Skills, Health and Labor Market Development

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A. Introduction

The labor market plays a key role in the process of economic development. This includes many factors underlying the formation of human-related capital, often referred to as "embodied" capital.

There are many dimensions along which labor market decisions and performance interact with the development process, including key issues listed below:

- **Educational Choice: Lucas (1988), Laing-Palivos-Wang (1995), Fender-Wang (2003)**
- **The Role of Teachers: Tamura (2001), Chetty-Friedman-Saez-Turner-Yagan (2017)**
- **On-the-Job Learning: Lucas (1993), Laing-Palivos-Wang (2004)**
- **Entrepreneurship: Bernhardt & Lloyd-Ellis (2000), Jiang-Wang-Wu (2009)**
- **Fertility and Labor Trade-off: Becker-Murphy-Tamura (1990), Scotese-Wang-Yip (1994), Galor-Weil (2000), Greenwood-Seshadri (2005)**
- **Health Capital: Acemoglu-Johnson (2007), Wang-Wang (2013)**
- **Human Capital Stratification: Benobou (1996), Chen-Peng-Wang (2009)**
- **Inequality: Glomm-Ravikumar (1992), Acemoglu-Dell (2009)**

B. The Role of Teachers: Tamura (2001)

- **Empirical facts of Schooling across U.S. States: 1901-90**
  - **enrollment rate (73.3 to 92.1%): ↑by 6% over 1901-60; 12% over 1960-90**
  - **class size (36.9 to 16.9 students/teacher): ↓by 12 1901-60 & 8 over 1960-90**
  - **relative teacher salary (from 1.53 to 2.35 to 1.76 teacher to average income ratio): ↑by 0.8 over 1901-60 and ↓0.6 over 1960-90**
- **Overlapping generations:**

	generation	time t	time t+1	time t+2
	t	child	adult	
1. The Model	t+1		child	adult
	t+2			child ...

- **Two-period lived overlapping generations with constant population**
- **Altruistic Preferences:** $U = \frac{c_t^{\sigma}}{\sigma} + \beta \frac{h_{t+1}^{\sigma}}{\sigma}$, **$0 < \beta < 1$ and $\sigma < 1$**
- **School Quality and Human Capital Evolution:**
  - **teacher quality (teacher-parents human capital ratio):**

$$Q_{it} = \frac{\text{average human capital of school district } i \text{ teachers}}{\text{average human capital of school district } i \text{ parents}} = \frac{E\{h_{it}^T\}}{E\{h_{it}\}}$$

  - **class size (student-teacher ratio):**

$$C_{it} = \frac{\text{number of students in school district } i}{\text{number of teachers in school district } i} = \frac{N_{it}}{N_{it}^T}$$

- **Human capital accumulation (HC):** $h_{it+1} = Ah_{it}(C_{it}^{-\epsilon}Q_{it}^{1-\epsilon})^{\nu}, \ 1>\epsilon>0, 1\geq\nu>0$
- **Individual Budget Constraints (BC):** $c_{it} = h_{it}(1-\tau_{it})$
- **Local Governments' Budget Constraints (GBC):**
  - **poor school districts ($N_{Pt} = \alpha$):** $\alpha\tau_P h_P = N_P^T E\{h_P^T\}$
  - **rich school districts ($N_{Rt} = 1-\alpha$):** $(1-\alpha)\tau_R h_R = N_R^T E\{h_R^T\}$

2. Equilibrium

- **Theoretical results: under $\varepsilon < 1$, human capital is rising over time, with the poor districts growing at faster speed than rich districts (convergence) due to**
  - **limit to advance in Q, limit to class size reduction, limit to taxation**
- **Empirical findings:**
  - **Over the entire sample (1882-1990),**
    - **enhancement in Q accounts for 60% of real growth**
    - **reduction in C accounts for 40%**
  - **In the past 4 decades (1950-1990),**
    - **enhancement in Q accounts for 13% of real growth**
    - **reduction in C accounts for 85%**
- **Open issues: college and post-bachelor education, see Chetty-Friedman-Saez-Turner-Yagan (2017); Chen-Fillmore-Lee-Li-Lien-Wang (2021)**

C. On-the-Job Learning

- Learning on-the-job can enhance productivity over a shorter horizon
- Using data of the Liberty ship (institutionalized under the 1936 Merchant Marine Act, with nearly 3000 identical naval cargo/passenger vessels built using mass production line in 5 shipyards), Searle (1945) and Rapping (1965) identified 12-24% and 11-29% learning-by-doing effect in production
- In reality, product cycles are shortened over time, making pure learning on-the-job less productive

1. The Model: Lucas (1993)

- Final good output: $y = F(n, z) = Anz^{\xi}$
- Experience accumulation: $\dot{z} = G(n, z) = nz^{\xi}$
  - experiences grow over time
  - more work time helps accumulating experiences
  - while A is a conventional technical factor, the overall productivity depends on the experience input z^{ξ}

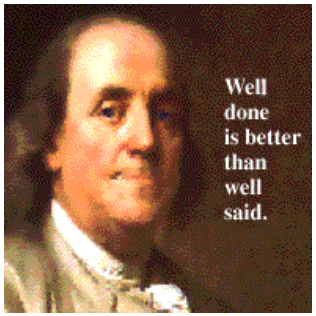
2. Equilibrium

- Set $n = \bar{n} \Rightarrow y(t) = A\bar{n}[z_0^{1-\xi} + (1-\xi)\bar{n}t]^{1/(1-\xi)}$
- Productivity growth: $\mu(t) \equiv d\ln(z^{\xi})/dt = \xi\bar{n}z^{\xi-1} \rightarrow \xi/[(1-\xi)t]$ if $z_0 \rightarrow 0$

3. Main Results

- Presence of scale effect: $d\mu/d\bar{n} > 0$
- Based on Rapping (1965), $\xi = 0.2$; so, $d\mu/dt = 0.25$
  - learning on-the-job faces rapid decay
  - sustained human-capital growth requires:
    - education
    - retraining
    - beyond-the-job learning
  - Korea/Taiwan vs. Phillippines

D. Entrepreneurship






- **Cagetti and De Nardi (2006): based on the Survey of Consumer Finances, entrepreneurs measured by self-employed business owners account for only 7.6% of the U.S. population but for almost 1/3 of the total net worth**
- **Mondragon-Velez (2006): entrepreneurs receive more than 20% of income of the entire population**
- **Entrepreneurship:**
  - **The International Social Survey Programme of 1989 shows about 63% of Americans, 48% of Britons and 49% of Germans desire to become entrepreneurs**
  - **Only about 15% realize their dream**

- **Major factors affecting agent's choice (Kihlstrom-Laffont (1979):**
  - **entrepreneurial ability vs. labor skills**
  - **access to capital markets (internal funding, banks, venture capital)**
  - **individual attitude towards risk**
- **Barriers to entrepreneurship:**
  - **preference bias toward "heroes" limited by true ability (Blanchflower-Oswald 1998)**
  - **financial/liquidity constraints (Evans-Jovanovic 1989, Evans-Leighton 1989, Den Haan-Ramey-Watson 2003)**
- **Theoretical frameworks:**
  - **Lucas (1978), Bernhardt & Lloyd-Ellis (2000): model entrepreneurs as managers**
  - **Jiang-Wang-Wu (2009a,b): model the 4 special features of entrepreneurs, entrepreneurial ability, financing, risk-taking and heroic preferences**
    - **presence of selectivity, scale and loanable fund supply effects**
    - **tightened credit market =>**
      - **more selective high-quality entrepreneurs (+)**
      - **less entrepreneurial scale (-)**
      - **more loanable fund supply (+)**
    - **entrepreneurship and growth need not be positive related**

E. Health Capital

- **Sub-Saharan Africa and South Asia have suffered high disease and intense poverty. Poor health environments may be important for explaining why "geography" matters for growth, especially for those countries in sub-Saharan Africa and South Asia long falling in the low-growth trap.**
- **Basic idea:**
  - **Increased life expectancy raises population and lowers capital-labor and land-labor ratios, leading to lower per capita output**
  - **Lengthened life expectancy encourages labor-market participation and saving, resulting in more capital accumulation and higher per capita output**
  - **This "non-monotone" effects can be best seen from experiences facing initially poor countries**

1. The Model: Acemoglu-Johnson (2007)

- **Country i's aggregate output:** $Y_{it} = (A_{it}H_{it})^{\alpha}K_{it}^{\beta}L_{it}^{1-\alpha-\beta}$
- **Land:** $L_{it} = L_i = 1$
- **Effective labor:** $H_{it} = h_{it}N_{it}$
- **Life expectancy X_{it}, affecting:**
  - **Population and technology:** $N_{it} = \bar{N}_i X_{it}^{\lambda}$ **(nutrition) and** $A_{it} = \bar{A}_i X_{it}^{\gamma}$
  - **Individual human capital:** $h_{it} = \bar{h}_i X_{it}^{\eta}$ **(human capital incentives)**
  - **human capital incentive effect < nutrition effect in poor countries**
- **Capital accumulation with an exogenous saving rate s:** $K_{it+1} = s_i Y_{it}$ **+ (1 - δ)**K_{it}

2. The Estimation

- **Regression:**

$$y_{it} = \frac{\alpha}{1-\beta}\log\bar{A}_i + \frac{\alpha}{1-\beta}\log\bar{h}_i + \frac{\beta}{1-\beta}\log s_i - \frac{\beta}{1-\beta}\log\delta - \frac{1-\alpha-\beta}{1-\beta}\log\bar{N}_i + \frac{1}{1-\beta}[\alpha(\gamma+\eta) - (1-\alpha-\beta)\lambda]x_{it}$$

depending on life expectancy and an array of other variables, where $\alpha(\gamma+\eta)-(1-\alpha-\beta)\lambda \approx 0.5\cdot\eta-0.2\cdot\lambda < 0$ for initially poor countries

3. Data

Life Expectancy	Initially Poor	Initially Middle-Income	Initially Rich
At Birth in 1900	28.77	36.92	49.36
At Birth in 1940	40.63	50.93	65.13
At Birth in 1980	61.92	69.66	74.3
At Age 20 in 1940	56.96	64.51	70.41
At Age 20 in 1980	70.27	73.59	75.73

4. Main Findings

- Predicted mortality has a large effect on changes in life expectancy since 1940, but not before
- 1% increase in life expectancy raises population by 1.7-2%
- The effect of life expectancy on per capita real GDP is negligible

F. Health and Development Accounting: Wang-Wang (2013)

- **An organizing framework:**
  - **Production:** $Y_t = AK_t^{\alpha} L_t^{1-\alpha}$, **where** $L = NH_t \ell_t^d$ **(e.g., α = 1/3)**
  - **Human capital:** $H_t = Bh_t^{\beta} m_t^{1-\beta}$ **(e.g., β = 0.4)**

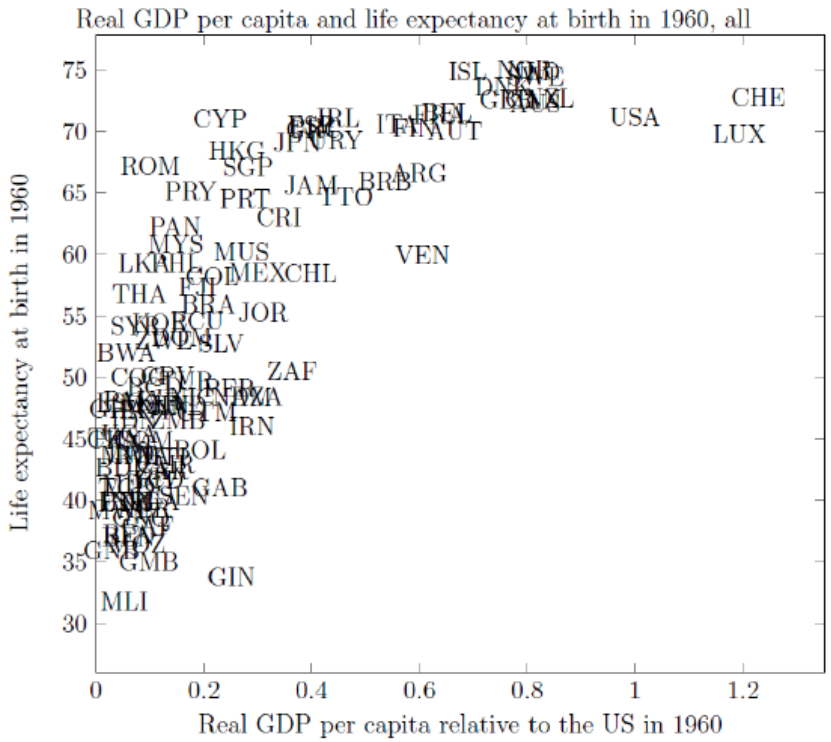
    where h measures physical health and m measures mental knowledge
  - **Mincerian equation:** $m_t = M \exp(\zeta E_t)$, **where ζ = returns to education**
  - **log calculus => growth accounting:**

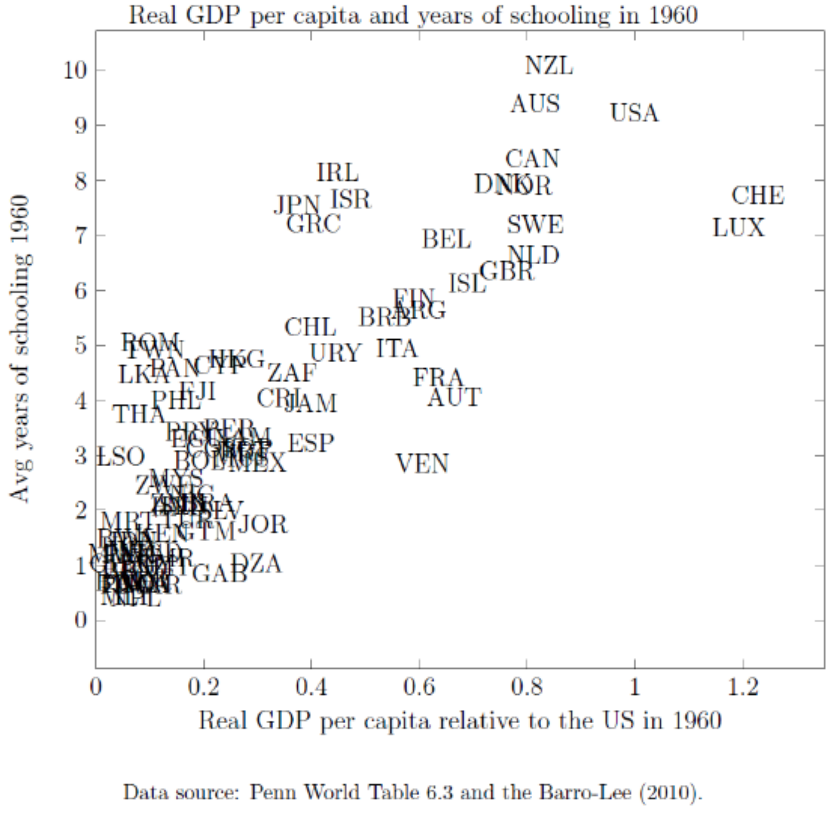
$$\ln \frac{Y_t}{\bar{N}_t} = [\ln A + (1-\alpha)\ln B + (1-\beta)(1-\alpha)\ln M] + \alpha \ln \frac{K_t}{\bar{N}_t} + (1-\beta)(1-\alpha)\zeta E_t + \beta(1-\alpha)\ln \frac{h_t}{\bar{N}_t}$$

where, in addition to the residual TFP (the constant term) output growth can be decomposed into 3 components:

- **capital accumulation**
- **education enhancement**
- **health improvement**

- **Data:**





  - **concavity => health is highly dispersed in relatively low income countries**

	Middle Income High		Middle Income Low			Trapped countries					
	Greece	Korea	Egypt	China	India	Bangladesh	Cambodia	Ghana	Kenya	Malawi	Nigeria
Growth, 1970-2007	2.26	5.74	3.19	7.62	3.11	1.12	1.10	0.76	0.42	1.92	1.46
GDP/GDPUS											
1970	0.57	0.14	0.11	0.03	0.06	0.09	0.09	0.10	0.10	0.04	0.08
2005	0.61	0.53	0.12	0.15	0.08	0.05	0.06	0.04	0.05	0.03	0.04
Years of schooling											
1970	6.52	6.34	1.31	3.43	1.57	1.38	5.06	3.58	2.17	1.57	NA
2005	9.89	11.47	6.59	7.62	4.68	5.20	5.90	7.50	7.10	4.38	5.00
Life expectancy at birth											
1970	71.84	61.25	50.43	61.97	48.83	44.10	43.63	48.93	52.19	40.52	42.37
2005	79.17	78.43	69.54	72.58	62.78	64.59	59.26	56.53	52.41	51.03	49.00

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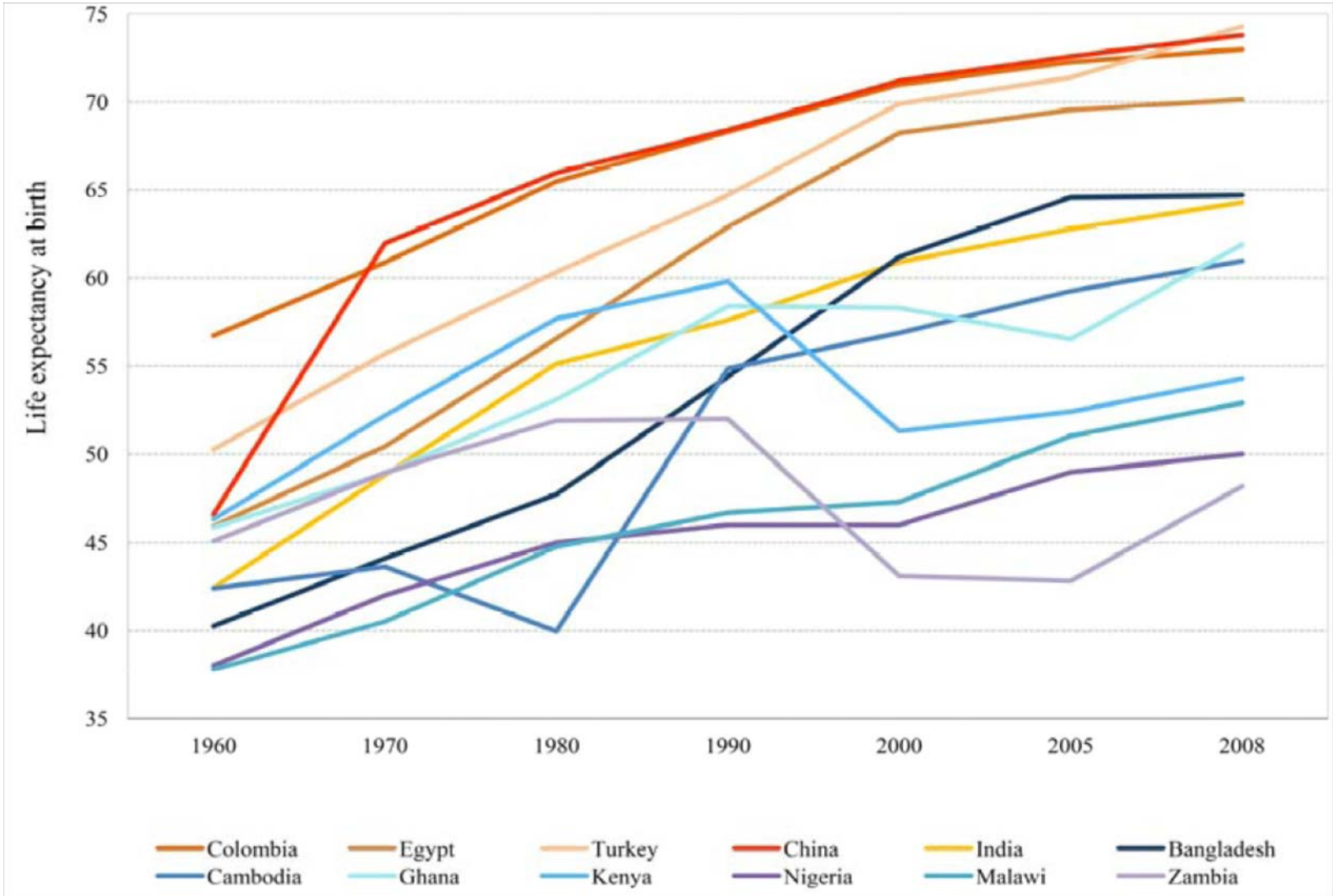
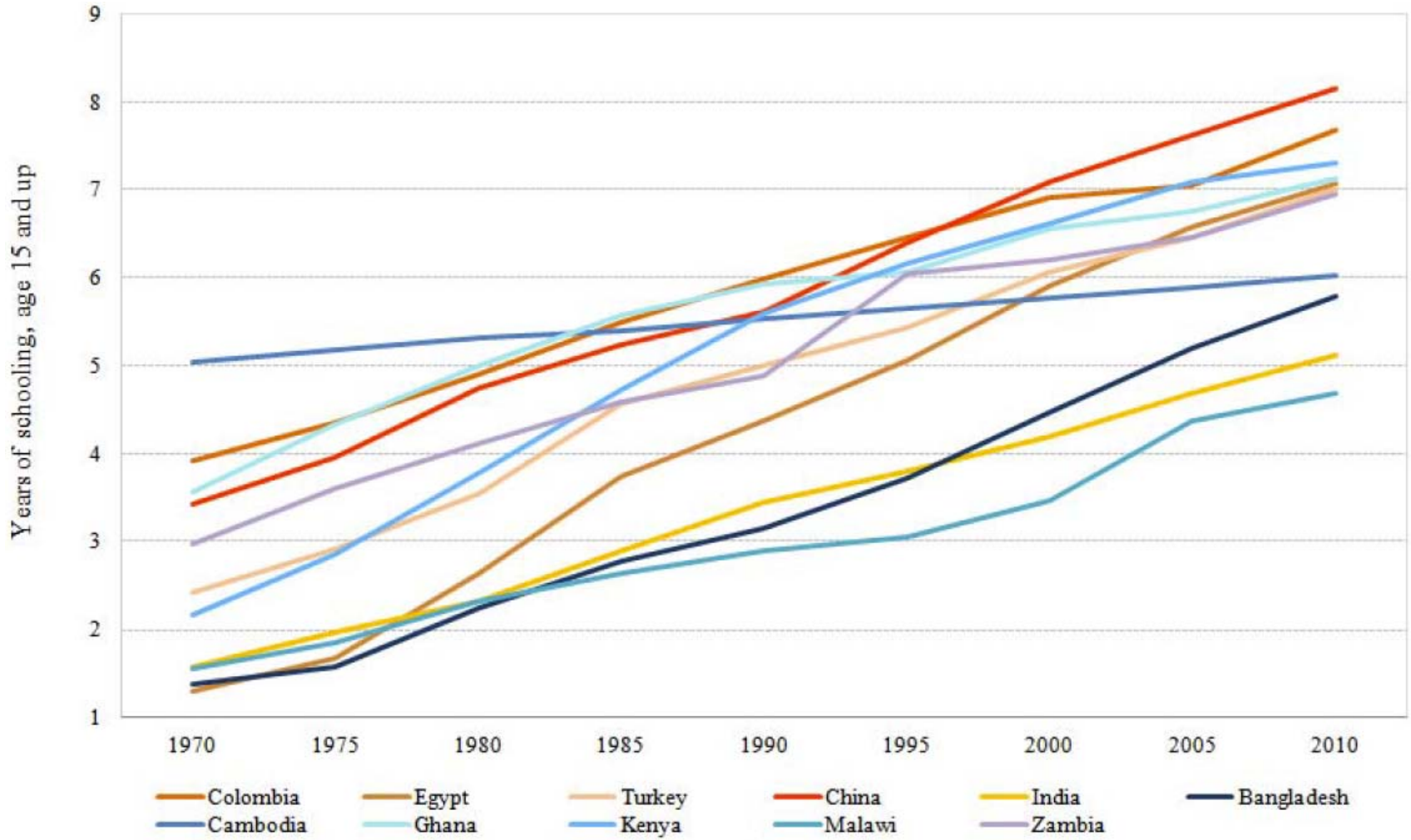
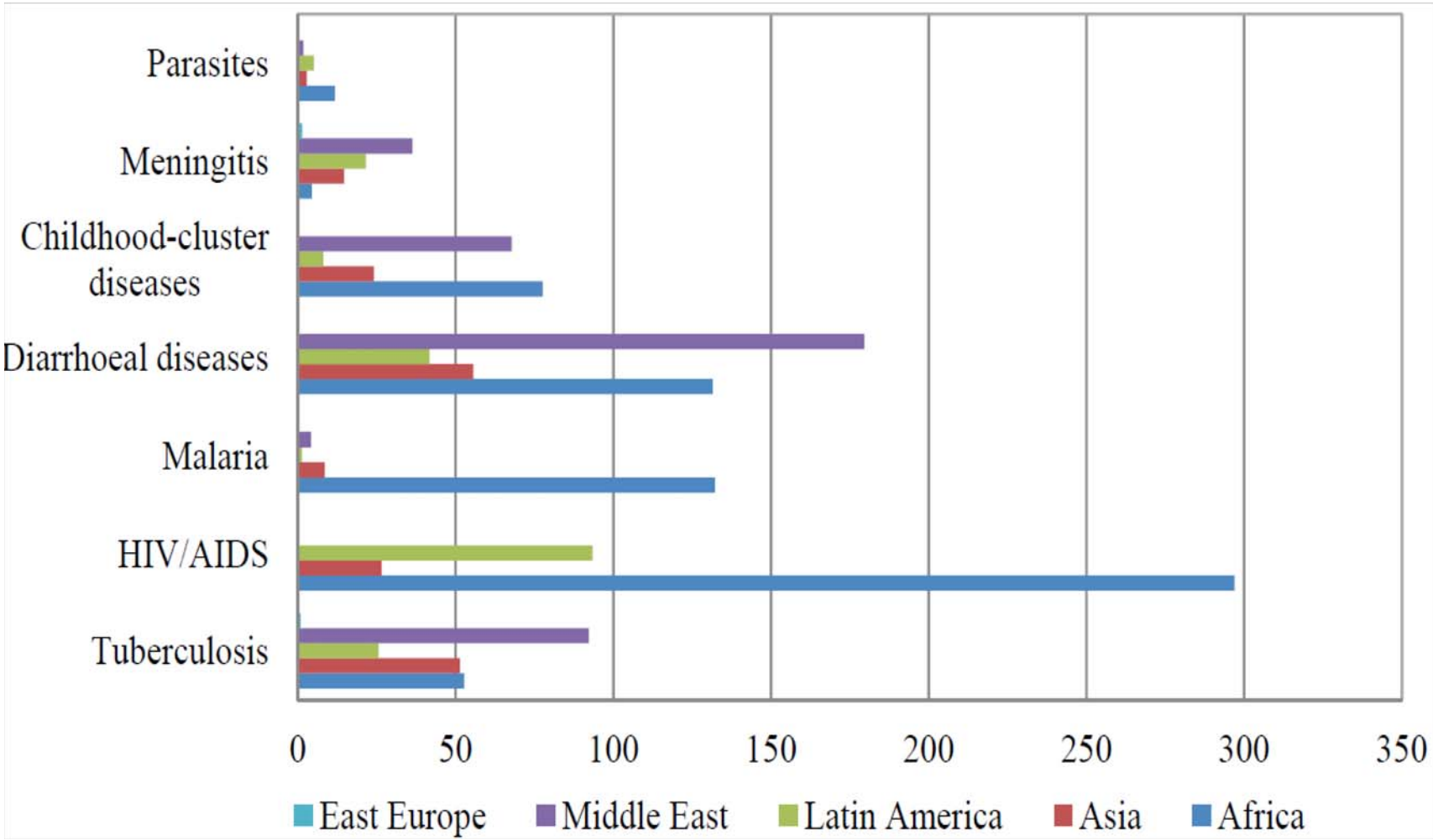
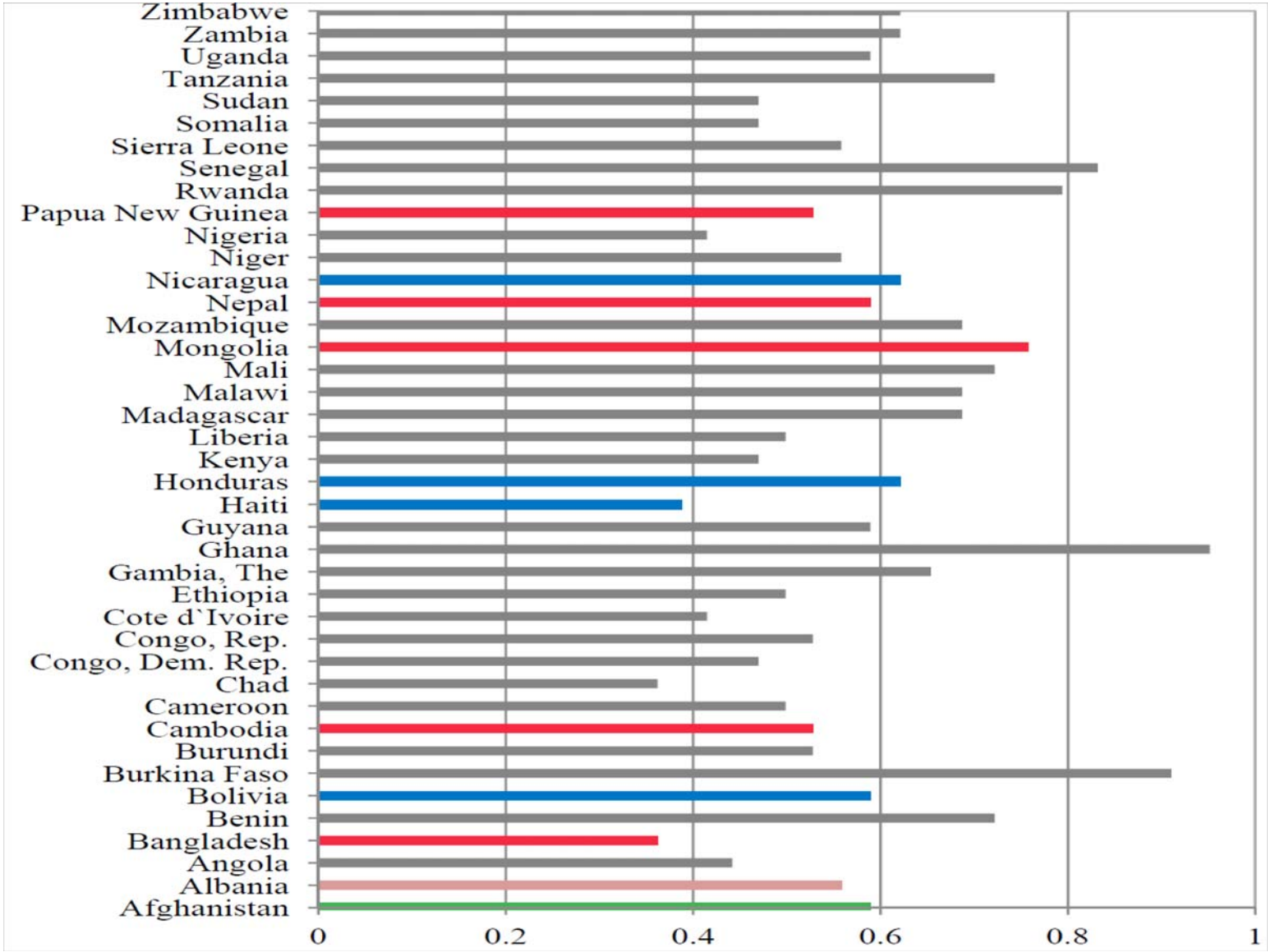

Life expectancy at birth
75
70
65
60
55
50
45
40
35
1960
1970
1980
1990
2000
2005
2008
Colombia
Egypt
Turkey
China
India
Bangladesh
Cambodia
Ghana
Kenya
Nigeria
Malawi
Zambia


Years of schooling, age 15 and up
9
8
7
6
5
4
3
2
1
1970
1975
1980
1985
1990
1995
2000
2005
2010
Colombia
Egypt
Turkey
China
India
Bangladesh
Cambodia
Ghana
Kenya
Malawi
Zambia

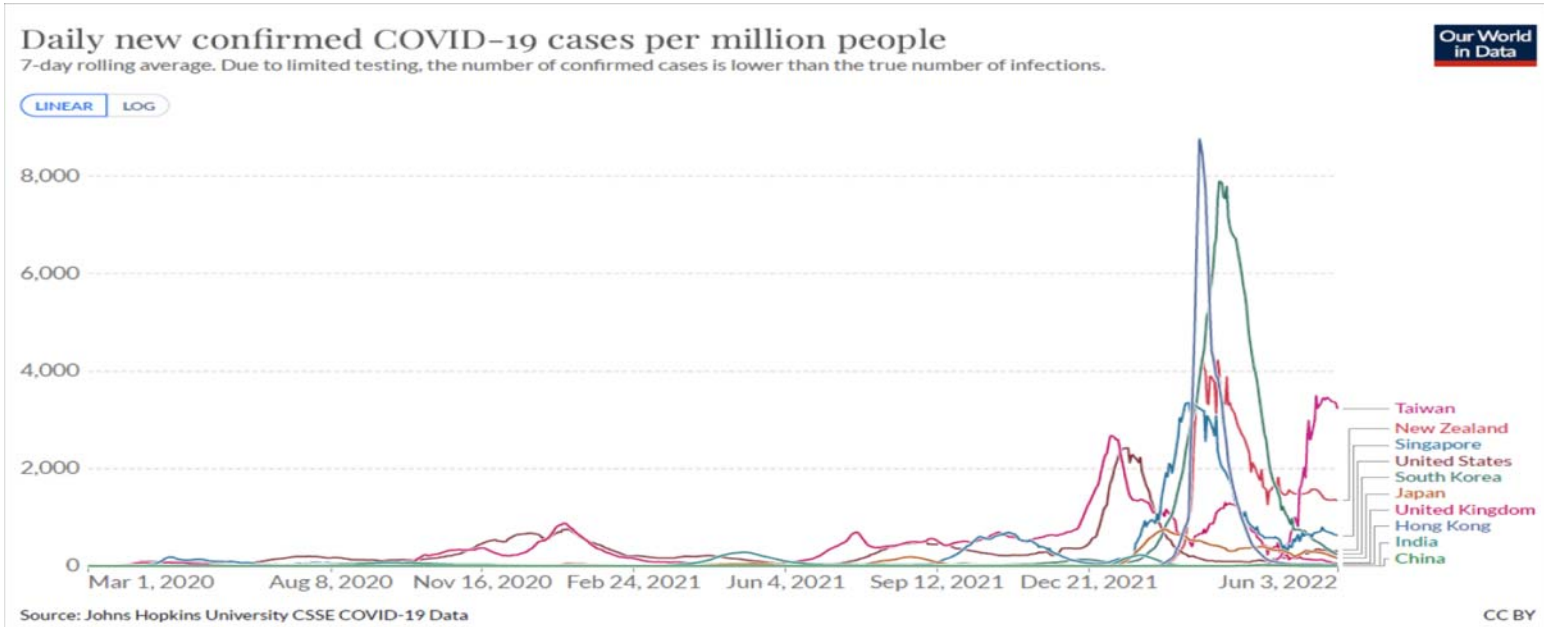

Parasites
Meningitis
Childhood-cluster diseases
Diarrhoeal diseases
Malaria
HIV/AIDS
Tuberculosis
0
50
100
150
200
250
300
350
East Europe
Middle East
Latin America
Asia
Africa

- **Results: chance to pull out of poverty trap (41 currently trapped economies)**



G. The Economics of the Pandemic

- **The 1918 Flu, 2002 SARS, 2013-16 Ebola and 2019-2021 COVID-19 are acute viral infections interfering with proper functioning of innate immune system.**
- **Their high transmission and death rates have created miserable public health problems accompanied by macroeconomic downturns.**
- **Thus, while the issues were initially under study by medical and public health scholars, the latest world-wide pandemic has induced high numbers of macroeconomic research.**
- **Observations of the COVID-19 pandemic**
  - **World-wide observations of the COVID-19 pandemic:**
  - **by mid-September 2021, there have been 226 millions of cases and 4.65 millions of deaths since the outbreak**
  - **top 5 cumulated infections: US (41 millions), India (33), Brazil (20), Russia (7.2), UK (7.1)**
  - **top 5 deaths: US (677 thousands > 1918 flu), Brazil (586), India (442), Mexico (267), Peru (198, highest death per capita @ 6114 per million)**
  - **top 5 death rates: Yemen (18.9%), Reunion (9.2), Peru (9.2), Mexico (7.6), Sudan (7.6)**
  - **while the poor are more vulnerable within a country, many rich countries suffer more**



1. Epidemiology: The Classic SIR Model (Kermack-McKendrick 1927) and the Herd Immunity

- **Individuals are divided into 4 groups:**
  - **S: susceptible (those who have not yet been exposed to the disease)**
  - **I: infected (those who contracted the disease),**
  - **R: recovered (those who survived the disease and acquired immunity)**
  - **D: deceased (those who died from the disease)**

- **Population evolution:**
  - **At a point in time t, a fraction of susceptible individual is newly infected: $T_t = \pi_i S_t$**
  - **Those newly infected (T) exit from the susceptible state: $S_{t+1} = S_t - T_t$**
  - **Those newly infected enter the infected state whereas those recovered ($\pi_r I_t$) or died ($\pi_d I_t$) exit from the state: $I_{t+1} = I_t + T_t - R_t - D_t$**
  - **Similarly, the population of the recovered and deceased states evolves according to: $R_{t+1} = R_t + \pi_r I_t$ and $D_{t+1} = D_t + \pi_d I_t$**
  - **Normalizing initial population $Pop_0 = 1$ and ignoring birth/immigration: $Pop_{t+1} = Pop_t - \pi_d I_t$**
  - **Initial condition: $I_0 = \varepsilon$ and $S_0 = 1-\varepsilon$**
- **Reproduction via disease transmission at a given point in time (notation duplication owing to following the epidemiology literature):**
  - **R = the average number of persons infected by a case**
  - **R_0 = the reproduction number in the absence of control measures in a fully susceptible population**
  - **Fundamental reproduction equation: $R = (1-p_C)(1-p_I)R_0$**
    - **p_C = reduction in transmission due to non-pharmaceutical intervention**
    - **p_I = proportion of immune individuals due to recovery and vaccines**

- **Herd Immunity: $R < 1$**
  - **That is, the condition requires: $p_I > 1 - 1/[(1-p_C) R_0]$**
  - **COVID-19: $R_0 = 2.5$ to 4 (the new string from UK is above 10)**
  - **In the absence of any intervention ($p_C = 0$), $R_0 = 10/3$ implies $p_I > 70\%$**
  - **If intervention (selected lockdown, mask and social distance) reduce transmission by 40%, then the condition is $p_I > 50\%$**
  - **In the above intervention case, if vaccine is only 80% effective, then the condition becomes $p_I > 5/8 = 62.5\%$**
- **General issues:**
  - **the structure is mechanical, lacking behavioral responses**
  - **the probabilities are likely time and group varying**

2. The SIR-Macro Model: Eichenbaum-Rebelo-Trabandt (2020)

- **Infection rates via:**
  - **consumption (C): $\pi_1(S_t C_t^S)(I_t C_t^I)$ due to interaction between S and I types**
  - **work hours (N): $\pi_2(S_t N_t^S)(I_t N_t^I)$**
  - **social contact: $\pi_3 S_t I_t$**
  - **thus, $T_t = \pi_1(S_t C_t^S)(I_t C_t^I) + \pi_2(S_t N_t^S)(I_t N_t^I) + \pi_3 S_t I_t$**
- **Individuals may respond by reducing consumption, work and social activities to avoid exposure to infection**

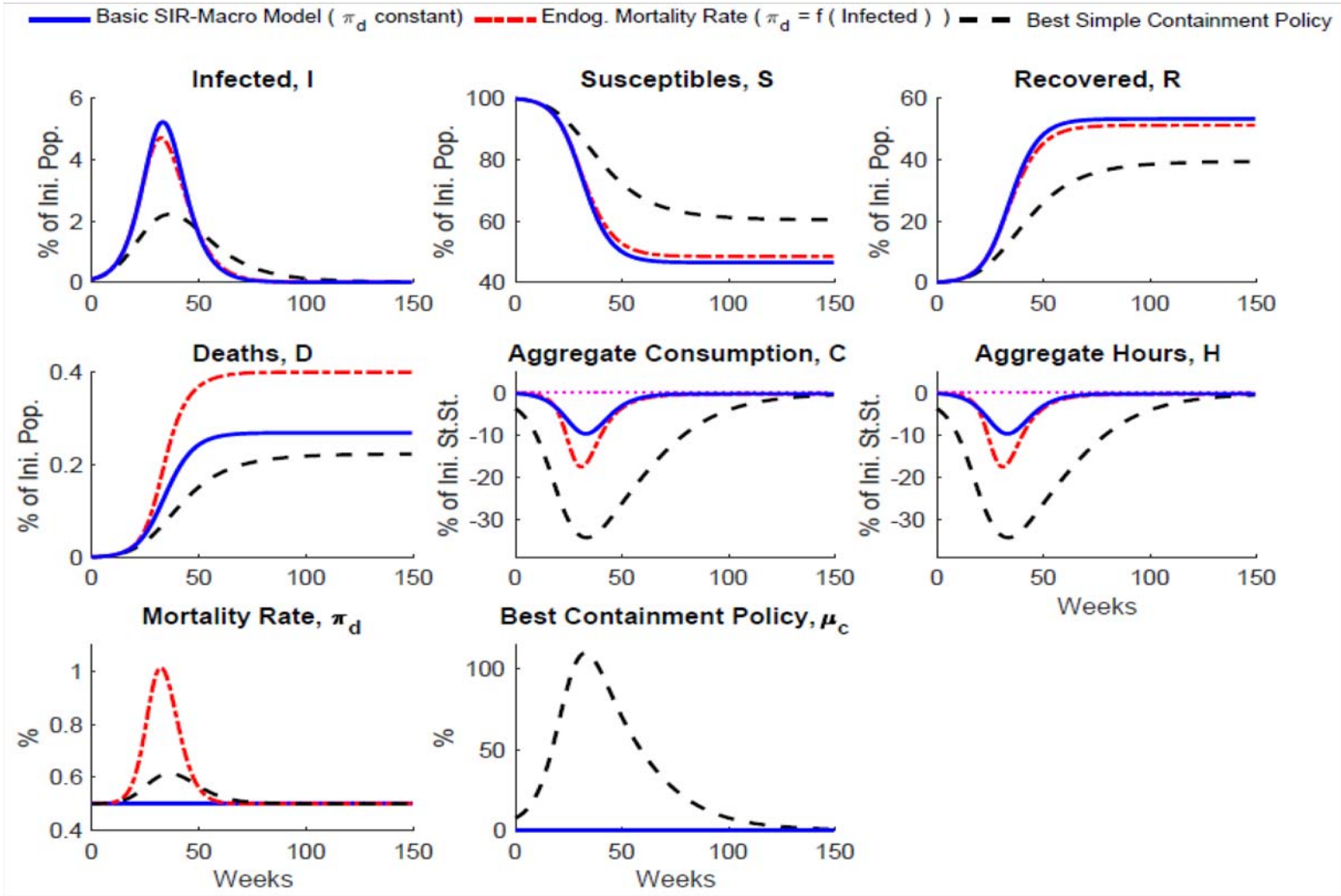
- **Budget for type-i (i = s, i, r):** $(1+\mu_t)c_t^j = w_t\phi^j n_t^j + \Gamma_t$
  - **productivity φ lower for infected (<1 for i and = 1 for s and r)**
  - **μ = consumption tax, reflecting containment policy making c more costly**
  - **Γ = government lump-sum transfer**
- **Lifetime utility:**
  - **susceptible:** $U_t^s = u(c_t^s, n_t^s) + \beta\left[(1-\tau_t)U_{t+1}^s + \tau_t U_{t+1}^i\right]$**, where**
    $\tau_t = \pi_1 c_t^s\left(I_t C_t^I\right) + \pi_2 n_t^s\left(I_t N_t^I\right) + \pi_3 I_t$
  - **infected:** $U_t^i = u(c_t^i, n_t^i) + \beta\left[(1-\pi_r-\pi_d)U_{t+1}^i + \pi_r U_{t+1}^r\right]$
  - **recovered:** $U_t^r = u(c_t^r, n_t^r) + \beta U_{t+1}^r$
- **Government budget constraint:** $\mu_t\left(S_t c_t^s + I_t c_t^i + R_t c_t^r\right) = \Gamma_t\left(S_t + I_t + R_t\right)$
- **Goods and labor market clearing:**

$$S_t C_t^s + I_t C_t^i + R_t C_t^r = A N_t,$$

$$S_t N_t^s + I_t N_t^i \phi^i + R_t N_t^r = N_t$$

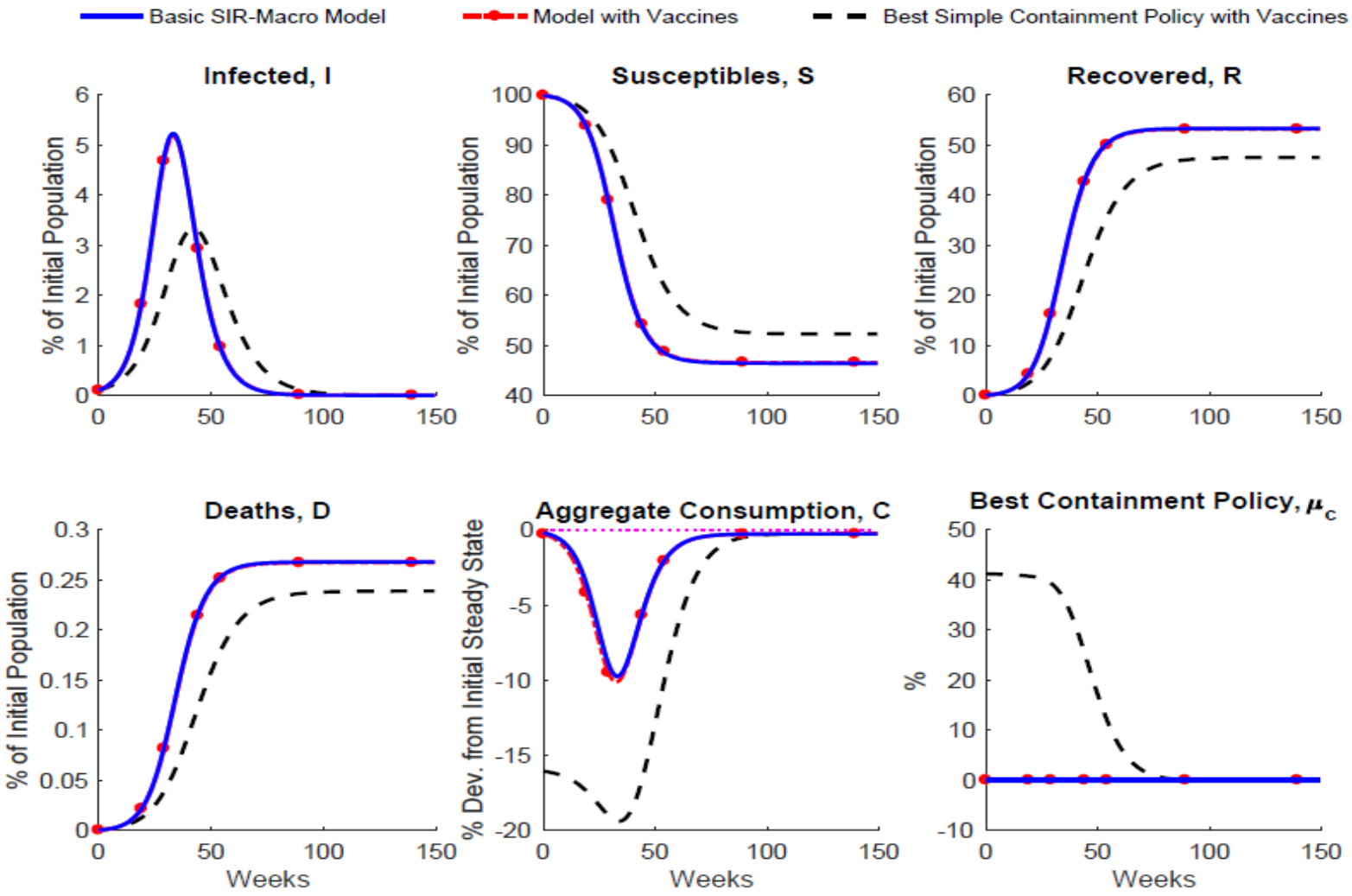
- **Potential issues:**
  - **asset accumulation and incidental bequest**
  - **health investment and health insurance**
  - **age-dependent infection rates**

- **Optimal containment policy (via μ)**



- **best containment policy => large reduction in infected cases and death tolls**

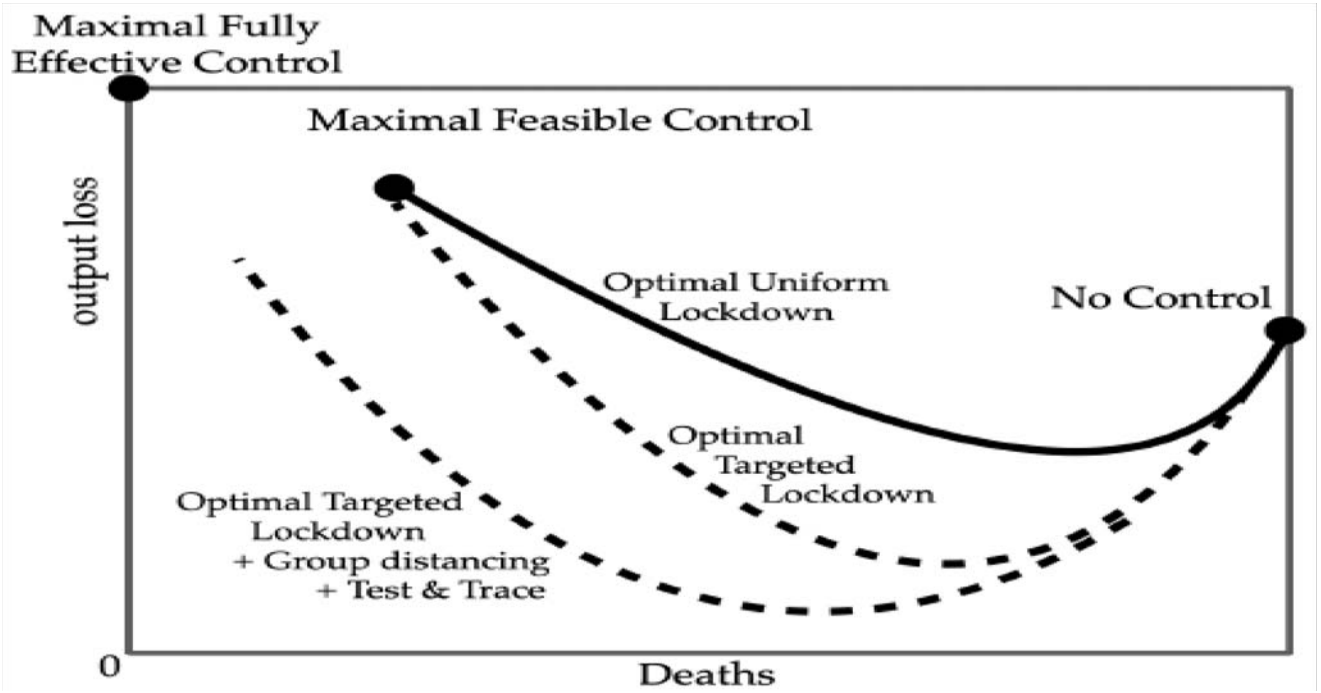
- **Containment and vaccine effectiveness:**



  - **vaccine without containment policy would never achieve herd immune**

3. Multi-risk SIR: Acemoglu-Chernozhukov-Werning-Whinston (2020)

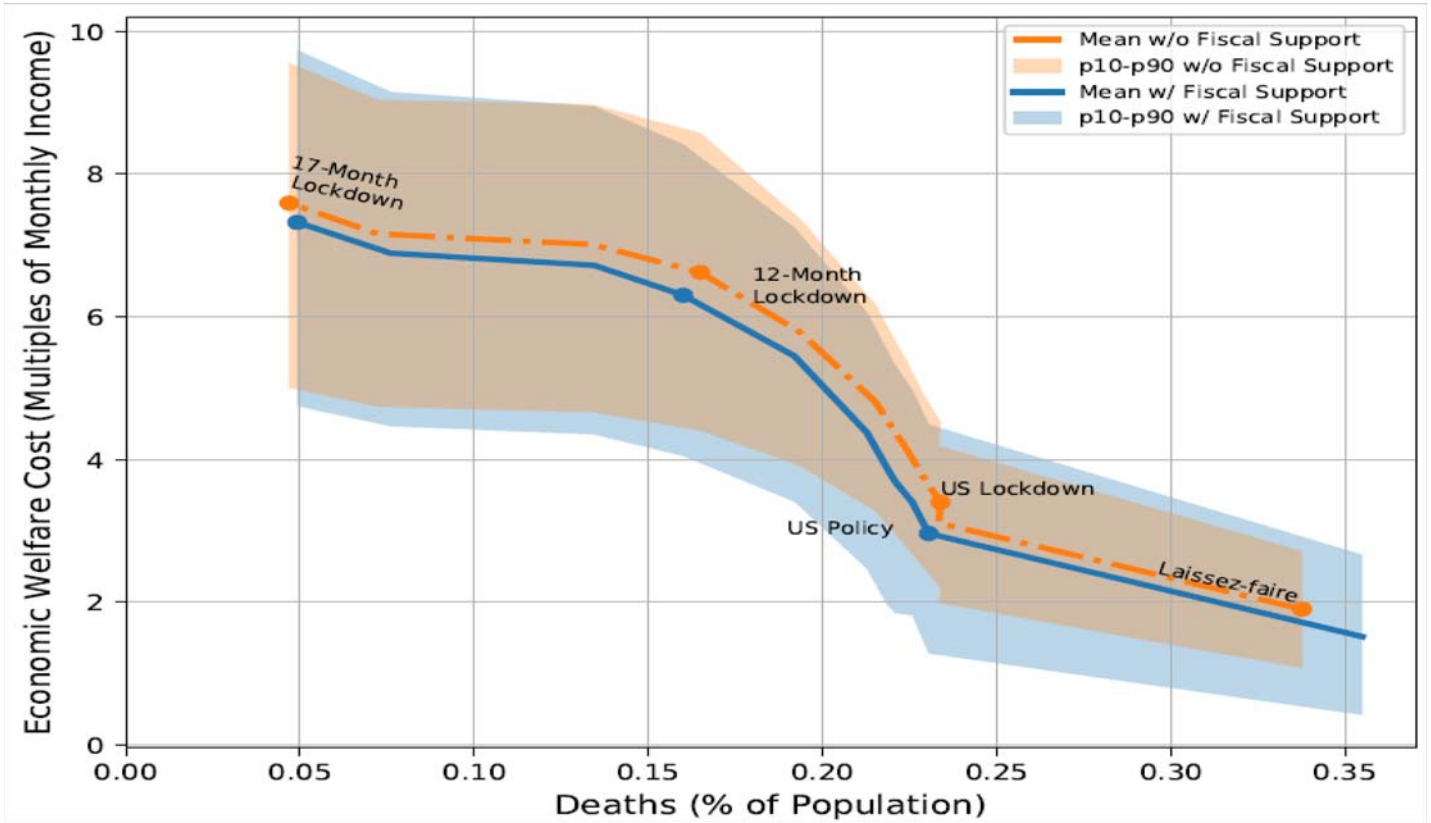
- **Individuals are heterogeneous in age, occupation, productivity, labor supply**
- **They thus have different vulnerability and different response**
- **Targeted policies treating people in different age group differentially can be much more effective**



Note: ignore upward sloping part of iso-cost curves (valuation bias)

4. Economic welfare costs of the pandemic: Kaplan-Moll-Violante (2020)

- **Uneven economic losses across the population => heterogeneous welfare costs**
- **Such heterogeneities matter for effective policy design**



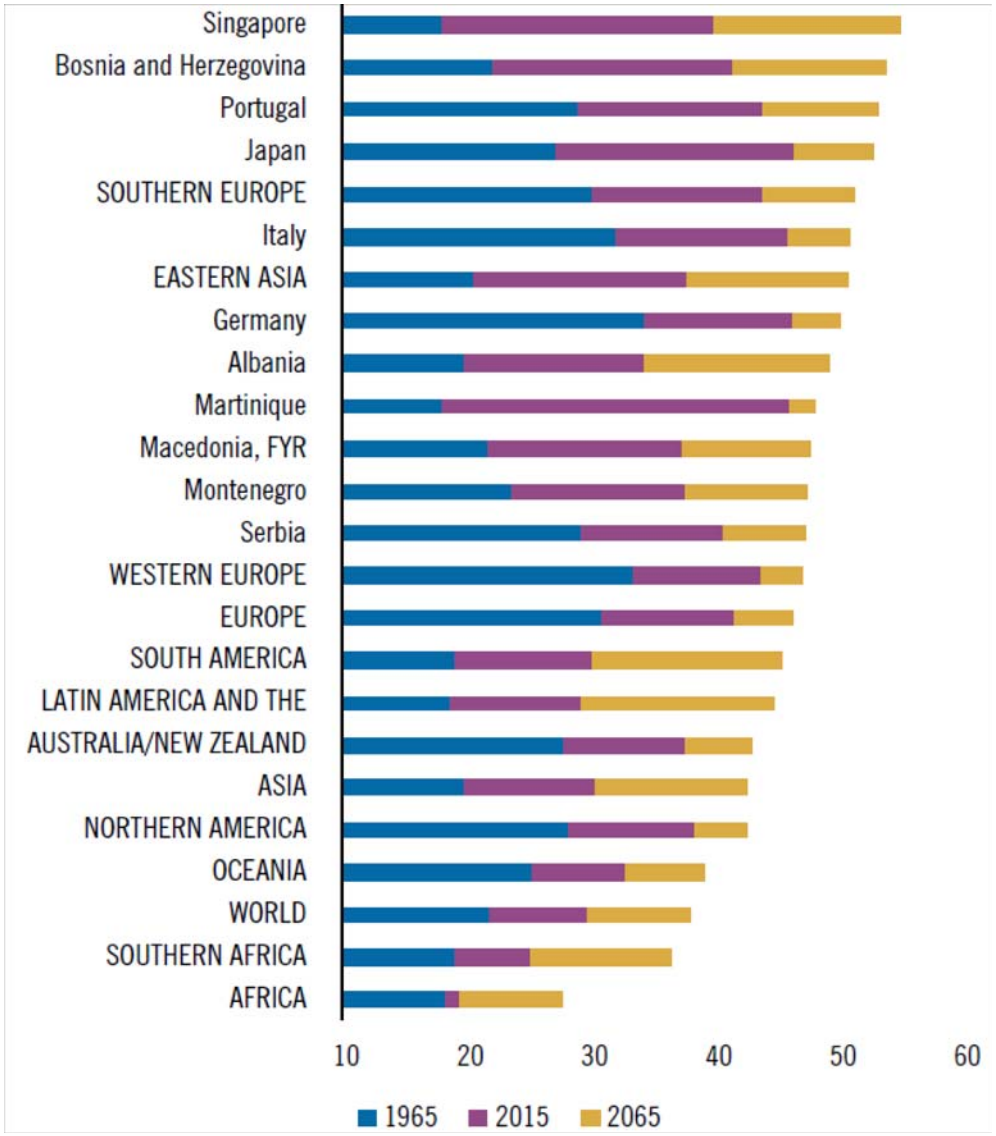
- **Fiscal policy can lower iso-cost curves, helping p10 poor group by more**

5. Systematic evaluation of the trade-offs

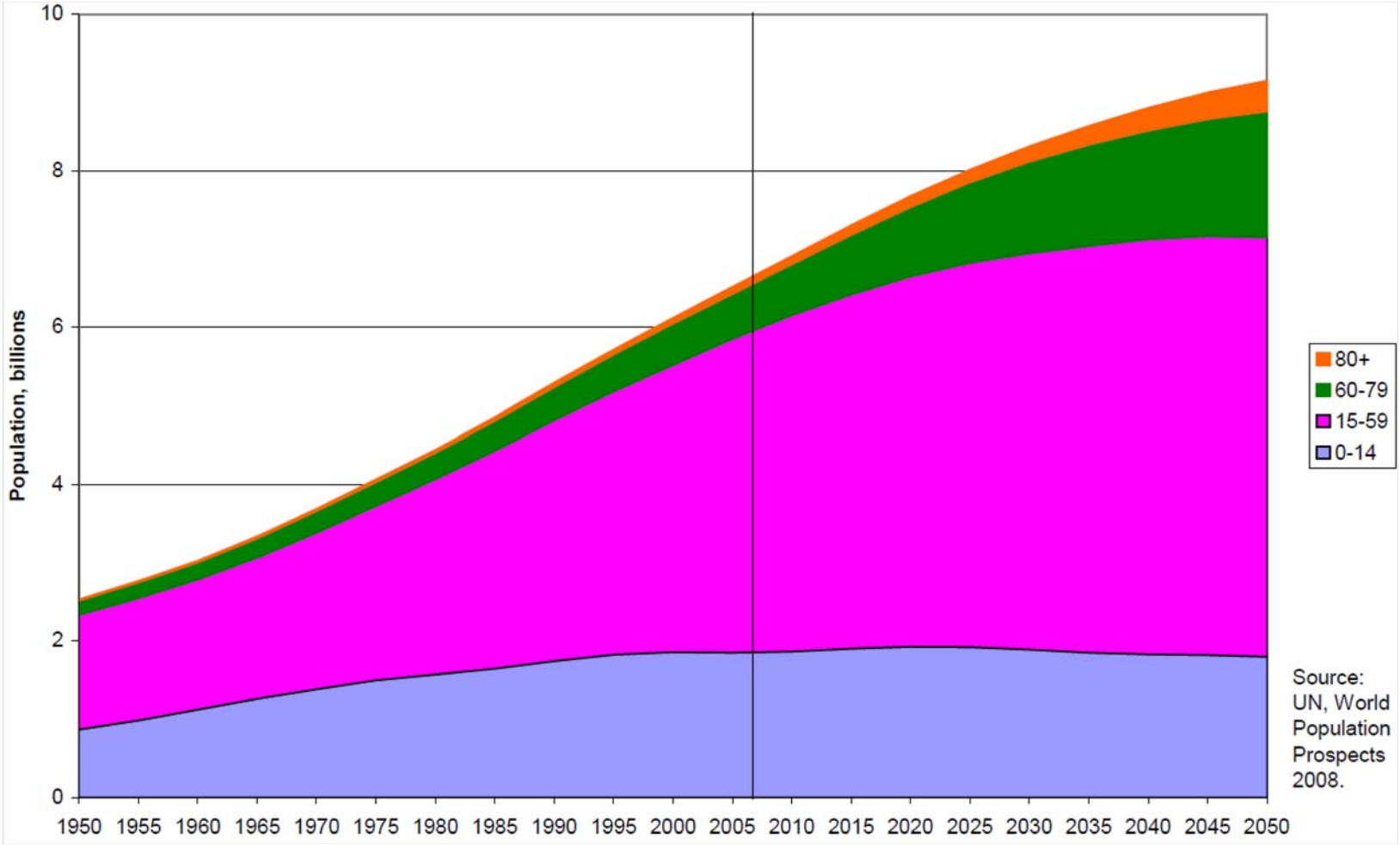
- **Economics, education and mental health matter (many NBER/BFI papers)**
- **Job losses and business losses are asymmetric (Wang-Yuen)**
- **Lifecycle impact of the pandemic (Wang-Yao)**
- **Impact of the pandemic on global value chain (Cheng-Liu-Wang-Wang)**
- **The state of new normal**
  - **5th industrialization: modern digitalization + personalization with big data**
    - **increasing adoption of automation and surging need for AI**
    - **more online shopping and delivery services (such as Uber eat)**
    - **more flexible workplaces/hours**
    - **more toward virtual activities, including virtual outpatient visits**
    - **from hard to soft skills**
  - **reshuffling of global value chain and rising protectionism**
  - **rising populism, racialism and terrorism and greater likelihood of wars**

H. Aged Society

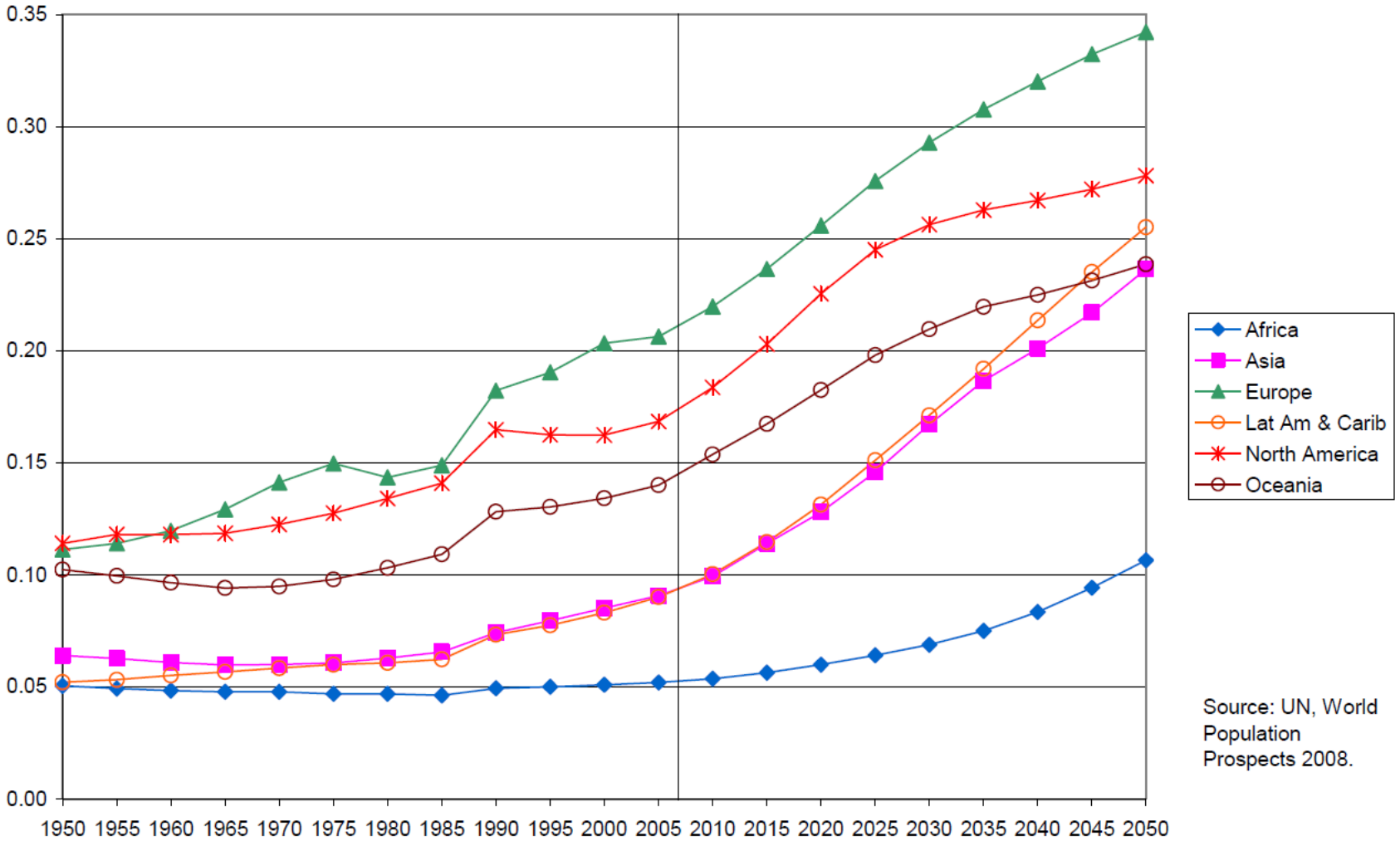
- **While most developed countries and many developing countries have completed demographic transition, their new demographic challenge is rapid ageing as a result of technological change in health and medicine and rising income, among others.**
- **Declined fertility and longevity imply higher median age (based on UN 2015 data/projection)**
- **The dependency ratio rises: the ratio in EU15 is 1/1.8 in 2015, projected to rise to 1/1.2 in 2065 (World Bank)**



- **World population by age group (Bloom-Canning-Flink 2011, based on UN)**

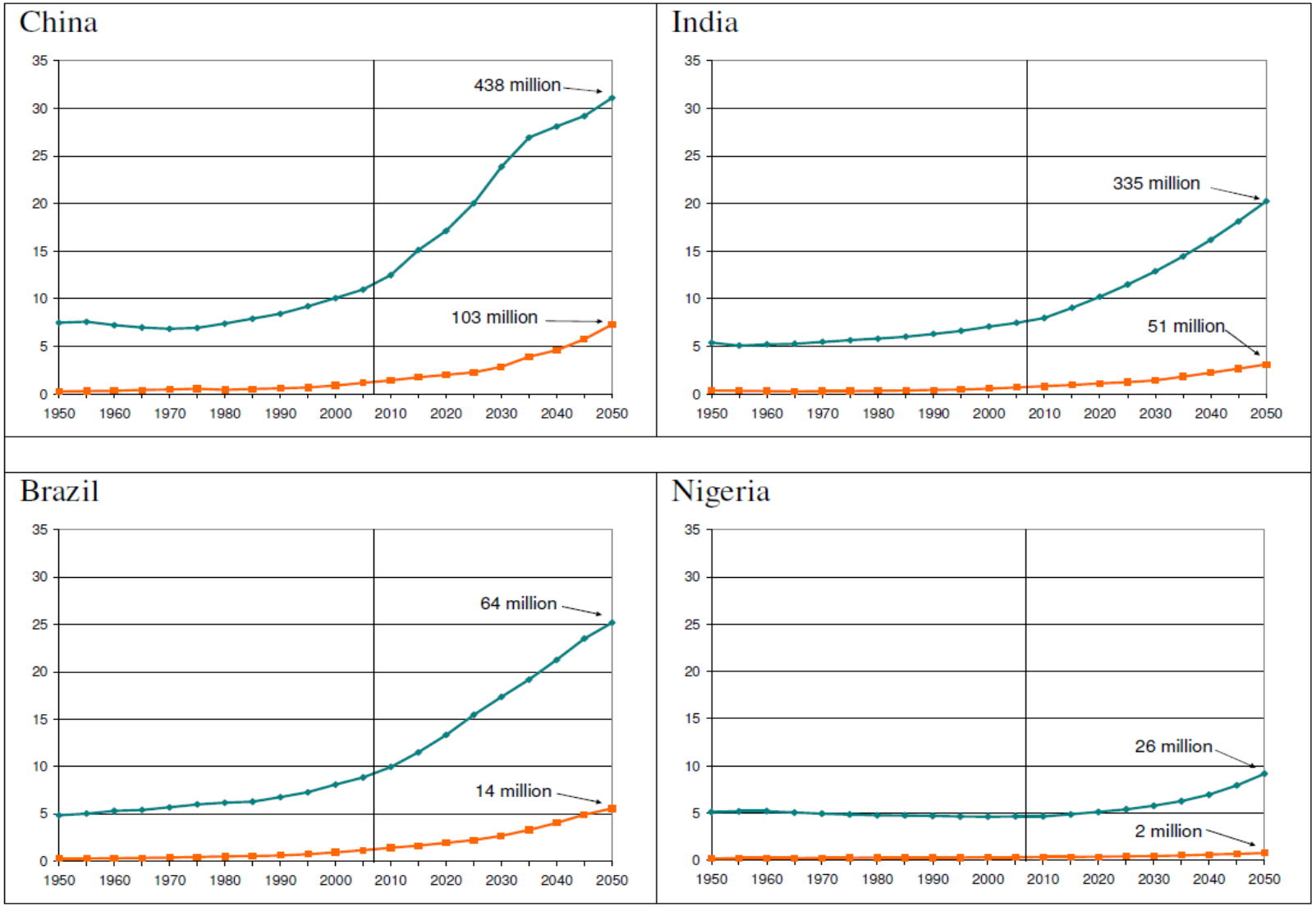


- **Share of 60+ population in the world by regions (ibid)**

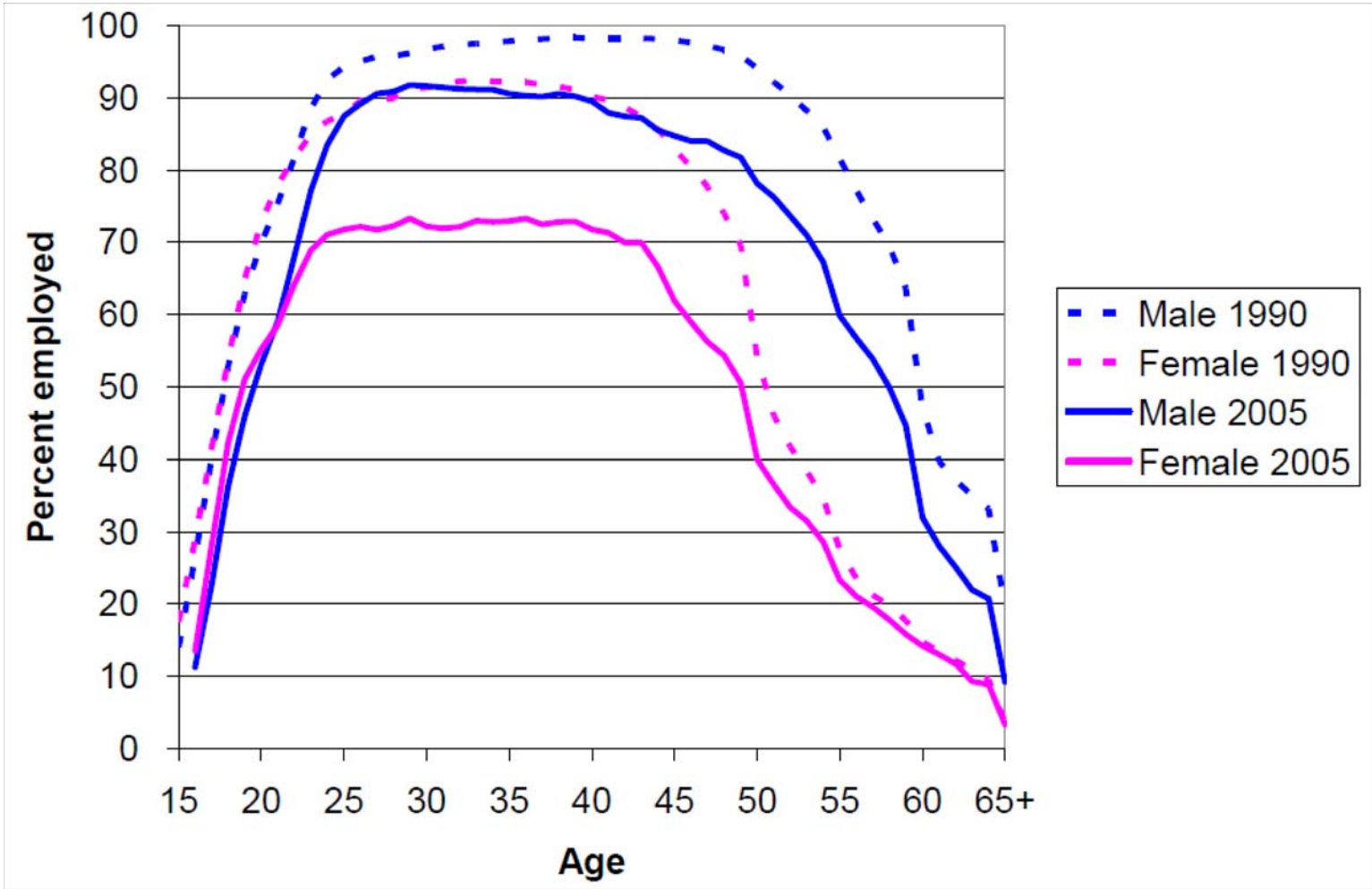


Source: UN, World Population Prospects 2008.

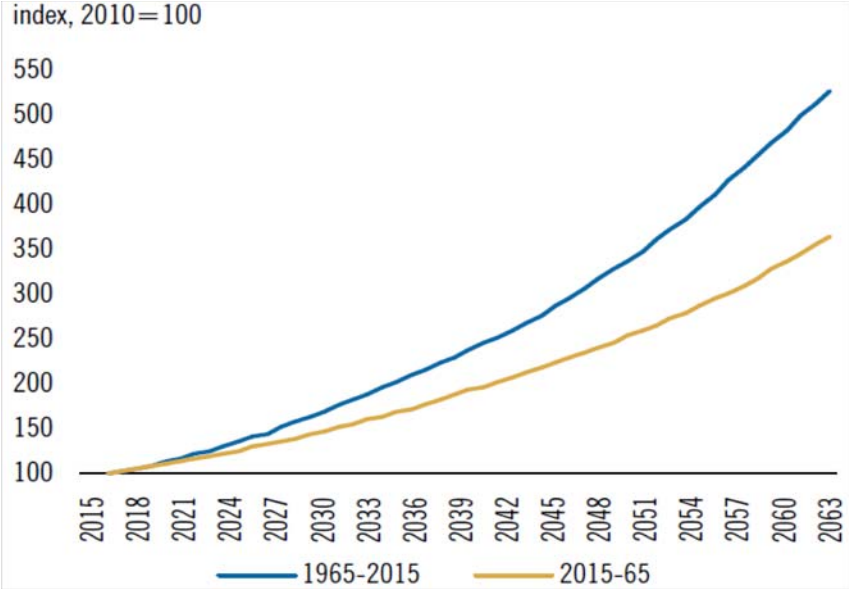
- **Share of 60+ (blue) and 80+ population in 4 large developing economies (ibid)**



- **City labor participation in the largest economy, China (ibid)**



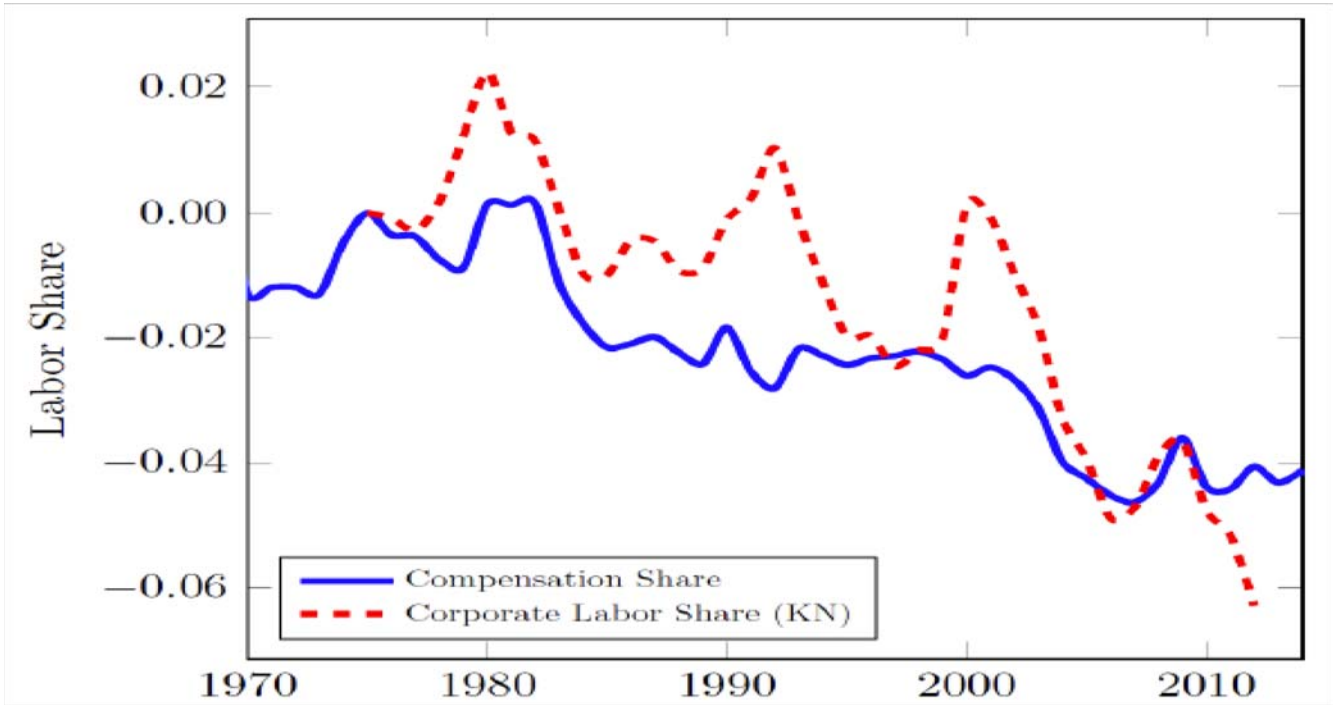
- **Issues:**
  - **lower labor force participation**
  - **lower productivity on per capita basis**
  - **higher health care and long term care cost**
  - **more welfare spending**
  - **less pension sustainability**
  - **lower growth: World Bank projection – lower by 0.4% in the next 50 years)**



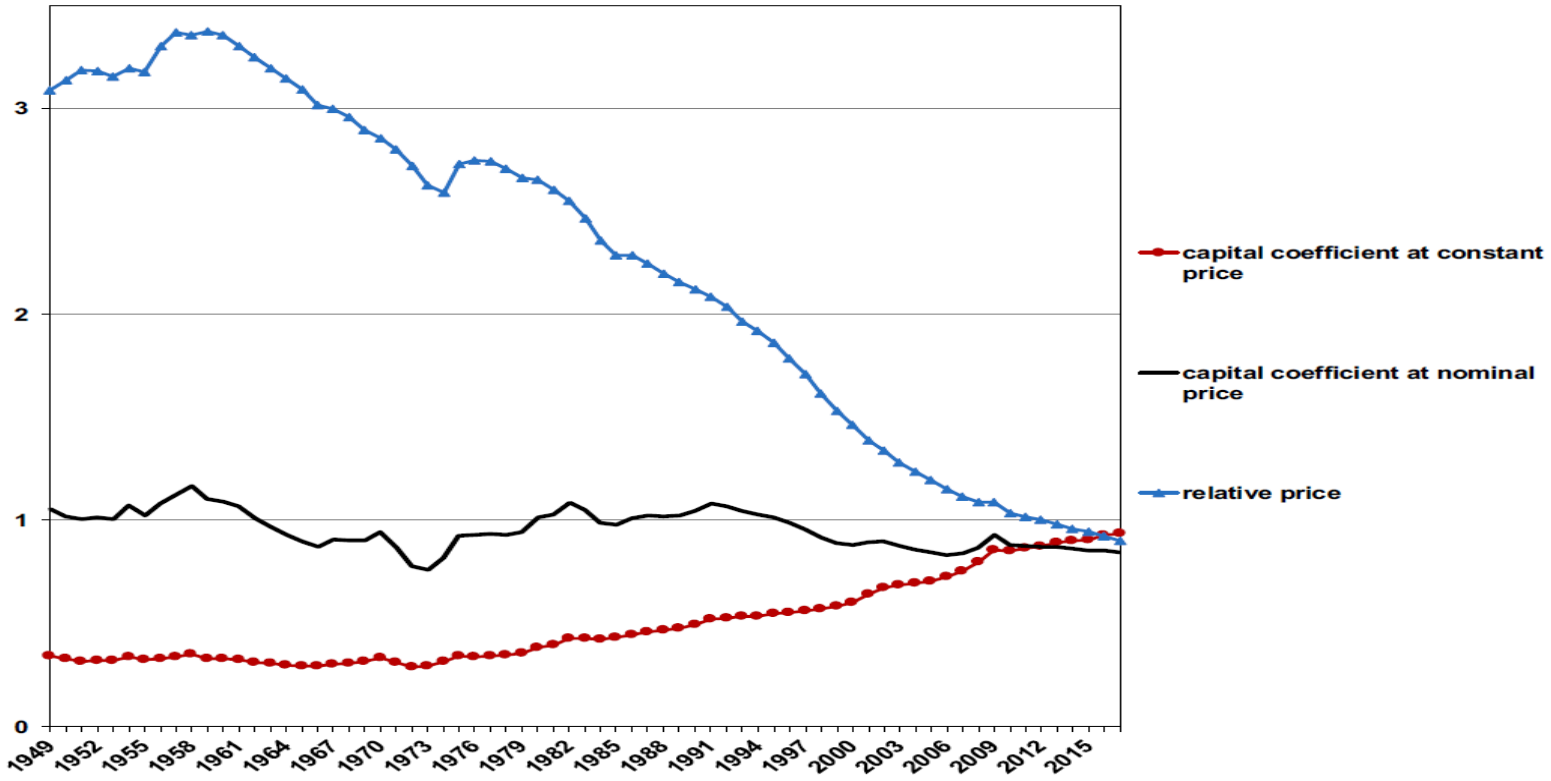
- **Policy:**
  - **raise retirement age**
  - **encourage adequate increase in fertility**
  - **enhance immigration**
  - **promote healthy ageing**
  - **improve pension management: from pay-as-you-go to fully-funded or to even more demographic-considered flexible system and to secure decent return**

I. Automation and Declined Labor Share: Acemoglu-Restrepo (2019)

- **Globally declined trend in the labor share: Karabarbounis-Neiman (2014), Grossman-Helpman-Oberfield-Sampson (2018)**



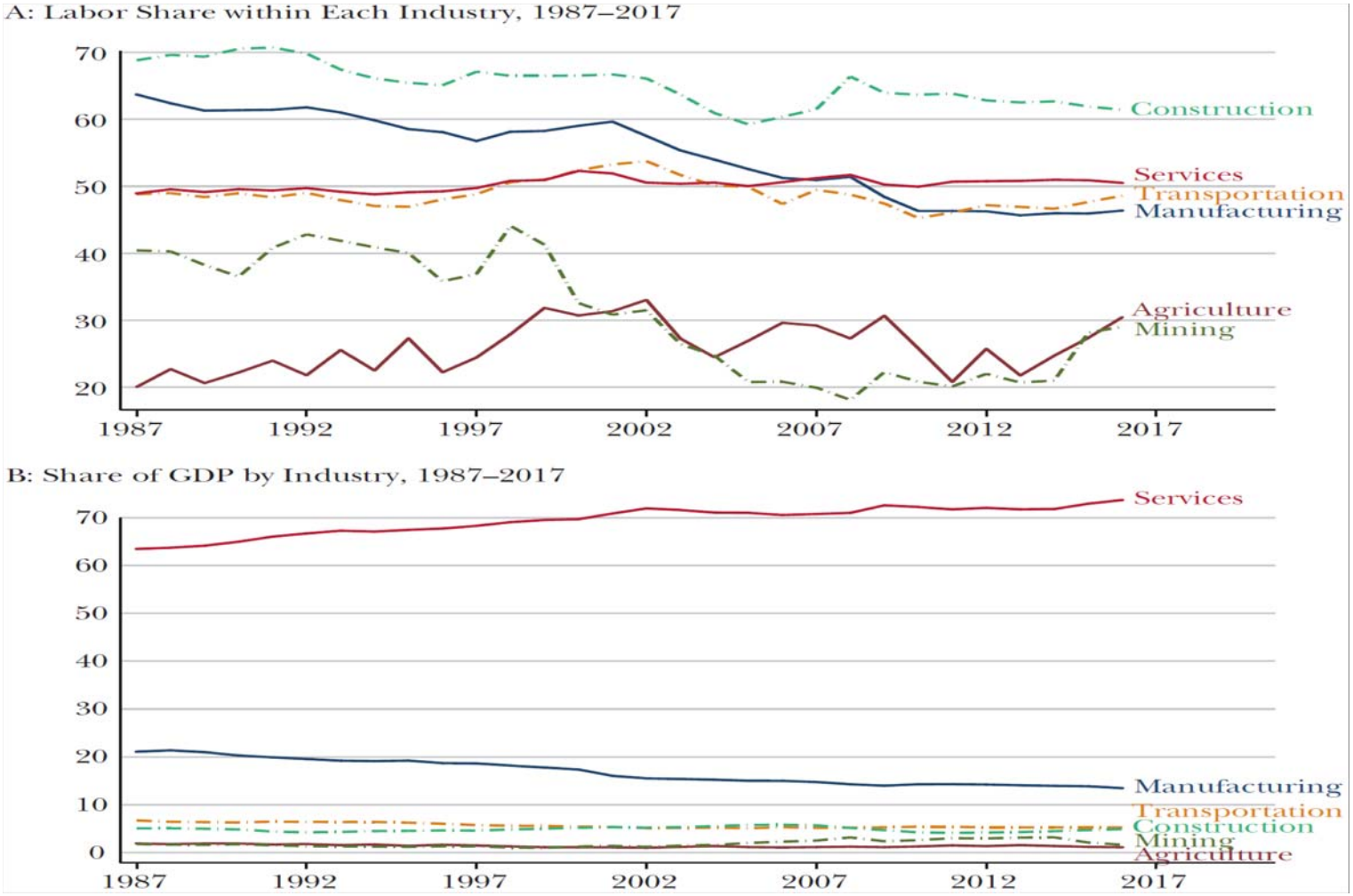
- **Rising capital coefficient and declining relative price of capital: Karabarbounis-Neiman (2014), Cheng (2017), Cette-Koehl-Philippon (2019)**



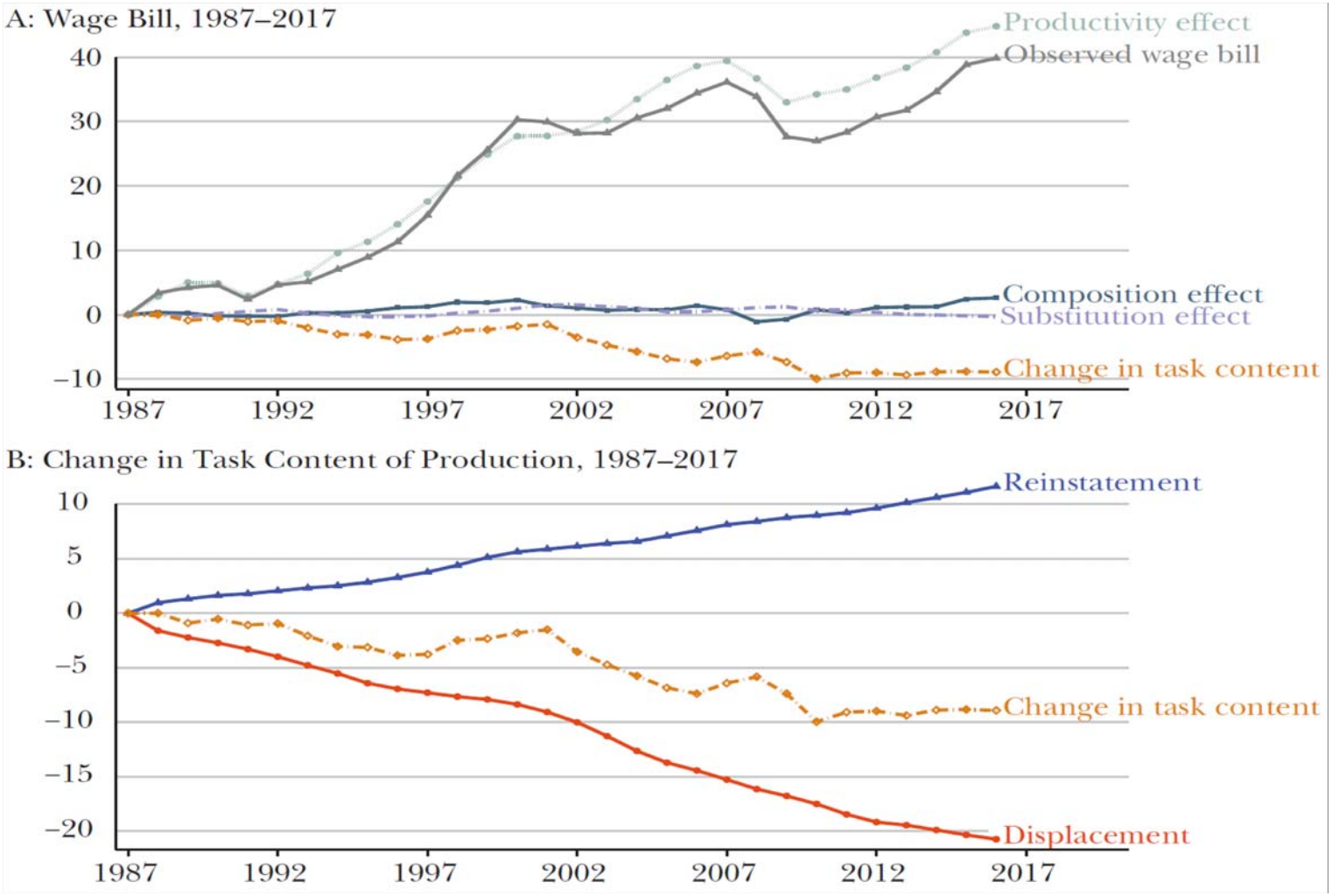
- **The task-based model of automation: Acemoglu-Restrepo (2018, 2019)**
  - **displacement effect: capital displaces labor (especially routine middle-skill)**
  - **productivity effect: automation raises productivity (esp. skilled & females)**
  - **reinstatement effect: new tasks reinstate labor into broader range of tasks, thus changing the *task content* in favor of labor**
  - **task substitution effect: substitution across tasks**

- **Economic Channels:**
  - **Effect of automation on labor demand = productivity effect (+) + displacement effect (-) => it is not the "brilliant" automation technologies that threaten employment and wages, but "so-so technologies" that generate small productivity improvements**
  - **Effect of new tasks on own labor demand = Productivity effect (+) + Reinstatement effect (+) => reinforcing positive effect > productivity effect**
  - **Effect of factor-augmenting technologies on own labor demand = Productivity effect (+) + Substitution effect (-) => positive if $\sigma > 1 - s^L$ (true empirically)**
  - **There is a sectoral composition effect, that is generally ambiguous**

- **Labor and value-added shares over 1987-2017**



- **Decomposition analysis:**



J. Locational Human-Capital Mobility: Bond-Riezman-Wang-Yang (2023)

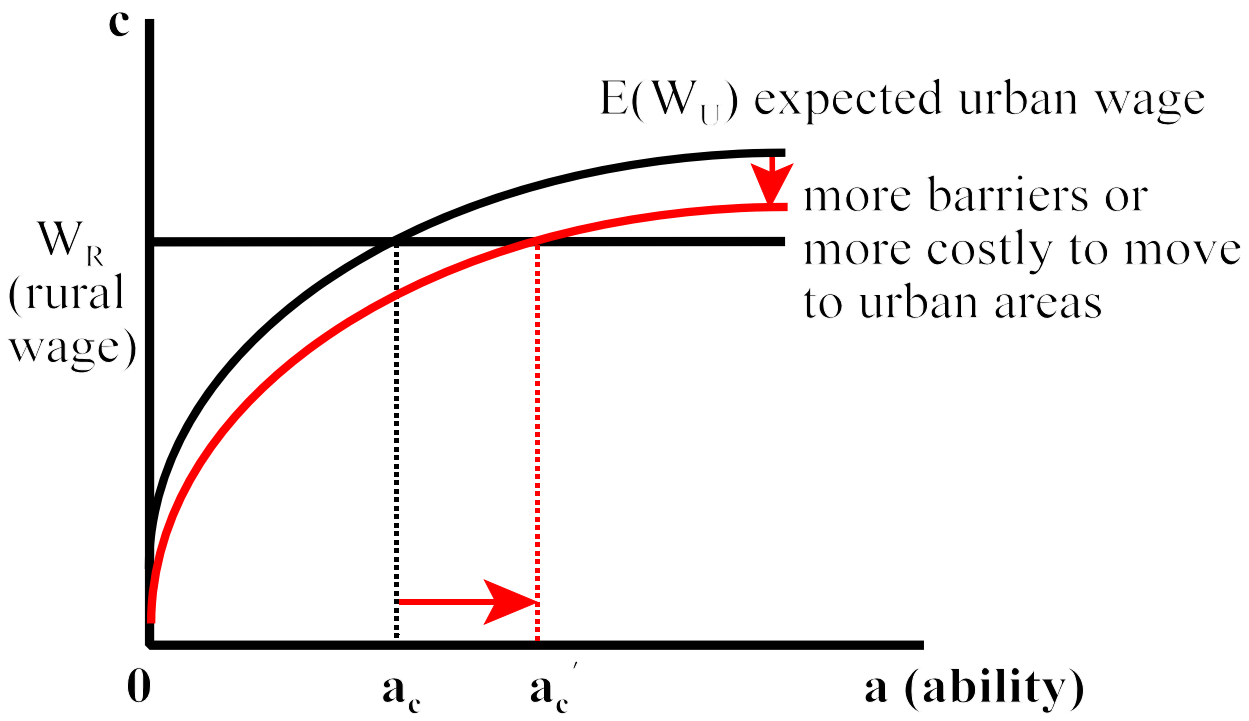
- **Along the global trend of economic development, it is often observed rapid industrial transformation accompanied by continual rural-urban migration (Lewis 1954, Fei-Ranis 1961, 1964, and Sen 1966)**
- **In many developing countries there are yet abundant supplies of surplus labor:**
  - **urbanization trend (% rural population):**

	Brazil	China	Egypt	India	Mexico	Korea	Thailand
1950	75	87	68	84	58	79	90
2000	19	64	55	72	26	18	78

  - **Key features:**
    - **abundant rural surplus labor (13-28% of total population)**
    - **large urban-rural unskilled wage gap (2:1)**
    - **low growth in real unskilled wage (less than 1% by excluding labor-augmenting technical progress)**
    - **gradual upgrade of some unskilled migrants to skilled (Lucas 2004)**
- **Conventional literature is either static (Todaro 1969, Hariss-Todaro 1970) or dynamic without modeling explicitly the dynamic process of labor migration (Drazen-Eckstein 1988, Glomm 1992, Bencivenga-Smith 1997, Banerjee-Newman 1998, with Lucas 2004 as an exception)**

- **The recent rise of the emerging economies in Asia and Latin America has been accompanied by rural-urban migration and trade liberalization**
- **Question: what is the role of open-trade policy played in facilitating locational human capital mobility and long-run growth**
- **Responses to tightened trade protection (higher import tariff) when the import substitution sector Y is more capital-intensive than the exporting sector:**
  - **protection raises the capital-labor ratio in Y (k_Y) more than that in X (k_X)**
  - **output in Y rises whereas output in X reduces; aggregate output decreases**
  - **both capital and urban employment are lower (urbanization ↓)**
  - **economic growth is lower**
- **Similar results in response to barriers to rural-urban migration, where more barriers reduces urbanization and growth**
  - **policies raising such barriers:**
    - **China: household registration system**
    - **India: caste system**
  - **policies reducing such barriers:**
    - **Taiwan: public training programs & job search assistance (Chicago)**
    - **UK (London)//China (tier-1 cities)/Singapore: public provided/subsidized urban housing**
    - **Australia/Canada/Singapore: immigration policy**
    - **Singapore: human capital policy (tax and other incentives)**

- **An organizing framework: rural to urban migration continues until the expected rural and urban wages (or utility) are equalized**



- **More barriers or more costly to move to urban areas will lead to a higher ability cutoff, resulting in slower urbanization**

- **Transition to urban society: Regimes 1 (1980-94), 2 (1995-2001), 3 (2002-08)**

Decomposition Analysis (all in %)	RGDP per cap $\frac{RGDP}{POP}$	Urban Share output φ	Urban Share emp υ
Case 1: Using counterfactual for Regime 2			
a. tariff reduction	8.0	19.5	46.5
b. migration cost reduction	**62.3**	57.5	37.2
c. sectoral technical progress	**29.4**	44.8	32.6
d. population change/service expansion	0.3	-21.8	-16.3
Case 2: Using counterfactual for Regime 3			
a. tariff reduction	2.4	1.9	5.5
b. skill expansion	*25.7*	3.7	6.1
c. sectoral technical progress	8.8	4.5	6.6
d. population change/service expansion	*63.1*	89.9	81.8

  - **migration cost reduction and TFP most important for earlier growth; skill/service expansion and pop control most crucial for later**
  - **urbanization driven by tariff/migration cost reduction and TFP earlier, by pop control and service expansion later**

K. Informality

- **The presence of an informal sector is a world-wide phenomenon particularly in developing countries with larger tax burden, heavier labor-market barriers and restrictions and lower government institution quality (de Soto 1989):**
  - **high business taxes**
  - **labor regulations (work hour restrictions, overtime pay requirement, minimum wage, fringe requirements such as health insurance, sick leave, maternal leave and pension, severance pay)**
  - **consumer protection**
  - **environmental regulations**
  - **high access costs to legality and entry, including financial cost and red tape**
- **While the informal sector can be a tax avoidance heaven (Loaya 1996), it may also serve as a temporalizing state to absorb urban unemployment (Marjit-Wang 2014)**
- **Informality also incurs costs:**
  - **penalties including fines and forced closure**
  - **bribes to corrupt government officials (10-15% of gross income, de Soto 1989)**
  - **inability to benefit from government-provided services**
  - **inability to access to formal capital markets**

- **The size of the informal sector (Loayza 1996)**

Country	Standardized Value	Absolute Value (% of GDP)
Chile	-1.342	18.2
Argentina	-1.107	21.8
Costa Rica	-1.012	23.3
Mexico	-0.762	27.1
Venezuela	-0.523	30.8
Ecuador	-0.494	31.2
Colombia	-0.240	35.1
Uruguay	-0.236	35.2
Brazil	-0.062	37.8
Honduras	0.516	46.7
Guatemala	0.754	50.4
Peru	1.243	57.9
Panama	1.518	62.1
Bolivia	1.746	65.6
Mean	0.000	38.8
Standard Deviation	1.000	15.3

- **Informality and development (ibid):**

Dependent Variable	Growth Rate of Real Per Capita GDP (1980-92)				Public Infrastructure Index
	(1)	(2)	(3)	(4)	(5)
Size of the Informal Sector	-0.8852		-0.8435		-0.5814
	(-2.61)		(-2.16)		(-2.98)
Public Infrastructure Index		0.5622	0.0718		
		(1.69)	(0.24)		
Corporate Income Tax Rate				-0.4436	
				(-1.09)	
Labor-Market Restrictions				-0.4333	
				(-0.84)	
Strength and Efficiency of Government Institutions				0.3598	
				(1.16)	
P-value (F-Statistic)			0.0233	0.0798	
Adjusted R^2	0.3584	0.1201	0.3068	0.2537	0.3381
Number of Observations	14	14	14	14	14

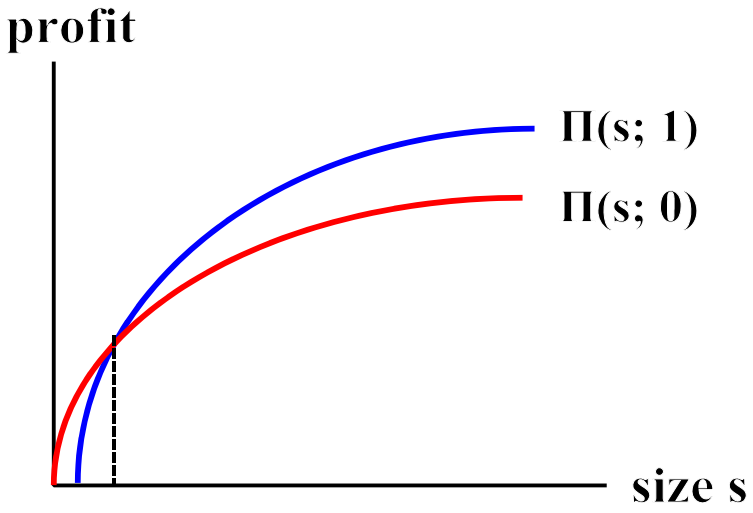
  - **informality has direct and indirect (via tax-financed public infrastructure) effects on economic growth and development**

- **Employee characteristics between formal the informal sectors: a case study of Buenos Aires, 1993-95 (Amaral-Quintin 2006)**

	Formal sector	Informal sector	*T*-statistic
Observations	10,010	5682	
Average age in years	37.32	33.45	17.44
Average tenure in years	7.88	3.42	35.14
Percent of workers with tertiary education	19.92	11.00	15.49
Percent of workers in plants with 15 employees or fewer	30.34	79.29	69.20
Average gross hourly earnings	4.43	3.32	16.90

  - **informal sector employees are younger and less educated, with shorter tenure**
  - **they earn 25% less**
  - **they are in much smaller firms**

- **Organizational choice based on establishment size s, revenue R, production cost C, other legal/regulatory cost X, fine φ, bribe β, corporate income tax rate τ and public infrastructure benefit g (Liao-Wang-Wang 2023):**
  - **informal firm profit: $\Pi(s; 0) = (1-\beta-\varphi)[R(s) - C(s)]$**
  - **formal firm profit: $\Pi(s; 1) = (1-\tau)[R(s) - (1-g)C(s) - X]$**



informal formal

- **larger firms are more willing to be legalized (fixed cost X less important)**
- **higher tax, lower infrastructure benefit and more legal/regulatory costs all encourage firms to become informal**
- **costly bribes and higher fines discourage informality**

L. Human Capital Policy in Developing Countries

- **Mandatory education: 6, 9 or 12 years of publicly provided education**
- **Vocational schools, particularly tech schools and commercial colleges**
- **Case studies:**
  - **Brazil (Narayan, Patel, Schafft, Rademacher, and Koch-Schulte 2000): low teacher salaries, insufficient schooling equipments/supplies, and corruption have wrecked incentive for quality education, with**
    - **teachers selling publicly provided textbooks and supplies**
    - **school officers receiving bribes from building construction and equipment purchases**
    - **both teachers and staff earning from secondary jobs**
    - **low school attendance without monitoring**
  - **Pakistan (Husain 1999): politicians dispense teaching positions as patronage, leading to:**
    - **large fractions of unqualified teachers with 75% failing to pass the exams taken by students**
    - **large-scale cheating at examinations supervised by those teachers**
    - **campus gangs, with high school students from rival religious fractions fighting on campus using AK-47s (more guns than textbooks)**

- Taiwan (Tallman-Wang 1994): thorough education reform were undertaken in the 1950s and 1960s, with
  - 1-12 public school teachers being required to pass nationally monitored qualification exams
  - 1-12 public school teachers being provided with good salaries, superior fringes (health and pension) and job security
  - county-level standardized tests for students to take for entry to junior high and senior high, and national university entrance exam
  - 1-9 mandatory education
  - strong tech, agricultural and commercial schools that were tied to related businesses
  - publicly provided job advertisement and training

- The race for global talents (Global Talents 2021, Oxford)