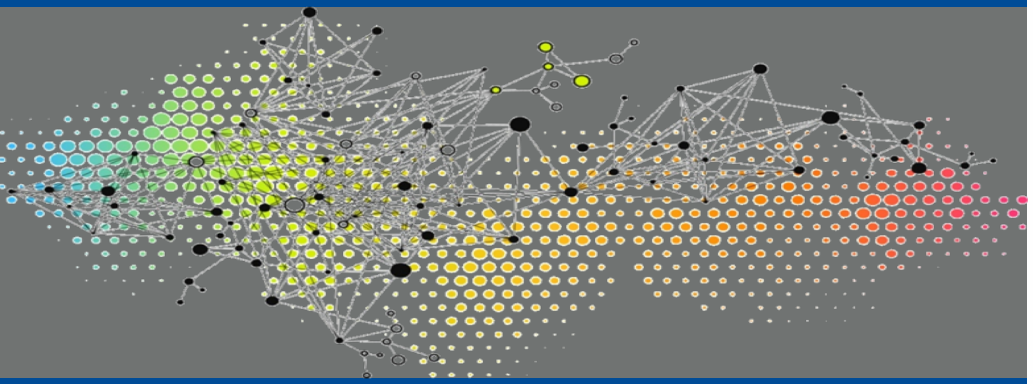

STATISTICS

Measuring the Digital Economy

THIRD STATISTICS CONFERENCE, CENTRAL BANK OF CHILE

OCTOBER 1, 2019

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Outline

- Debate over the Digital Economy and Measurement of Growth and Productivity
- Challenges in Measuring the Output of the Digital Sector
- Recommendations to compilers
- Conclusions
- Bonus: the Fund's Digital Strategy

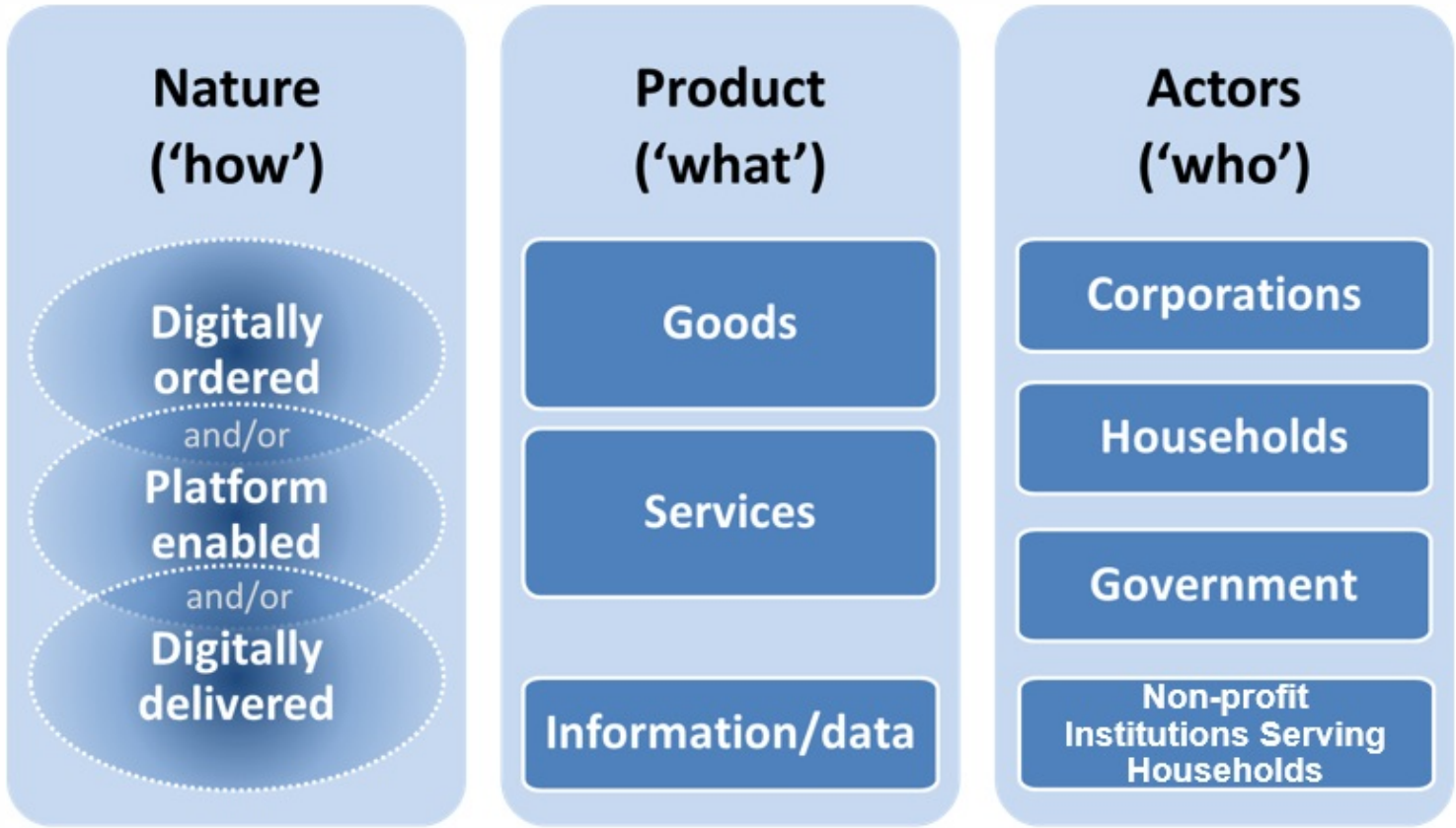
Digital economy: key questions / measurement challenges

1. Productivity growth slow down ➔ can it be due to mismeasurement of digital components of GDP—e.g., new products; new kinds of producers; access to new varieties and sources of supply; data?
2. Proliferation of free digital products: GPS, camera, music, videogames, alarm clock, translator, etc. integrated in smartphones; but also Wikipedia, Google services, Facebook ➔ they definitely increase household's welfare: are they correctly reflected in GDP?
3. Shift of production across borders and into the informal economy ➔ are we missing a significant chunk of what's going on in the economy?

Can mismeasurement of the digital economy explain the productivity slowdown?

- Let's first define the digital economy: covering all internet-enabled activities or transactions embodying digital technology would be impractical.
- Therefore, focus on "The digital sector":
  - Producers of ICT equipment and software, and ICT services
  - Internet platforms (or "online platforms")
  - Platform-enabled activities (the Sharing Economy, gig economy, …)

Dimensions of digital transactions



Source: Fortanier and Matei (2017).

Plausible Size of the Digital Sector: an example

Possible Size of the Digital Sector in the United States, 2015	
Product group	**Percent of GDP**
Included in GDP (on a value-added basis):	
ICT equipment, semiconductors and software	**2.8**
Telecommunication and Internet access services	**3.0**
Data processing, and other information services	**0.7**
Online platforms, including e-commerce platforms	**1.3**
Platform-enabled services, (e.g., the “sharing economy”)	**0.2**
Total	**8.0**

Source: STA Staff estimates based on official U.S. data, Nakamura, Samuels and Soloveichik (2017), Byrne, Corrado and Sichel (2017), and Guvenen *et al*. (2017)

What is GDP and what is not? Links between GDP and welfare

- Question: Can GDP be an indicator of welfare?
- Welfare growth can be measured but not welfare level ➔ direct link to GDP misleading (omits consumer surplus).
- GDP deflators can be used to measure welfare growth (via growth of household final consumption).

Economic Welfare *versus* market value

- GDP measures production at market prices.
- But current prices (determined by current consumption) do not reflect the level of economic welfare: diamond-water paradox.

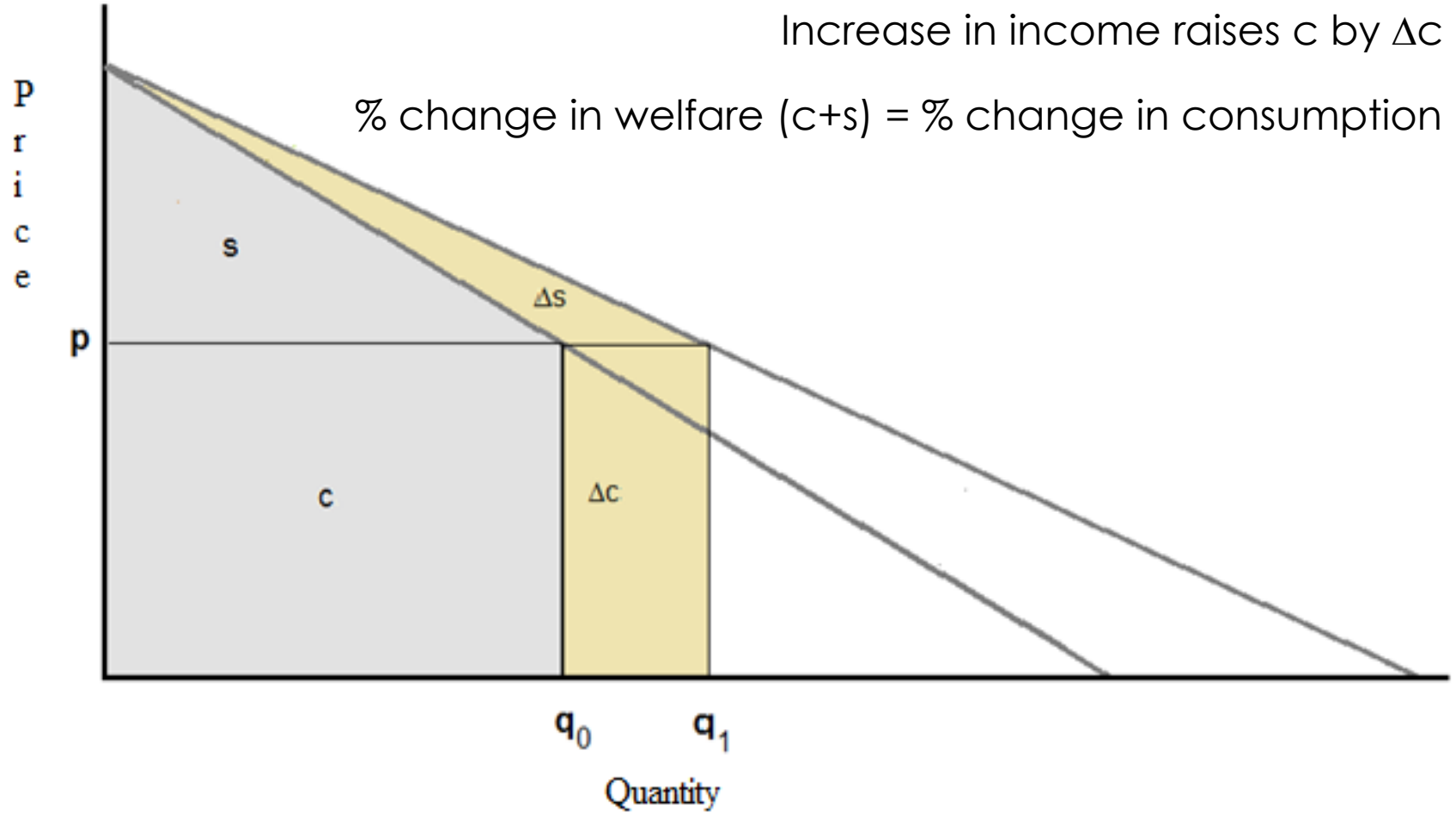
- Yet, prices are relevant for measuring welfare growth via volume indexes.

GDP (growth) can only be used as an indicator of welfare *growth*

c ≠ welfare because surplus s is omitted

Increase in income raises c by Δc

% change in welfare (c+s) = % change in consumption (c)



What is GDP and what is not? Valuation of free products/services

- Free products from market producers already (indirectly) included in nominal GDP (embedded in the price of smart phones or of the advertised products when free content is funded via advertising).
- Amending the definition of GDP to include (directly) the “value” of free products would require imputing income and expenditures.
- Transactions in which consumers receive imputed income from producers and use it to purchase the product adds the same amount to output, expenditures and income.

What is GDP and what is not? Valuation of free products/services

- But imputed expenditures don't create jobs, and imputed income of producers or consumers cannot be saved, taxed or spent on other things.
- Imputed income and expenditures would make GDP less suitable to answer policy questions about income, employment and government finances.
- Consequently, measuring how much people value free products could rather be measured through indicators beyond GDP (e.g., through questions like "How much are you willing to accept (get paid) for giving up XXX (e.g., Facebook) for one month")(*).

(*) Brynjolfsson et al. (2019)

What is GDP and what is not? Data as a Product and Asset

- In the digital economy, data has assumed new roles as a product and an asset (even called “the new oil”).
- Need to determine first whether data are produced.
- SNA includes databases in intellectual property products, but not cost of acquiring the data.
- Value of data could be measured by (a) costs, (b) market transactions if available, or (c) the present value of the projected income stream.
- Data as an asset or as an intermediate product may not be properly measured: some refinements in definitions and compilation practices may be needed.
- But avoid risks of double counting (data are “non rival”, i.e., usable repeatedly over time and space).

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Challenges in Measuring Current-Price Output

Emergence of the digital economy has created measurement challenges in all areas of economic and financial statistics.

Measurement issues affect:

- The rapidly growing, dynamic digital sector
- Software
- Online platforms and e-commerce
- ICT services

Balancing Supply and Use Tables (SUTs) helps to find and adjust for gaps in source data.

Rapid Growth of the Digital Sector

- In 5 years between US Economic Censuses, e-commerce doubled and platforms tripled.
- In southeast Asia, growth is even faster.

Source: gojek.io

Therefore, indicators for moving forward from the benchmark year may overlook new businesses or products ➔ What to do?

- Strengthen procedures for capturing births in the business register and in business surveys
- Expand use of administrative data (including tax data), and private data sets (e.g., on digital payments)
- Trade associations may have data on their industry
- Help wanted ads and other employment data were used to estimate size and growth of the “app economy” and to develop lists of local platforms in Indonesia and Vietnam

Software

For packaged software, investment can be measured by market transactions.

- Trend towards licenses for software as a service (SaaS) has complicated measurement.
- In principle the leases are not investment, but in practice may be impossible to distinguish: the more SaaS in the cloud substitute software on own equipment, the more investment may tend to disappear.

Custom software and own-account investment in software can be measured by cost of production, primarily compensation of coders/developers.

Online platforms and e-commerce

In principle, business surveys should collect data on platforms and e-commerce vendors.

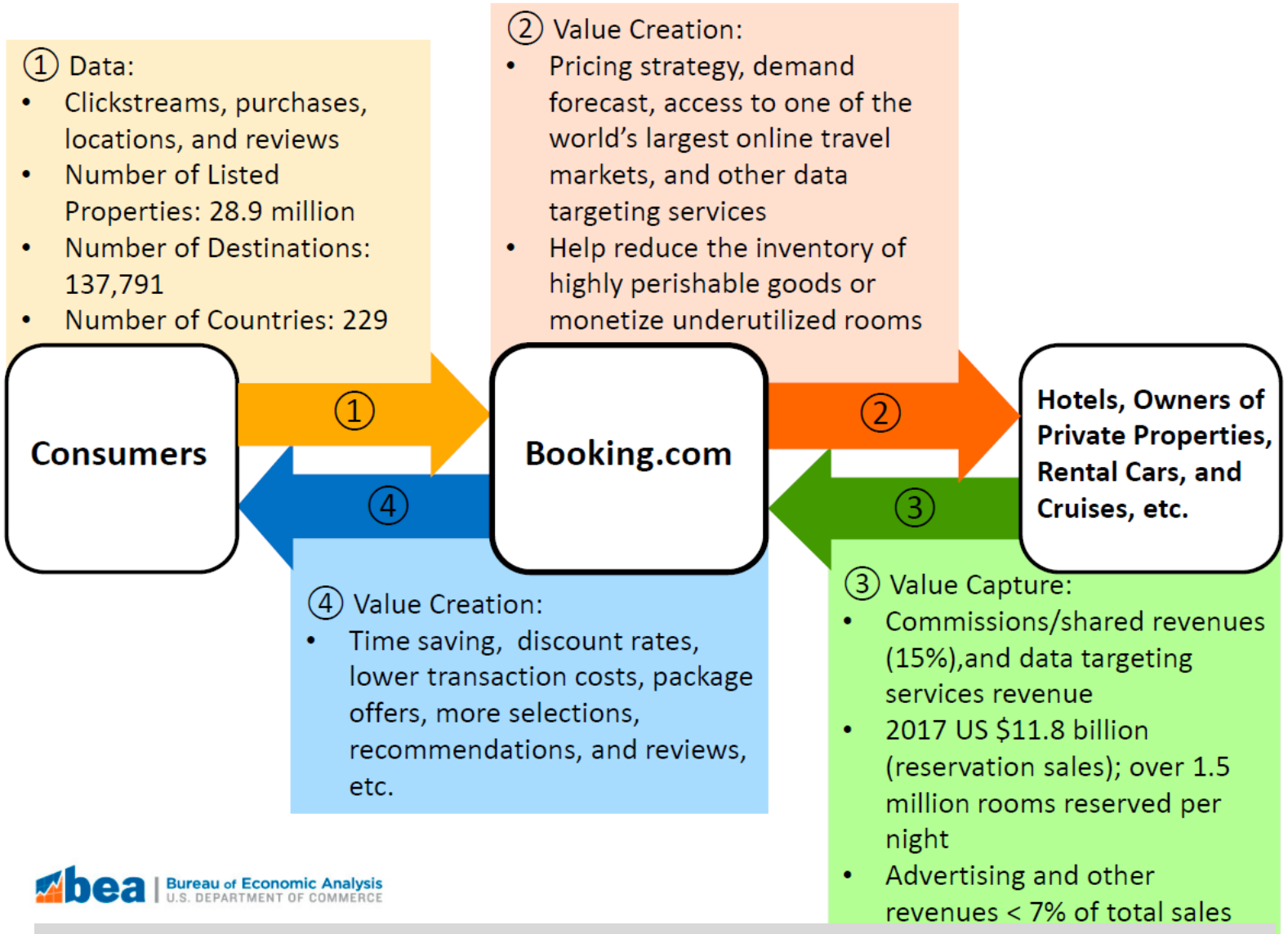
Platforms:

- Revenue comes from advertising, data sharing, and commissions/fees
- Platforms matching supply and demand often collect money on behalf of others – their output reflects money they keep

E-commerce:

- Has facilitated growth of small international transactions
- Output based on margins on goods sold
- Often estimated based on outdated ratios or even ignored; omissions greater on the import side

Example of an online platform



bea | Bureau of Economic Analysis U.S. DEPARTMENT OF COMMERCE

Source: Presentation by Wendy Li at 6th IMF Statistical Forum

ICT Services

- Growing/changing environment is a challenge ➔ Important to include new products and suppliers when measuring ICT services, incl. broadband internet service providers
- Telecom comps. potential source of data on e-money and mobile money payments
- Cloud computing poised to grow rapidly
  - Telecom companies very active (e.g., Alibaba has data centers in Indonesia; Amazon Web Services and Google Cloud have announced plans)
  - *Cloud computing displaces users' IT investment and increases the importance of easily overlooked own-account investment*
  - Accelerate dynamism by reducing fixed capital investment start-up costs
  - Challenge: location of *supplier* of cloud services can be ambiguous

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Recommendations to Compilers

GENERAL

- Sufficient resources to be devoted to measuring digital products and to developing indicators of the welfare effects of digitalization.
- Ease access to data by statistical compilers:
  - Sharing of administrative data across statistical agencies
  - Partnerships between private and public sectors—including international organizations—to get access to Big Data

Recommendations for Compilers

PRICES

- New digital products to be included in index compilation as soon as they become important.
- Focus on quality-adjusting a selective list of products drawing on similar work by other countries.
- IOs to develop compilation approaches fit for use by compilers facing severe resource and data sources constraints.

Recommendations for Compilers

NATIONAL ACCOUNTS

- National accounts compilers and price statisticians to work in partnership to align the composition of the deflators for digital products with that of the aggregates to be deflated.
- Ideally, use the same datasets containing prices and quantities to simultaneously calculate deflators and nominal values.

Recommendations for Compilers

EXTERNAL SECTOR STATISTICS

- Enhance data collection and/or develop methods for estimating:
  - Small transactions facilitated by digital ordering and delivery of services;
  - Cross-border services provided by, or through, online platforms; and
  - international payments via new kinds of digital channels, such as remittances via mobile money.

Recommendations for Compilers

MONETARY AND FINANCIAL STATISTICS

- Add marketplace lending platforms that lend their own funds to credit statistics, and report supplementary data on peer-to-peer lending; and
- Develop methods for compiling statistics on digital currencies

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Conclusions

- Free products and services in the digital economy raise conceptual questions, but the core framework of macroeconomic statistics remains valid.
- The level of GDP does not provide a measure of welfare. But GDP growth closely related to welfare growth.
- Possible digital mismeasurement of digital economy's growth (estimated at a maximum of 0.3 percentage points) does not explain the 1-2 percentage points of "missing growth".
- Refinements to the treatment of data as an asset/input—possibly including changes in the production boundary—should continue being discussed. The IMF keeps working on it.

Conclusions

- The current framework of macro statistics continue providing a sound portrait of economic reality, but has to be used for what it was designed.
- Many issues were already there (e-commerce, IPPs, SPEs, GVCs, etc.), but globalization and the raise of the digital economy have exacerbated them.
- Next generation of statistical manuals (SNA, BPM, GFSM, MFSM) should consider whether and where adjustments to current guidelines and/or supplementary accounts are necessary.
- Coordination across all macro statistics fields (specially between external sector statistics and national accounts) during the process becomes fundamental.

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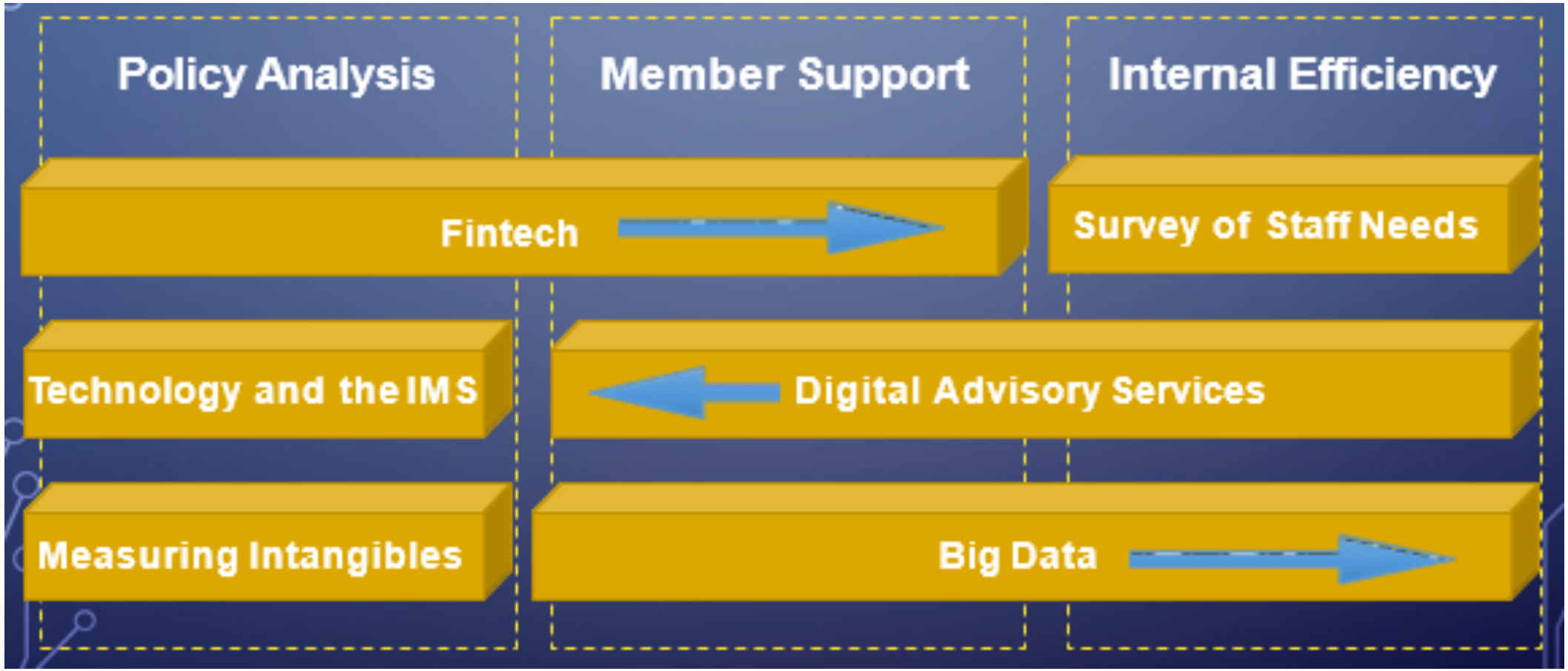
The Bali Fintech Agenda

Selected Fund work on the Digital Economy



Measuring Intangible Assets

Big Data Supporting Statistical Innovation

Several Fund-wide initiatives

- Big Data Community of Practice promoting knowledge sharing
- Data Collaboratives consortium with WB and IDB to leverage access to private sector data (e.g. Google, Zillow)
- Cloud-based Big Data lab (platform supporting experimental projects)

Project: mobile money data (Kenya, Tanzania, Uganda)

- Cross-border transactions, remittances, financial inclusion
- Partnership with U.K. Office for National Statistics and Vodafone

Online Courses: Growing Rapidly

(November 2013 – January 2019)

Government Officials

All Participants (cumulative)

(as of Jan2018)	(as of Jan2019)
41,500 active participants	55,100 active participants
23,400 successful participants	30,100 successful participants
190 countries	191 countries

Thank you very much for your attention!