

# How big is China's Digital Economy

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# Roadmap

1. Motivation
2. Internationally comparable measures of the digital economy
3. China's own steps towards measuring digital economy
4. Our own estimates
5. Conclusion

# 1. Motivation

# Why China's digital economy and its measurement is relevant

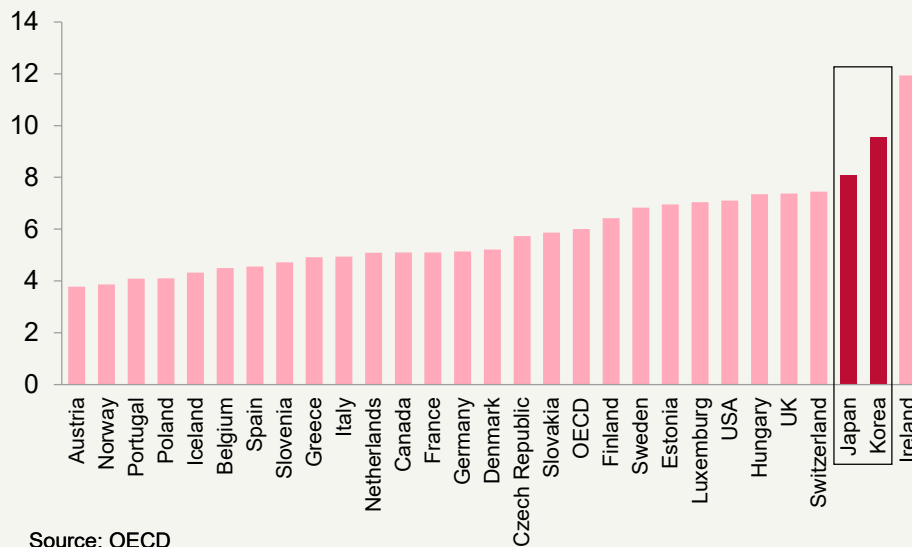
- Digital economy in China to showcase China's success in innovation
- Innovation key for growth for such aging economy with increasingly low return on assets
- **Hard to know how large is China's digital economy**
  - Some measures exist but hard to compare

Official source: NBS	Non-official source: Caixin
Digital Economy Index (as a subsection of a broader self-defined New Economy Index)	Caixin Digital Economy Index

# Internationally comparable measures of digital economy

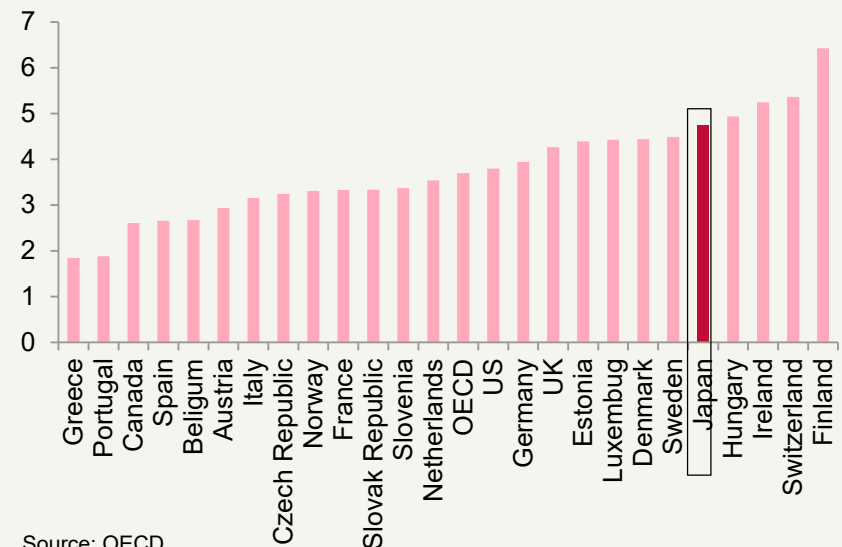
# Japan and South Korea stand out but no full information on China

Value added of digital economy, % of total (2012)



Source: OECD

Employment in the ICT sector % of total (2012)

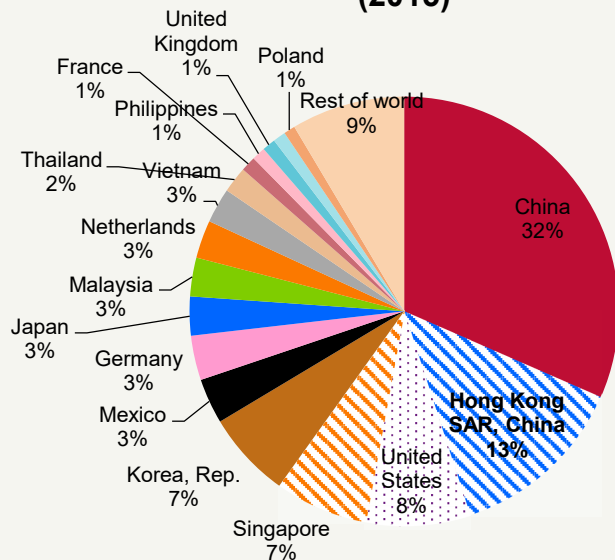


Source: OECD

# Clues on China from international comparisons:

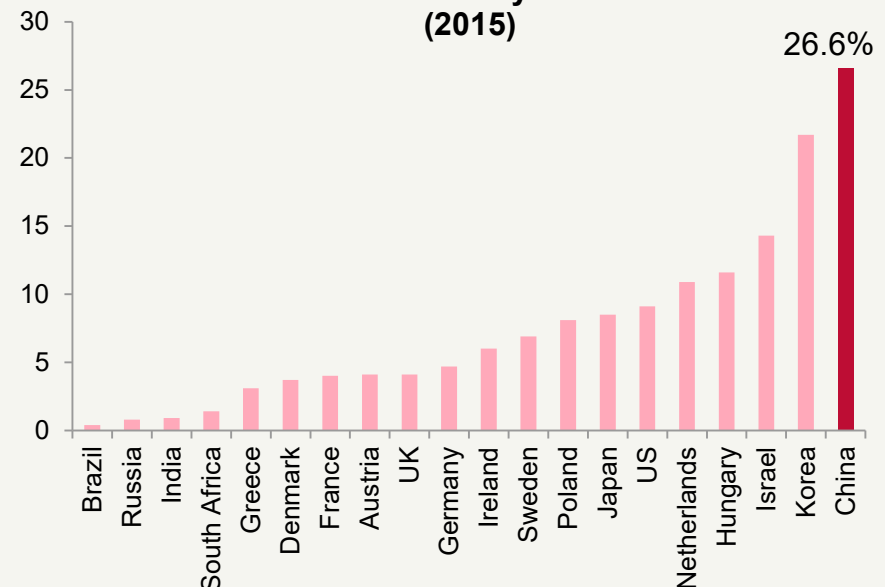
## 1. China clearly stands out for relative relevance of exports of ICT goods

**ICT goods exports % of world total ICT goods exports (2015)**



Source: WDI

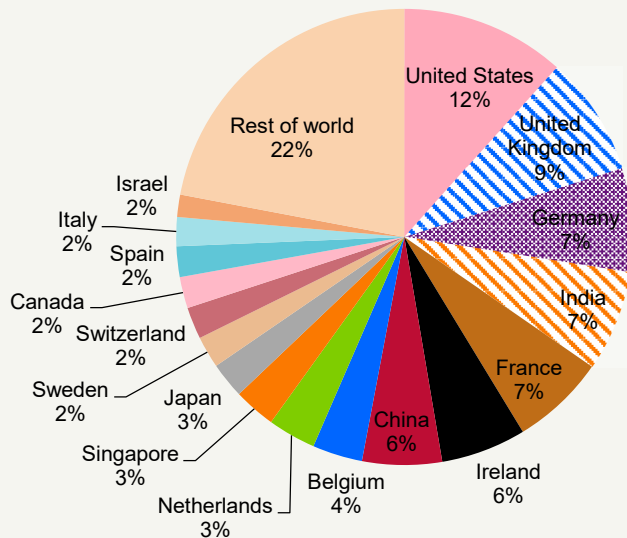
**ICT goods exports % of the country's total goods exports by country (2015)**



Source: WDI

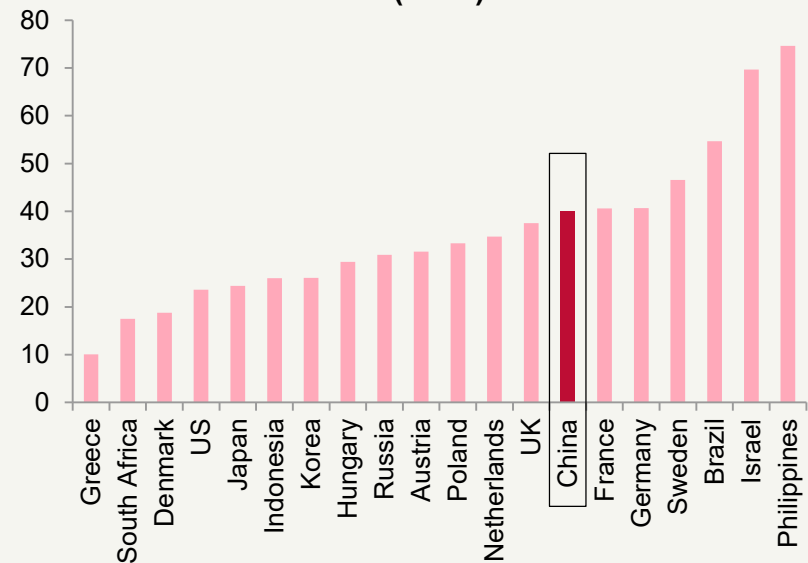
## 2. This is less the case for exports of ICT services

**ICT service exports % of world total ICT service exports (2015)**



Source: OECD

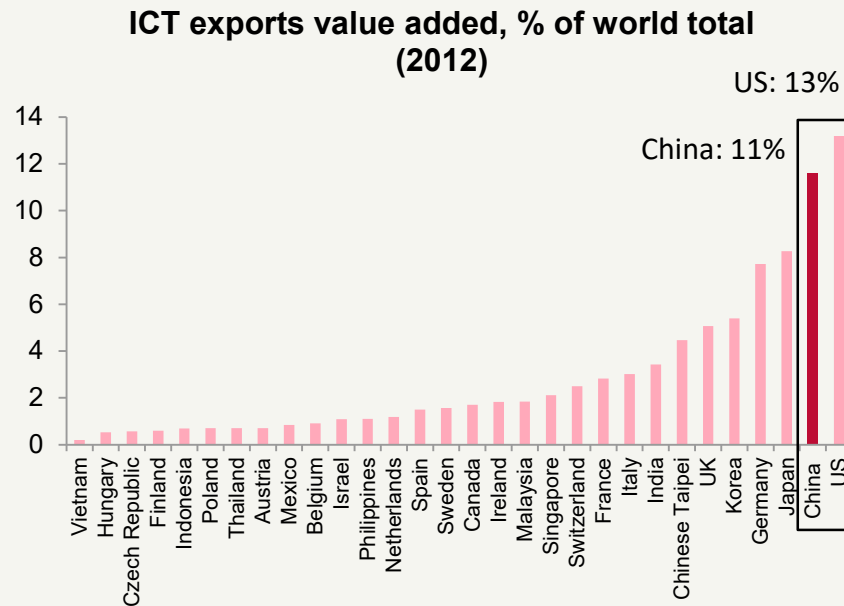
**ICT services exports % of total services exports by country (2015)**



Source: WB



### 3. When we move to value added, China's ICT exports still very large in relative terms but below US



Source: OECD

# China's own steps towards measuring its digital economy

Official (NBS) and private (CAIXIN) sector efforts

# Official measurement has moved from a general definition to a broad measure of "New Economy"

- **China's push for common definition of digital economy (G20 IMF-OECD task force):**  
Broad range of activities that include
  - *using digitalized information and knowledge* as key factor of production,
  - modern information networks as important activity space
  - *effective use of information and communication technology (ICT)* as driver of productivity growth
  - *Optimization* of economic structure
- National Bureau of Statistics (NBS) currently developing measure of "**New Economy**"
  - Corresponding to government's definition of strategically important sectors.
  - Sectoral based analysis + product based analysis
  - Only internal tests but not yet released officially

# Within "New Economy", narrower official measure of Digital Economy

- Last August, NBS released an index of China's digital economy.
- Five issues included:
  1. **internet broadband users**
  2. **mobile internet users**
  3. **mobile internet access traffic**
  4. **e-commerce transactions**
  5. **Share of online retail sales** over total retail sales
- *Official results point to annual growth of digital economy close to 40% in the course of 2015.*
- While relevant to estimate growth of key aspects of digital economy, such index does not cover all aspects of digital economy nor can it serve as a value-added measure comparable to other countries.

# From private sector, Caixin Digital Economy Index stands out

- Coverage: 2012 NBS Classification of Emerging Sectors of Strategic Importance, of which those related to digital are chosen for Caixin index
  1. **high-end software development**
  2. **new information technology services**
- Method: Standard production function estimation:  $Y = Af(K,L)$  using big data

Labor Input (weight: 40%)	Capital Input (weight: 40%)	Technology Innovation (weight: 30%)
1. Digital sector average wage relative to total social average wage  2. Position available in the digital sector relative to all positions available	1. Proportion of venture capital in the digital sector  2. Proportion of auction  3. Proportion of the firms' registered capital  4. Proportion of newly registered capital in the digital sector	1. Share of researchers in the digital sector  2. Share of new inventions and patents in digital sector  3. Patent conversion rate in digital sector

- **According to its index, the digital economy has experienced 176% increase from Jan. 2016 to Apr. 2017.**

# Comparison of international measurement of digital economy with NBS or Caixin index: not really possible

International Measurement (OECD/IMF)	China: Caixin Digital Economy Measurement	China: NBS Digital Economy Index Measurement
<b>Manufacturing activity:</b> <ol style="list-style-type: none"> <li>1. ISIC (Rev. 3.1) 3000 – Office, accounting and computing machinery</li> <li>2. ISIC (Rev. 3.1) 3130 – Insulated wire and cable</li> <li>3. ISIC (Rev. 3.1) 3210 – Electronic valves and tubes and other electronic components</li> <li>4. ISIC (Rev. 3.1) 3220 – Television and radio transmitters and apparatus for line telephony and line telegraphy</li> <li>5. ISIC (Rev. 3.1) 3230 – Television and radio receivers, sound or video recording or reproducing apparatus, and associated goods</li> <li>6. ISIC (Rev. 3.1) 3312 – Instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process equipment</li> <li>7. ISIC (Rev. 3.1) 3313 – Industrial process equipment</li> </ol> <b>Service activity:</b> <ol style="list-style-type: none"> <li>1. ISIC (Rev. 3.1) 5151 – Wholesale of computers, computer peripheral equipment and software</li> <li>2. ISIC (Rev. 3.1) 5152 - Wholesale of electronic and telecommunications parts and equipment</li> <li>3. ISIC (Rev. 3.1) 6420 - Telecommunications</li> <li>4. ISIC (Rev. 3.1) 7123 - Renting of office machinery and equipment (including computers)</li> <li>5. Computer and related activities.</li> </ol>	<p>CIC 6510 - Software development</p> <p>CIC 6520 - Information technology service activities</p> <p>(1) information integration, (2) information consulting (3) data store and processing (4) Digital game/movie and software service (5) client interactive service</p>	<ol style="list-style-type: none"> <li>1. Internet Broadband access users</li> <li>2. Mobile internet users</li> <li>3. Mobile internet access traffic</li> <li>4. e-commerce transaction</li> <li>5. The share online retail sales over total retail sales</li> </ol>

# Our attempt to estimate size of China's digital economy

# Data sources

- **Input-output table:**
  - Only data source that provides value-added information on narrowly defined sectors.
  - Drawback: 2012 is the latest available
- **Population Census:**
  - conducted every ten years (latest 2010)
  - Most reliable source to characterize employment activities in China at narrowly defined sectoral level
- Cross-sectional characteristic of the two data means that **we can only offer a static – and not too up to date – measure of China's digital economy.**



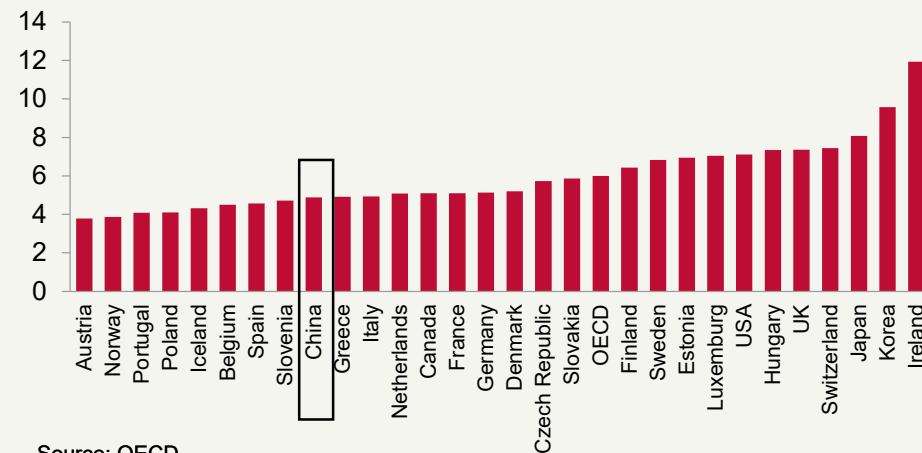
# Matching China's sectoral classification with that of OECD

## Method: sector-based analysis

Our classification for China	OECD definition for ICT
1. Culture and office machinery 2. Computer	1. ISIC (Rev. 3.1) 3000 – Office, accounting and computing machinery
3. Wire, cable and related apparatus	2. ISIC (Rev. 3.1) 3130 – Insulated wire and cable
4. Telecommunication devices	3. ISIC (Rev. 3.1) 3210 – Electronic valves and tubes and other electronic components
5. TV broadcast, radio and radar devices Video devices	4. ISIC (Rev. 3.1) 3220 – Television and radio transmitters and apparatus for line telephony and line telegraphy 5. ISIC (Rev. 3.1) 3230 – Television and radio receivers, sound or video recording or reproducing apparatus, and associated goods
6. Measurement devices	6. ISIC (Rev. 3.1) 3312 – Instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process equipment
7. Electronic process equipment	7. ISIC (Rev. 3.1) 3313 – Industrial process equipment
8. Electronic and telecommunication services	8. ISIC (Rev. 3.1) 5152 - Wholesale of electronic and telecommunications parts and equipment 9. ISIC (Rev. 3.1) 6420 – Telecommunications
9. Software and information technology services	10. ISIC (Rev. 3.1) 5151 – Wholesale of computers, computer peripheral equipment and software 11. ISIC (Rev. 3.1) 7123 - Renting of office machinery and equipment (including computers) 12. Computer and related activities.

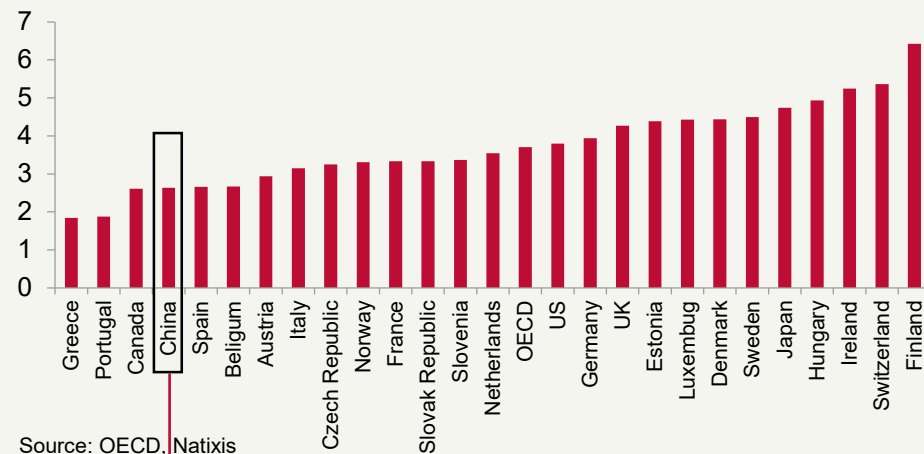
# ICT value added and ICT employment share below OECD average

Value added of digital economy, % of total  
(Including China)



Source: OECD

Employment in the ICT sector % of total

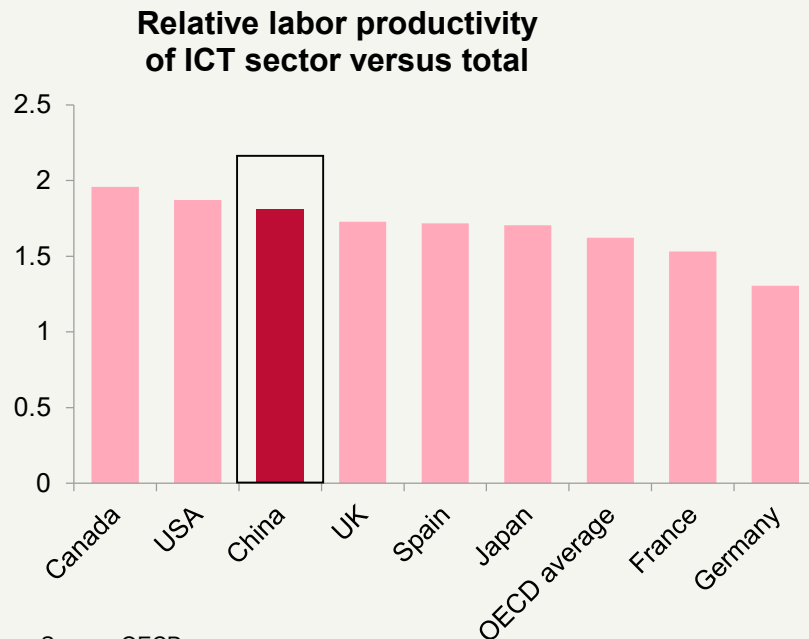


Source: OECD, Natixis

Reach 4.53% if only considers urban employment

# However, some positive aspects

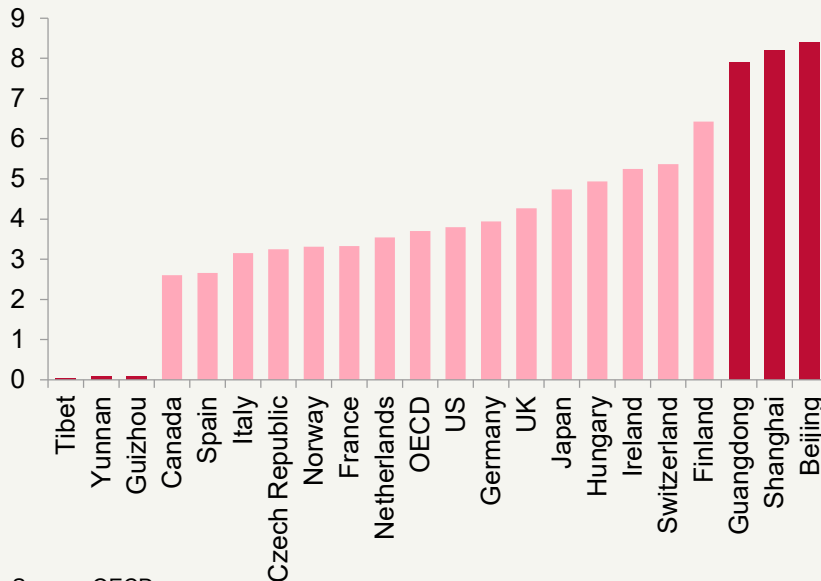
## 1. Relative labor productivity of ITC high



- We estimate China's labor productivity in the digital sector to be about **1.8 times higher than its average labor productivity** (that of OECD countries is only 1.6 times).
- *This points to digital economy contributing more to China's growth than an average OECD country. +*

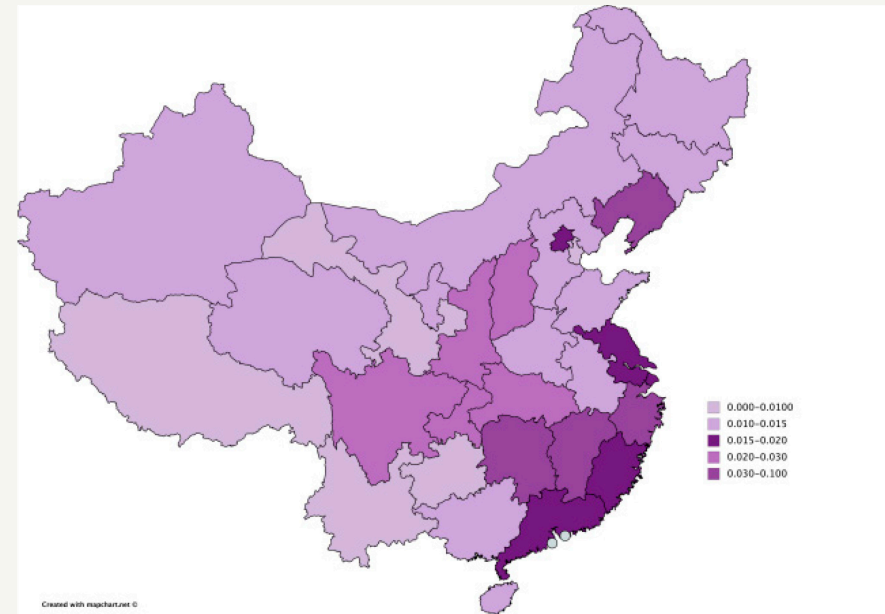
## 2. Provincial level data shows a much more positive picture for more developed regions

ICT share of employment



Source: OECD

Regional development of the digital sectors



# Conclusions

# What this paper does

- Reviews existing discussion on China's digital economy development
- briefly introduces China's official and private efforts to measure digital economy
- Proposes own estimate on size of China's digital economy, in value added and employment terms, so as to make it more comparable to international measures

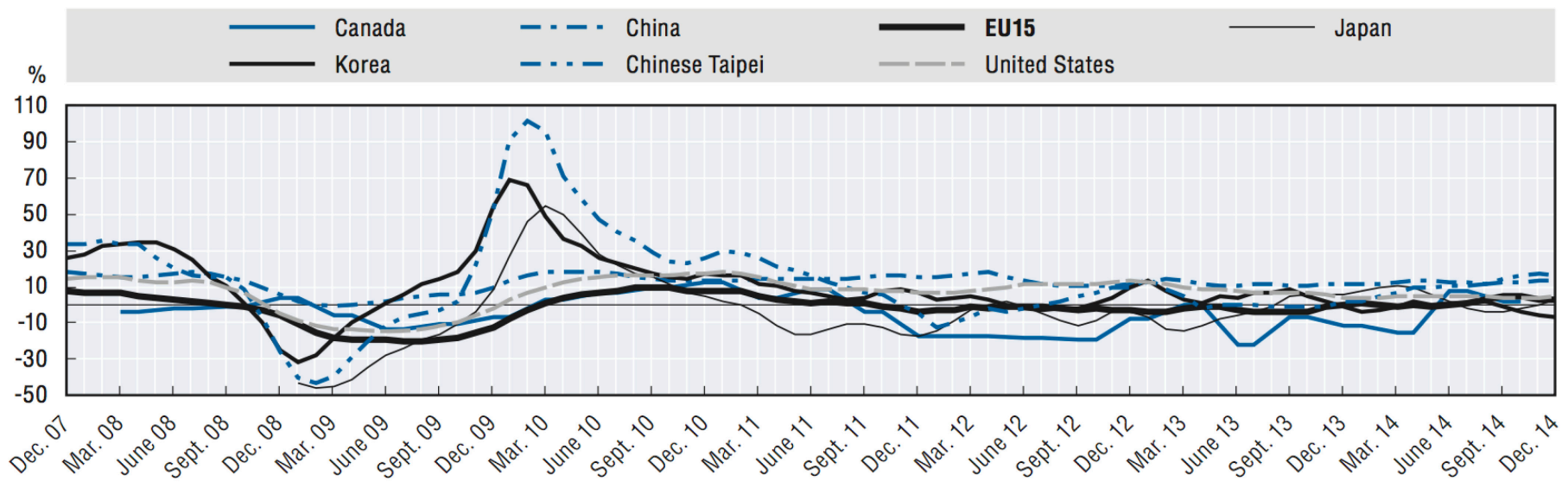
# Our findings

- Following ISIC standards as closely as possible, we find that the size of China's digital economy has been below the average of OECD's development, both in terms of value added and employment share.
- However, both international measures and our own estimates are somewhat outdated (2012) so China could have well moved further up in the rankings if the growth of China's digital economy has been faster than OECD average. NBS and Caixin estimates do point to a very rapid increase in digital sector and even international comparisons*

**Figure 2.1. Growth of the ICT sector, December 2007 – December 2014**

Year-on-year percentage change, three-month moving average

### A. ICT manufacturing output



# Also positive signals for real size of China's digital economy

- High labor productivity of digital sector

Digital sectors' relative labor productivity higher in China than OECD, which bodes well for China's potential growth as the digital economy grows in size.

- More developed provinces topping OECD rankings

Uneven distribution of ICT employment across regions. If spillovers from more developed to least developed sectors high, we should expect a much larger size of the digital economy in the future



Comments welcome  
Thank you!