

Fourth Industrial Revolution and The Macro Economy: Challenges and Opportunities

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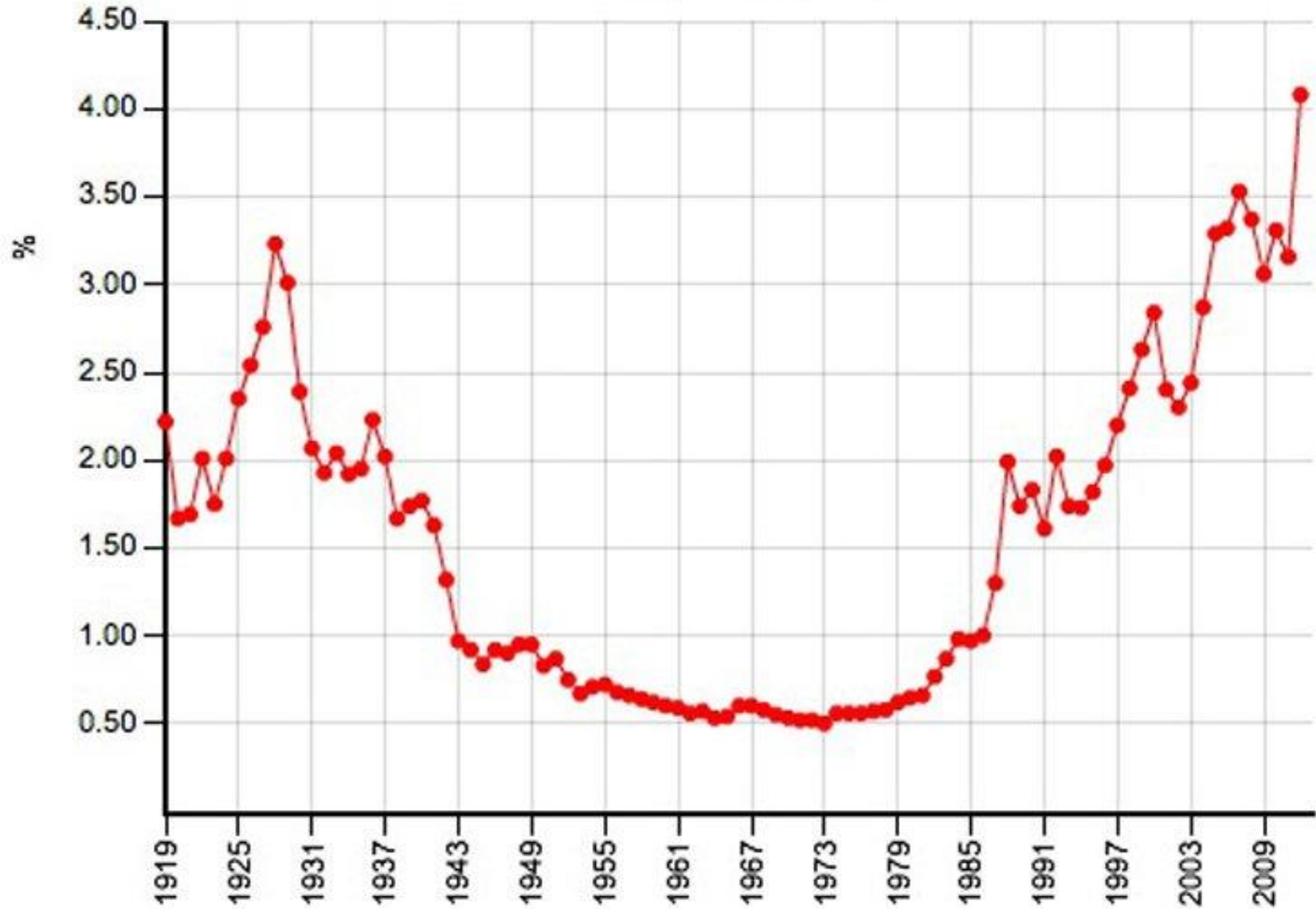
Seoul, June 28th, 2017

3 Macro Trends

- 1. Declining real interest rates –secular stagnation (Summers 2013)
- 2. Rising Inequality
- 3. Job Polarization

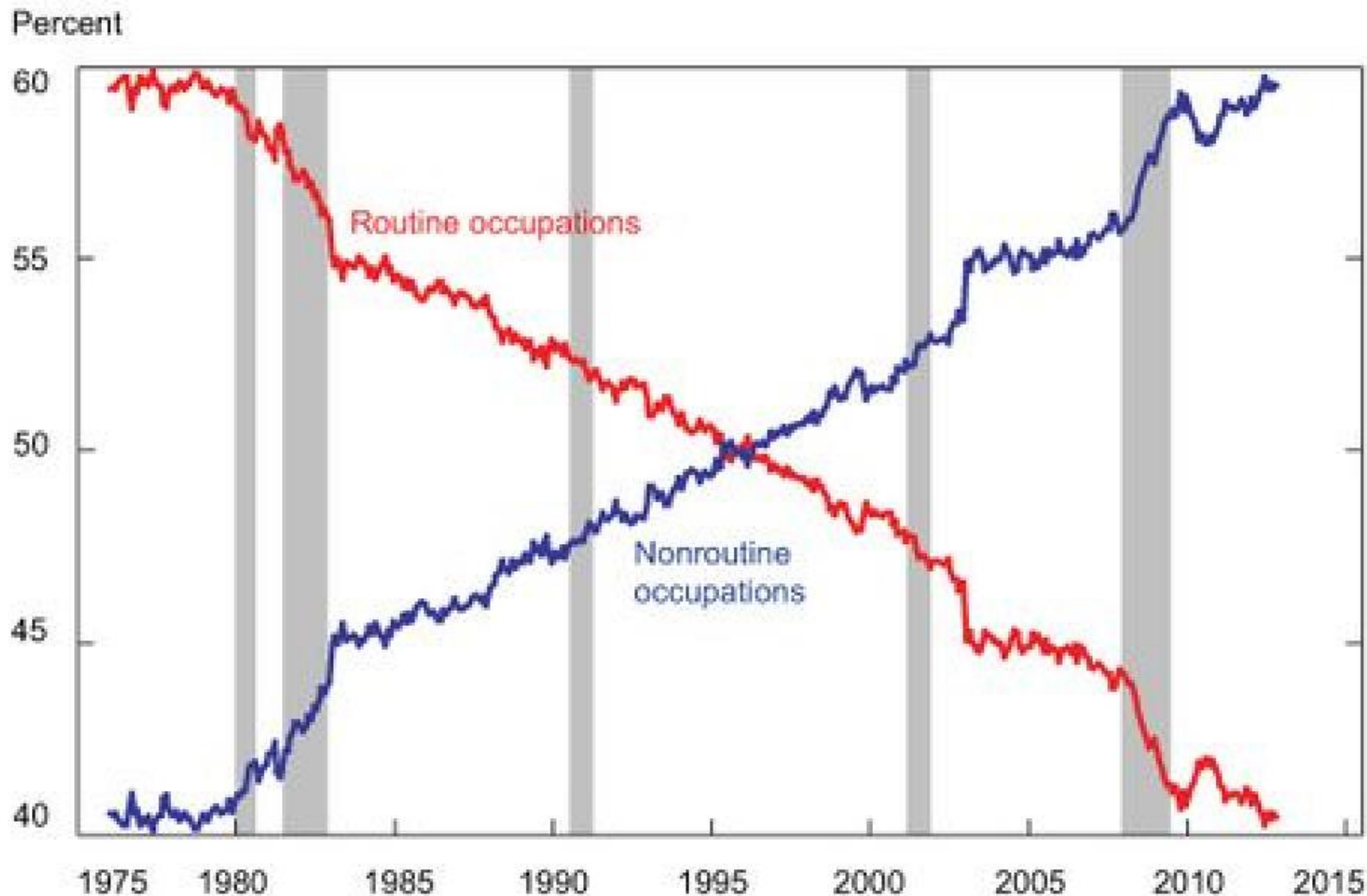
Top income shares. United States. 1919-2012

Sources: The World Top Incomes Database. <http://topincomes.g-mond.parisschoolofeconomics.eu/>
Piketty & Saez (2007)



Top 0.01% income share

Employment Share

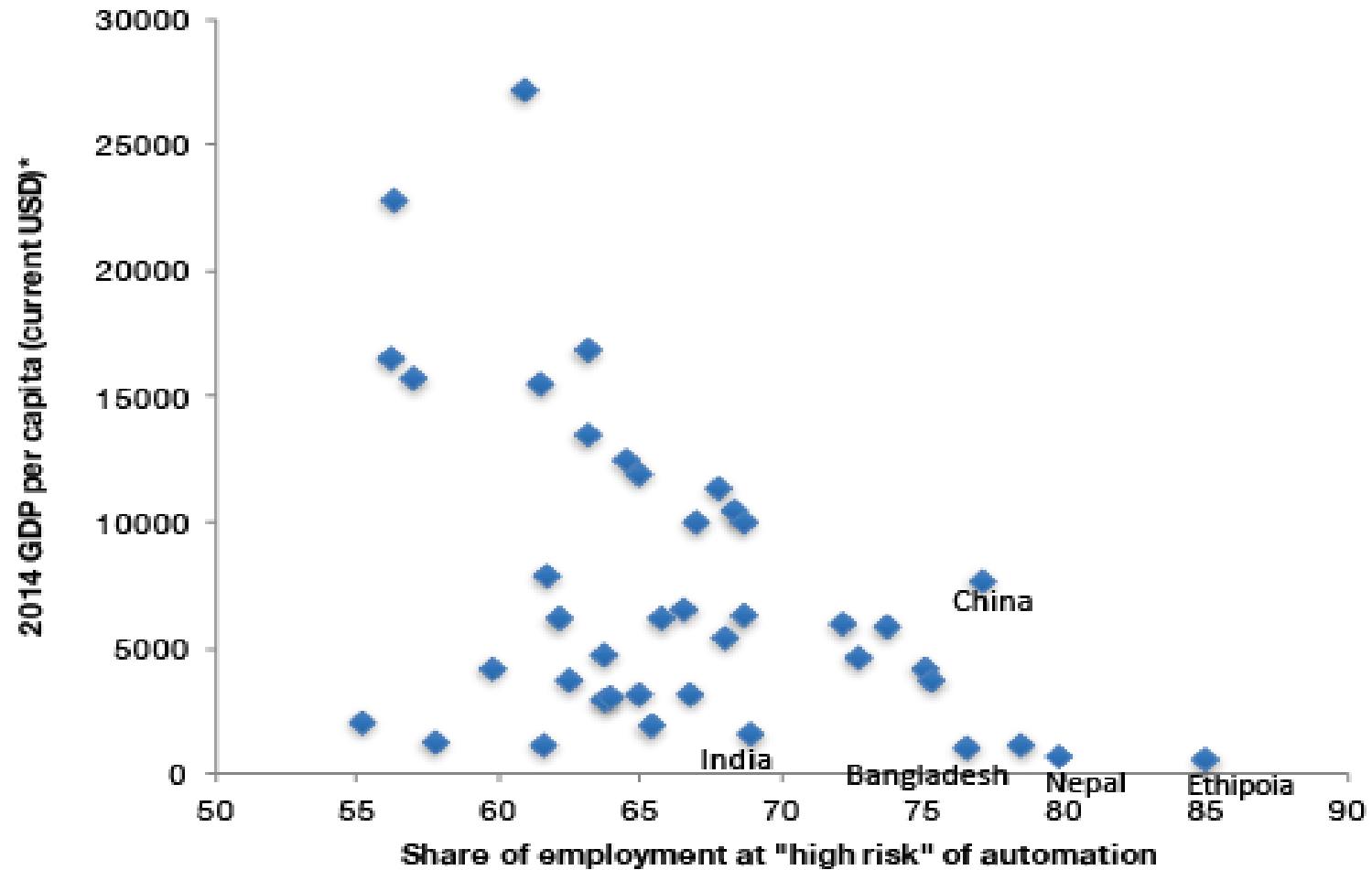


Source: U.S. Census Bureau, Current Population Survey.

Note: The bands indicate recessions as defined by the National Bureau of Economic Research.

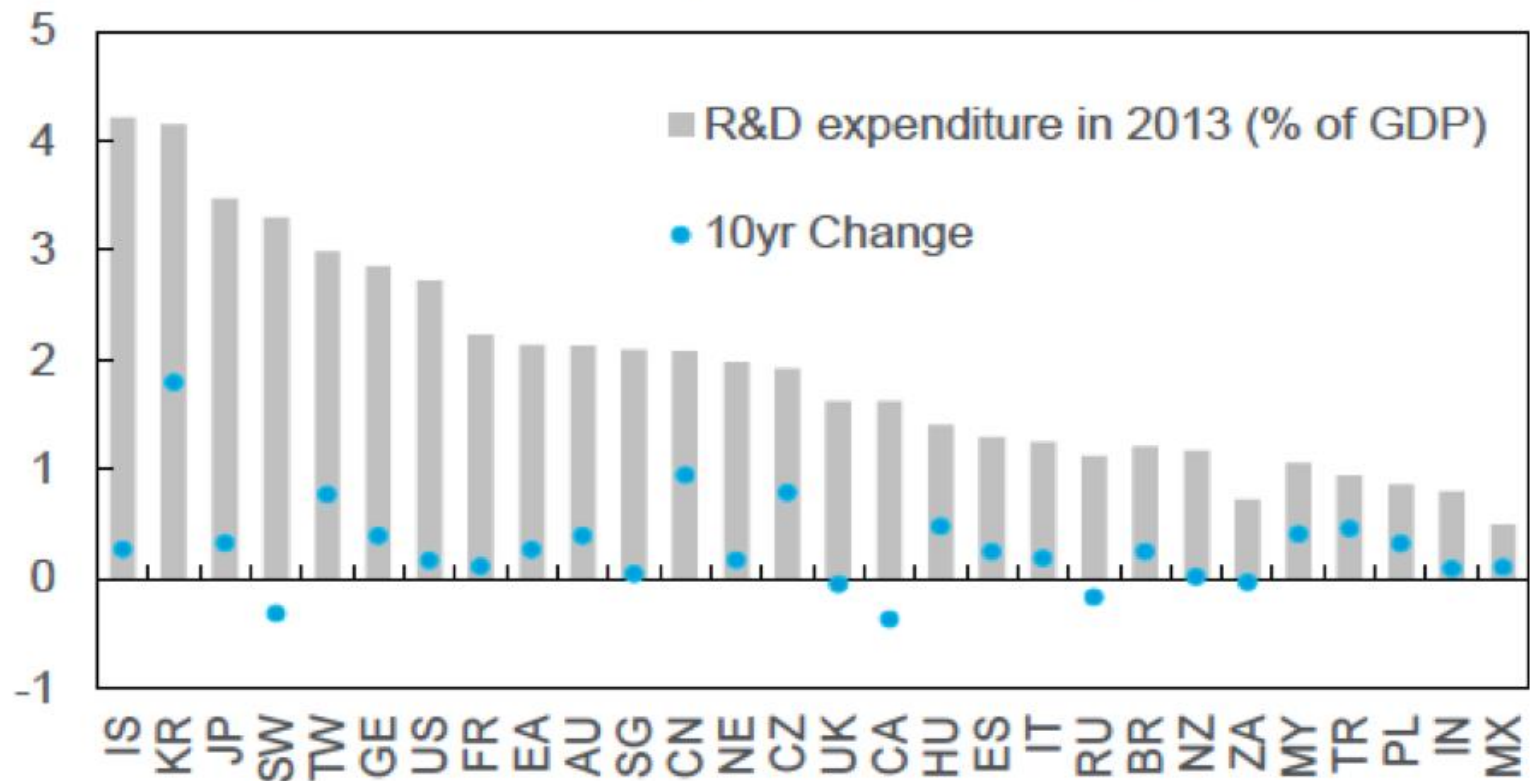
**1. TECHNOLOGY AND THE MACRO
ECONOMY:
THE MISSING MIDDLE CLASS**

Poorer countries more susceptible to automation



(%, %p)

R&D expenditure (% of GDP)



Source: World Bank, OECD, Haver, Citi Research

2. NEW JOBS?

- New jobs are needed most in
 - in green sector (700,000 jobs in US) and industrial sector
 - Healthcare: 4 million new jobs needed in US between 2012-2022; EU 8 million jobs
 - IT sector : security analysts; data scientists; cloud architects; robotic engineers and technicians



Source: Cedefop, Citi Research

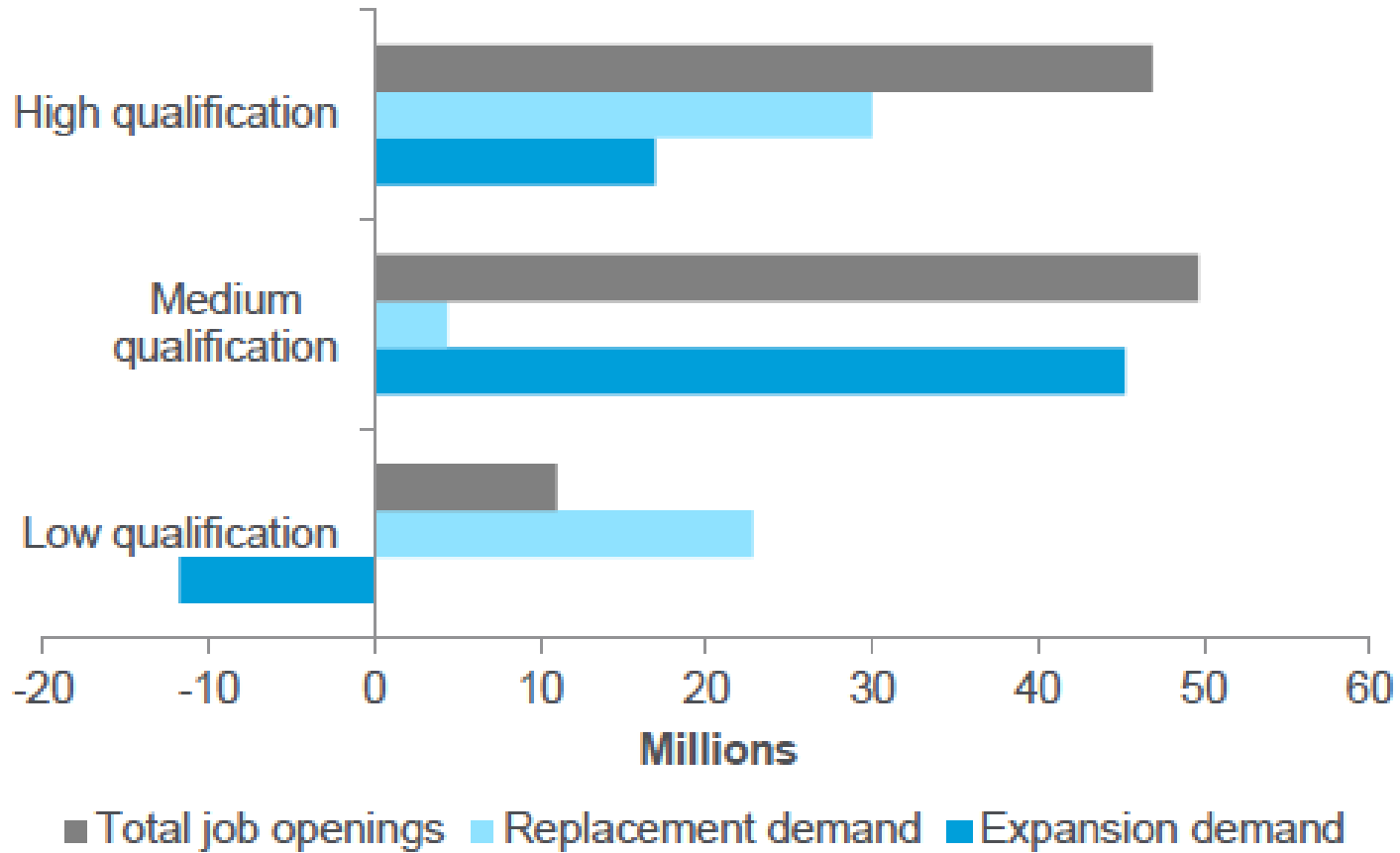
In the EU, it is estimated that there will be job openings in all sectors with additional jobs estimated at over 9.5 million and replacement jobs at 98 million between 2013 and 2025.

Employment in the IT Sector in the US in 2012 and Expected in 2022

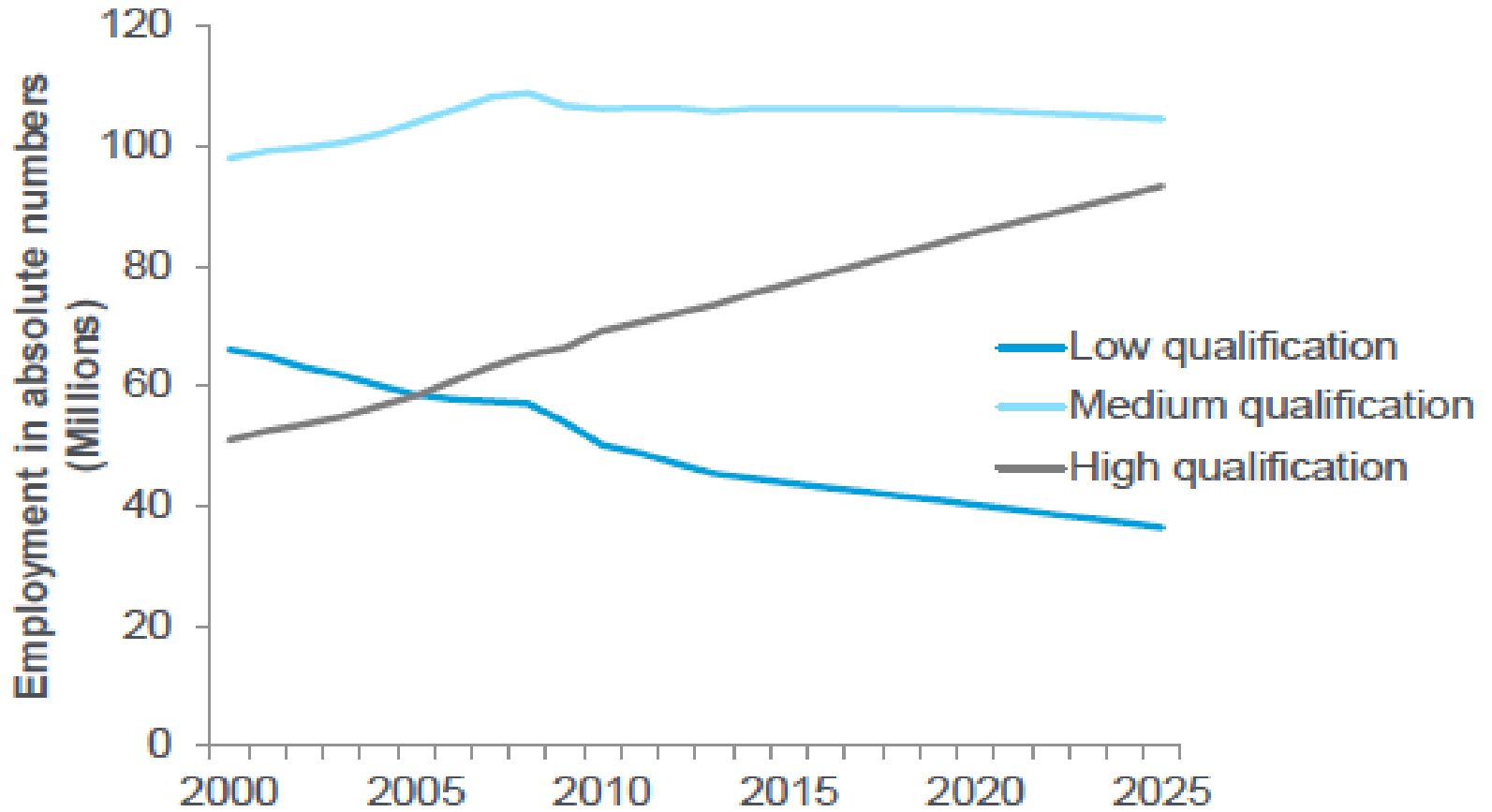
Title	Employment in 2012	Employment in 2022	Change % in 2012-2022
Information Security Analyst	75,100	102,000	37%
Computer System Analysts	520,600	648,400	25%
Software Developers	1,018,000	1,240,600	22%
Web Developers	141,400	169,900	20%
Computer Support Specialists	722,400	845,300	17%
Database Administrators	118,700	136,600	15%
Computer & Info Research Scientists	26,700	30,800	15%
Computer Network Architects	143,400	164,300	15%
Network Computer Systems Admin	366,400	409,400	12%
Computer Programmers	343,700	372,100	8%
Computer occupations (all other)	205,800	213,600	4%
Total	3,682,200	4,333,000	18%

Source: US Bureau of Labour Statistics, Citi Research

Skill and New Jobs

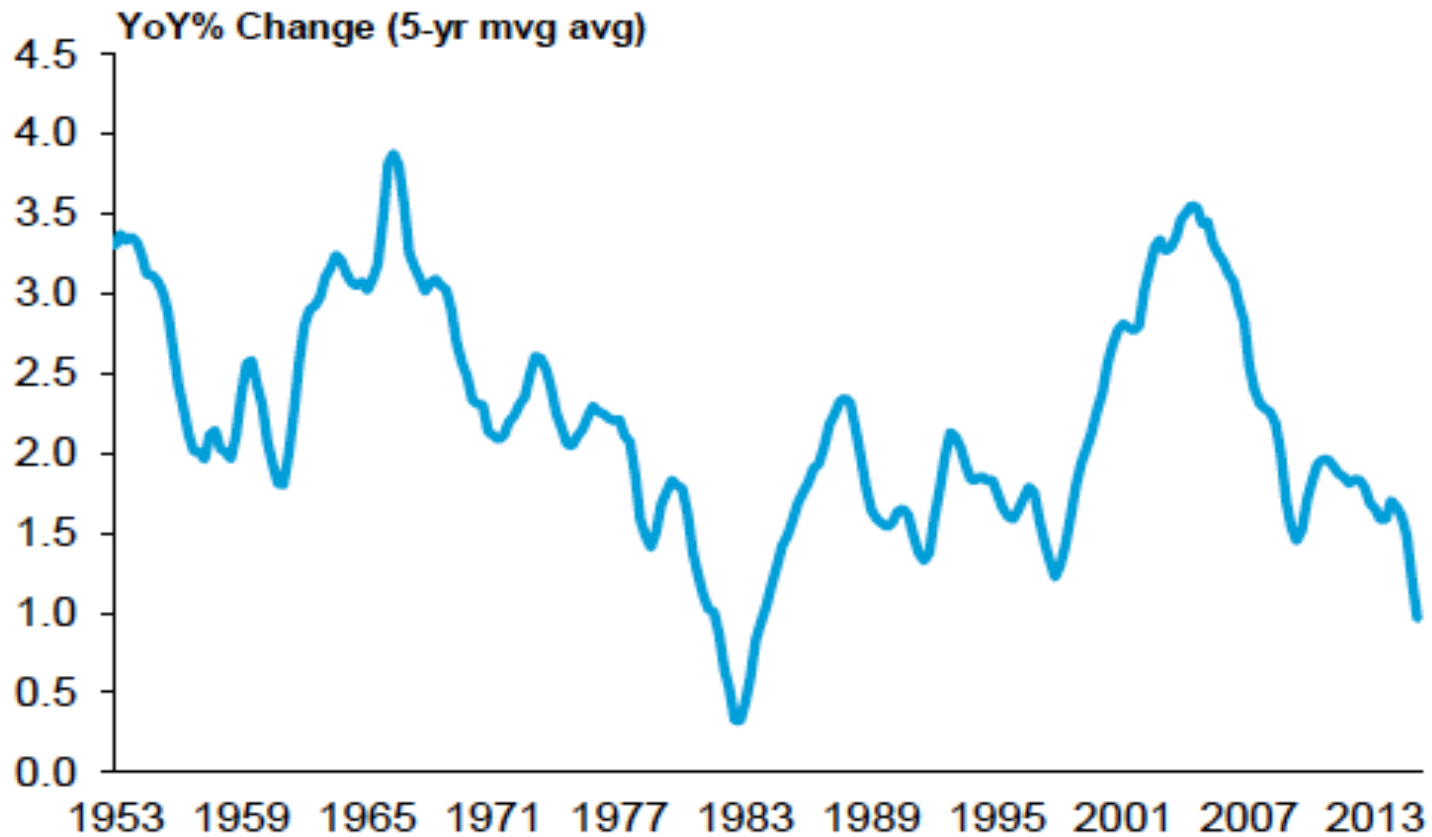


Employment in the EU (absolute numbers) by Qualification



Source: Cedefop, Citi Research

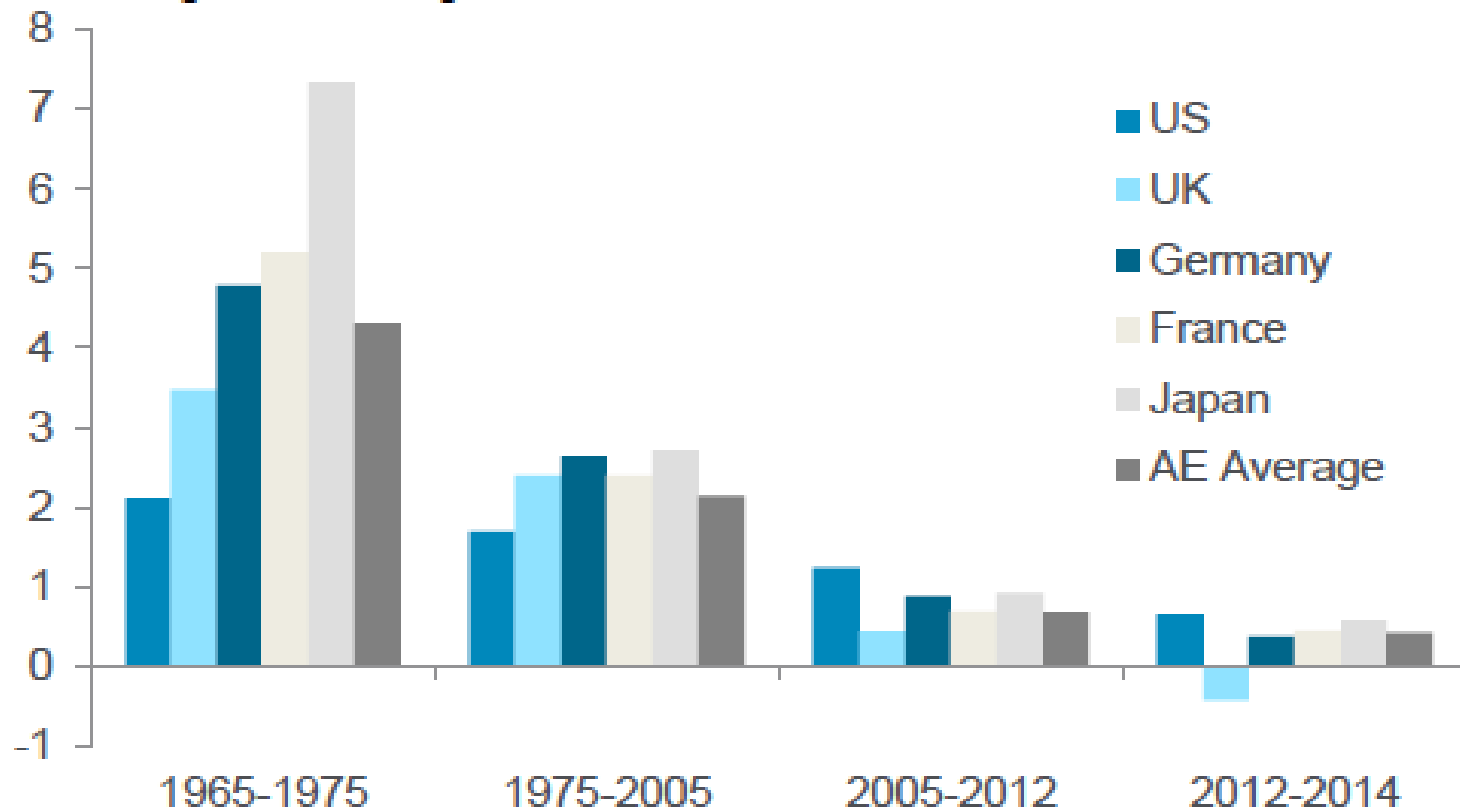
3. Productivity and Measurement



Note: Defined as real output per hour worked in the nonfarm business sector.

Source: BLS and Citi Research

Avg YoY % Change



4. CHINA : TECHNOLOGY AND GLOBAL IMPACT

Fintech Revolution

- Trend:
 - Consumers and SME turning to alternative providers for access to payments, credit, investment, insurance
 - 40% of Chinese consumers using alternative payment methods (4% in Singapore)
 - 35% using fintech to access insurance products (1-2% in Southeast Asian markets)

- Target

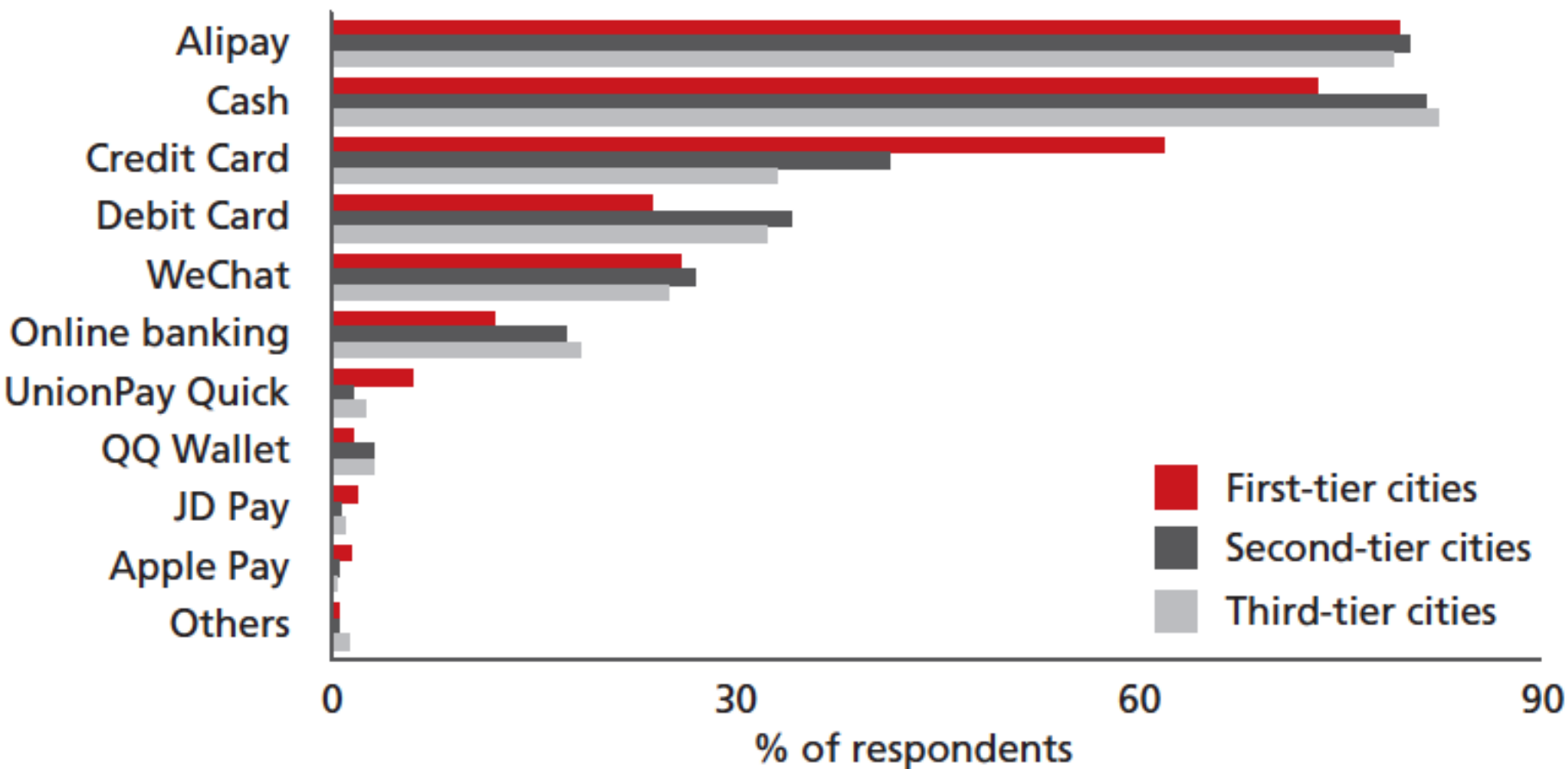
- Under-banked and unbanked SMEs and consumers
- Middle class for wealth management, insurance and private banking.
- BAT aggressively creating platforms to embed services into customers' lives
- Invest heavily in emerging technologies to support block chain and AI

Percentage of banking/financial services customers using FinTech services

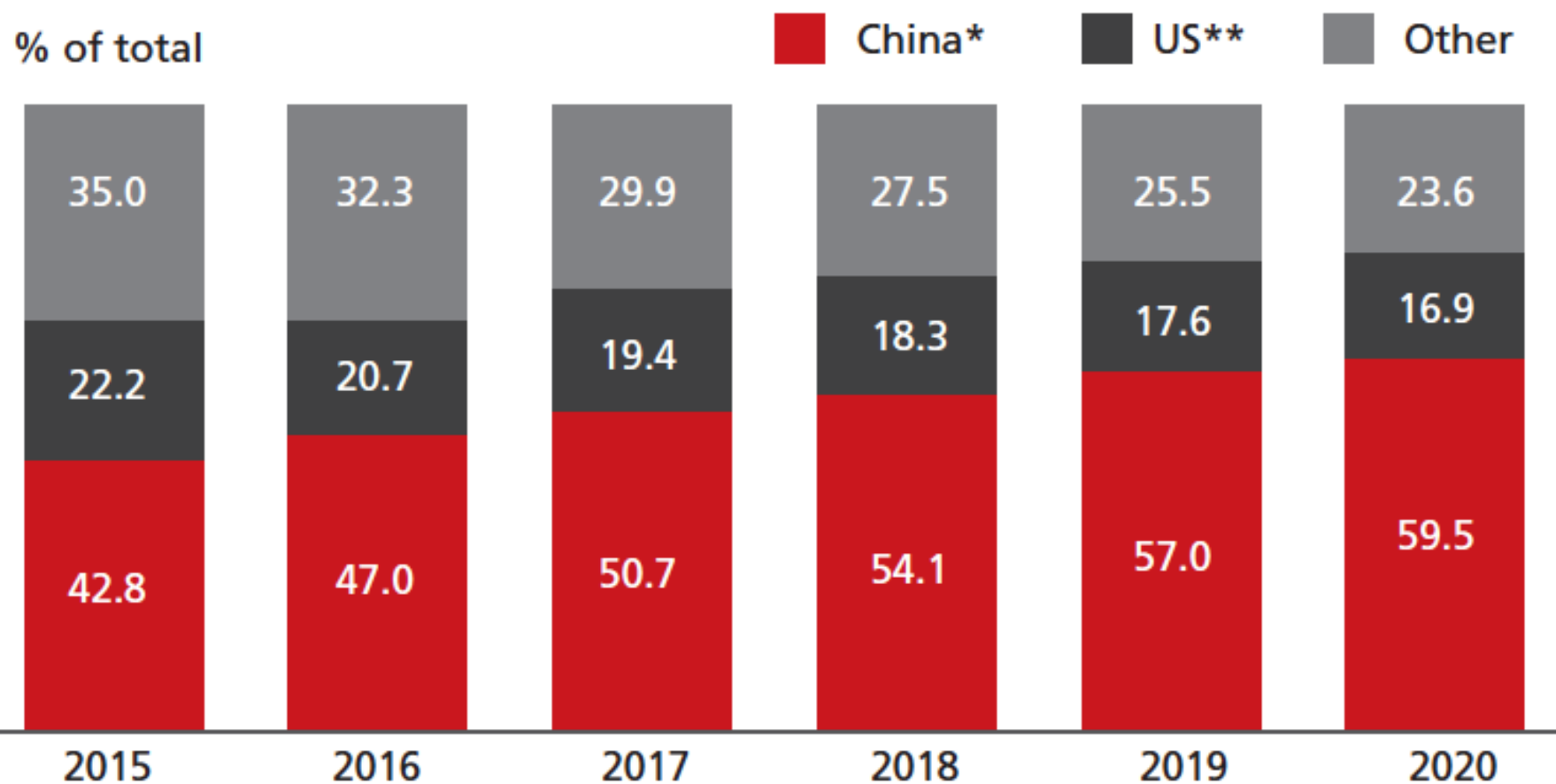
Service type	China	India	Singapore	Indonesia	Malaysia	Thailand
Payments/remittances	40%	20% ⁵	4%	1%	1%	1%
Lending	14%	5%	2%	2%	2%	2%
Personal wealth management	5%	3%	1%*	2%	1%	1%
Insurance	35%	2%	2%	1%	1%	1%



Payment method used most regularly the past 3 months



Share of global retail e-commerce sales



Source: eMarketer, August 2016

Chinese Global Companies

- Alibaba:
 - The Group is developing an international ecosystem that encompasses targeted marketing, logistics, payment services and cloud computing.
 - In Europe and the Americas, Alibaba intends to continually expand offerings to the expats and 120 million Chinese tourists who travel abroad annually.
 - Exposures into Southeast Asia

BAT

- Baidu:
 - extending its overseas service, Baidu Wallet in Asia
 - aggressive moves into several verticals outside its core search engine operations (O2O business for food-delivery, ticketing, and entertainment, Uber); plans to invest US\$3.2 billion more in 2015-2018

BAT

- Tencent:
 - Social media giant and WeChat owner investing and diversifying into hundreds of companies focused on gaming, mobile money and artificial intelligence.
 - Examples: a US\$90 million funding for Indian health-care information provider, Practo, US\$8.6 funding for Finnish game-maker, Supercell...
 - Massive investments in car-sharing apps

Challenges

- 1. Need to localize and adapt business models
- 2. Need to guarantee safety and security (trust issues)
- 3. Internationalization efforts should: provide technologies for advanced transaction processing capabilities; open up the global settlement network; breakdown international payment barriers; and enhance opportunities for these Chinese tech companies to transform financial services to a lifestyle product for consumers.

China Global Leadership?

- Will China's Growth Sustain?
- Will China take on leadership?
- What are the defining characteristics of the leadership?