachs-Warner Index	1.610 (2.860)	8.560 (5.664)	-83.780** (16.214)
Ln(Per Capita GDP)*S-W Index	-0.208 (0.373)	-1.220* (0.739)	10.981** (2.115)
Ln(Population Growth)	0.288* (0.177)	0.183 (0.350)	-1.737* (1.000)
Ln(Sec. Schooling Enrollment)	0.817** (0.281)	0.452 (0.556)	-8.074** (1.598)
N	618	619	617



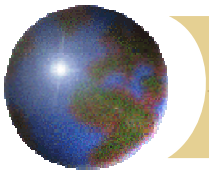
Importation of medical resources

- Cross-sectional evidence
- Use detailed trade data to construct value of medicinal imports/GDP and medicinal imports/person
- Find only evidence of reverse causality



Openness and development aid

- ✿ Foreign aid may be linked to trade policy
- ✿ Examined 8 different kinds of aid
- ✿ Water resources aid associated with better health outcomes
- ✿ Water resources aid linked to volume of trade
- ✿ But impact of trade only reduced slightly by taking this channel into account



Conclusions

- More open developing economies exhibit better health outcomes
- The effects are small or statistically insignificant for developed countries
- Knowledge spillovers play a role
- Policy may evolve as countries open to trade