Symposium on Technology, Innovation and Inclusive Growth

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Science, Technology and Innovation (STI) for inclusive growth

- **Recent growth record**: not much **"trickle down"** nor effective **redistribution => high inequality**.

hence aim at,

- **Inclusive growth**: increase pie while **reducing inequality**
- Harness **STI** for **inclusive growth**: want innovation and its benefits **widely distributed** across sectors and occupations,

but instead,

- STI **concentrated** in few sectors and regions, ***and***
- **Educational gaps** interact with STI to increase inequality

Can policy make a difference?!

Policies for inclusive growth

Take unconventional approach (not the "Arrow-Solow…") – focus **on people** rather than on techs:

1. **Upgrade** large, growing **occupations**
2. Promote **human-enhancing** innovations
3. Improve **access** to digitized quasi-public goods

Have far reaching implications!

US civilian labor force 2014-24

source: BLS – projections for 2024

civilian labor force – millions				
Age	**2014**	**2024**	**change**	**% change**
Total	156	**164**	+8	+5%
16 - 24	21	18	-3	**-13%**
25 - 54	101	105	+4	+4%
55 +	34	41	+7	**+20%**

Slow growth of labor force in coming decade, dramatic change in age composition!

Sectoral composition of labor force 2014-24

source: BLS – projections for 2024

employment by major sector – millions				
	millions			Percentage growth
Sector	2014	2024	change	
Goods producing	19	19	~	~0%
Services	**121**	**130** *(80%)*	**+ 9.3**	**+7%**
of which Health care & social assistance	18	**22 (14%)**	**+ 3.8**	**+20%**
Other	10	11	+ 0.5	+1
Total	**151**	**160**	**+ 9.8**	**+6%**

Educational requirements and wages of growing occupations

- Of **15** occupations with largest ***absolute*** growth 2014-24:
  - **5** in **health and personal care** (personal care aides, home health aides, home health nurses, etc.) **1.6 million new jobs!**
  - **11 no formal educational** credential or **high school** diploma
  - **11** with wages ***lower*** than median ($35,540)

home health aides*: *350,000* new jobs, *no educational* credential, wage *$21K

- Of **15** occupations with largest ***percentage*** growth 2014-24:
  - **9** in health and personal care, just **220K new jobs, plus**
  - **10 Bachelor's degree** or higher, or some college
  - **11** with wages ***higher*** than median ($35,540)

- Of **10** highest paying occupations, **9 in medicine** (the 10th: CEOs)

Inclusive growth – how to go about it?

- For **inclusive growth**: upgrade large, growing **occupations**
- All in services, most in **health and personal care** (HPC)
- Growth in **HPC** mostly driven by demand:
  - increased **longevity** & population **aging**
  - high **demand elasticity** for health care and "quality of life"
  - **health insurance reform** increases access
- At present most occupations in HPC: require **little training** and educational requirements, very **low wages**

focus on workers & occupations, rather than on technologies or sectors

Upgrading occupations for inclusive growth:
Policy steps

Not the classic **"do more"** - more R&D, more "hot fields", more college degrees,

but instead,

- **Professionalization** of **large, growing occupations**, particularly in **health and education** (quasi public goods)
- Design **comprehensive policies** for them, derive job and **training requirements**
- Provide for **tertiary education** and **academic** infrastructure
- **Expose** newly empowered & trained workers **to STI** – they (and others) will seek there opportunities to **innovate**!

Upgrading occupations for inclusive growth: history-dependent

Pay, content of occupations depend upon history, state of the art, policy:

- **Physicians,** surgeons and apothecaries:
  - until **early 19th century:** low pay and status among "trades"
  - gradual improvement as discipline **more scientific**
  - huge jump up since 2nd WW

- **Nurses:**
  - by **1946** wages just **1/3** of female workers in garment industry!
  - The ***Nurse Training Act of 1964*** upgraded curriculum, required academic degrees. **Salaries went up**, more **specialization** and administrative roles for nurses.
  - Since then: medical **innovation** further improved status and pay

Upgrading occupations for inclusive growth:

example: early childhood education (ECE)

- **ECE** – birth to age 6, most important birth to age 3:
  - Still family homecare (unpriced), nannies, private child care
  - Very low pay, little EDU required – call it the **"diaper care"**

- Large volume of **research**: most important **development** stage, determines future of individual, "equality of opportunity"

- Key for early **detection** & effective treatment of conditions - learning disabilities, "spectrum", ADD/ADHD; expensive in short run, big benefits later

- Need **professionalization of ECE** – training, certification etc. Then deploy **STI** (e.g. cloud applications to detect conditions) - need policy!!!

- ***Very similar for elderly care***

Policy sum-up

Inclusive growth requires,

- **Upgrade people and occupations,** what they do and need to know
- Focus on **quality** of services provided, not on quantity – but **hard to measure**, not necessarily shows up as growth!
- **Harness STI to serve** those purposes

Policies for inclusive growth II: promote human enhancing innovations - HEI

- HEI: innovations that **magnify, enhance and extend** sensory, analytical and problem solving capabilities (not "input saving")

examples of HEI's:

- **in medicine**: **AI** applications for diagnostics; new imaging devices for minimally invasive surgery – **better doctors!**
- **in education**: **AI** to track **individual progress** of pupils, tailor tasks to foster their development – **better teachers!**
- HEI's can unleash newly found **human creativity**

- Many innovations do **the opposite** – see **Walmart**: turn workers into **unthinking automatons**, **TFP up** but more inequality, *"exclusive"* growth!

HEI's can be great equalizers, within and between occupations!

Policy for inclusive growth III: enabling access

- Lots of **benefits from innovation & digitization** from **access** to unpriced "quasi public goods" privately provided – search, networks such as Google, Facebook, WhatsApp, etc.
- **Access is great equalizer => m**ake them **universally available** (more equality with same income distribution, like public parks…),
- Access key for widely distributed **innovation opportunities**
- **Access** services using digital platforms e.g. telemedicine, **MOOCS**
- Render geographic and socio-economic **location less important** to access benefits

Policy for inclusive growth: yes, but what kind of "growth"?

- de-emphasize **GDP growth** as measured, turning irrelevant!
- same with **inequality** just of income: issue **not** just how to distribute more equally given goods and services, but equity in participation!
- Focus instead on **wellbeing,** happiness, satisfaction human development, sense of purpose, fulfillment, quality of life.
- **Equity** in access to the possibility of enjoying human enhancement innovations.

Thanks!

We live in a rapidly changing world,
hence to innovate is to survive…

Employment in services 2014-24

source: BLS – projections for 2024

employment in 5 largest service sectors – millions				
Sector	**2014**	**2024**	**change**	**% change**
Health care & social assistance	18	**22**	**3.8**	**20%**
Professional and business	19	21	1.9	10%
State and local government	19	20	0.8	4%
Retail trade	15	16	0.7	5%
Leisure & hospitality	15	16	1.0	6%
Total top 5	86 *(71%)*	95 *(73%)*	+9.0 *(97%)*	10%
All services	121	130	+9.3	+7%

Health care & social assistance:
largest and fastest growing sector - 14% of total!

5 Occupations with largest growth 2014-24

source: BLS – projections for 2024

Top 3 in Health Care

Occupations with largest absolute growth 2014-24 (thousands)				
Occupation	**2014**	**2024**	**change**	**% change**
Personal care aides	1,770	2,230	460	+26%
Registered nurses	2,750	3,190	440	+16%
Home health aides	910	105	348	+38%
Food preparation & serving	3,160	3,500	344	+11%
Retail salespersons	4,630	4,940	314	+7%

All in Health Care!

Occupations with largest percentage growth 2014-24*				
Occupation	**2014**	**2024**	**change**	**% change**
Occupational therapy assistants	33	47	14	43%
Physical therapy assistants	79	111	32	41%
Physical therapists aides	50	70	20	39%
Home health aides	910	105	348	38%
Nurse practitioners	127	172	45	35%

* With more than 1/10000 of labor workforce in services