13TH IMF STATISTICAL FORUM

MEASURING
CROSS-BORDER ECONOMIC
and **FINANCIAL LINKAGES**
in a Dynamic World

#StatsForum

Estimating Household Trade in Digital Services

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Introduction

Introduction

Measuring digital trade is very challenging, cross-border digital services consumption by households is growing significantly.

- **Digital trade** is defined as all international trade that is digitally ordered and/or digitally delivered (IMF, OECD, UNCTAD, and WTO, 2023).
  - **Digitally ordered trade** is the international sale or purchase or a good or services, conducted over computer networks by methods specifically designed for the purpose of receiving or placing orders (international e-commerce).
  - **Digitally delivered trade** is all international trade transactions that are delivered remotely over computer networks
- Traditional sources that mostly rely on large enterprises frequently do not sufficiently cover these actors.

Research objectives

This paper aims to estimate the value of household trade in digital services, case study in Indonesia.

Research objectives:

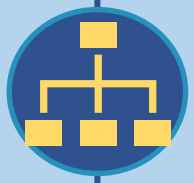
- to estimate the value generated from **mobile app stores** downloaded in Indonesia;
- to estimate the value generated from **online streaming applications**;
- to estimate household consumption of free digital products, a case study from **videoconferencing**.

Methodology

Data Sources

Market Intelligence Data

- Mobile apps use in Indonesia
  - average downloads per app, monetization modes, and country of origin, revenue estimates, subscription prices and installation traffic
- Online streaming applications and videoconferencing
  - subscription prices and the number of subscribers
- Free digital products
  - shadow prices using hedonic regression



Survey Data

- National Socioeconomic Survey
- E-Commerce Survey

Shadow Prices of Free Digital Services

Train data using model for paid videoconferencing plans:

$$\ln P_i = \beta_0 + \beta_1 participants_i + \beta_2 minutes_i + \beta_3 cloudGB_i + \beta_4 breakout_i + \beta_5 recording_i + \beta_6 transcript_i + \gamma(support\_lvl_i) + \delta(provider_i) + \varepsilon_i$$

Predict for free features:

$$\hat{P}_p^{free} = exp\left(X_p^{free}\,\hat{\beta}\right)$$

- **Robustness:** **Bootstrap resampling** of paid plans by repeating the hedonic regression to predict the free digital services and obtaining the distribution of household consumption.
- Household consumption was derived by multiplying the estimated number of **household using the internet** by **predicted price of free digital services**.

Household Trade in Digital Services

Experimental estimates of household trade in digital services using four scenarios:

- Scenario A (Full Import)
- Scenario B (Net Import)
- Scenario C (Digital Trade Ratios from Survey)
- Scenario D (Digital Trade Ratios and E-Commerce Transactions Value from Survey)

*No information of Indonesia's exports in online streaming and videoconferencing for Scenario A and B

Results

Estimating Digital Services based on Mobile Apps Data

Table 1. Household Consumption on Digital Services Based on Mobile Apps Data (Trillion Rp)

Metric	Mean	Lower Bound	Upper Bound
Household consumption (observed, shadow)	6.58	5.77	7.30

Estimating Digital Services based on Mobile Apps Data

Table 2. Household Trade in Digital Services Based on Mobile Apps Data (Trillion Rp)

Metric	Export	Import
Scenario A (Full Import)	0.06	7.96
Scenario B - Net Import	0.06	7.56
Scenario C - Digital Trade Ratios (Survey)	0.08	0.03
Scenario D - Transaction Value (Survey)	9.91	3.96

Estimating the Value of Online Streaming

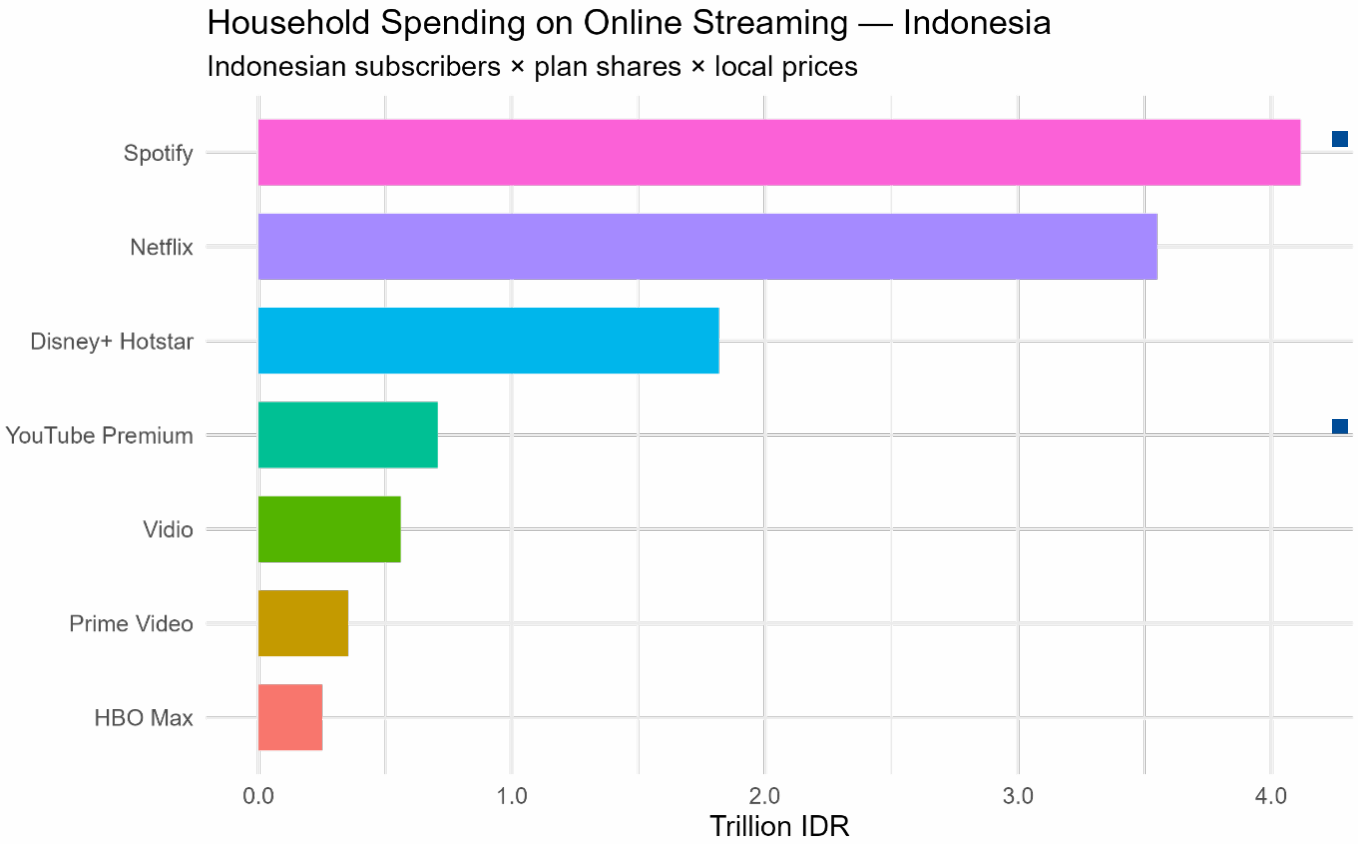


Figure 1. Estimated Household Spending on Online Streaming Services in Indonesia

- **Household consumption** on online streaming services in Indonesia was estimated at Rp 11.36 trillion for a year.
- **Music streaming services** has a wide adoption with affordable subscription price, while **video streaming services** has a variety of impact on Indonesian household consumption which depends on the subscription plans.
- In this study, only one streaming service as **resident** provider.

Estimating the Value of Online Streaming

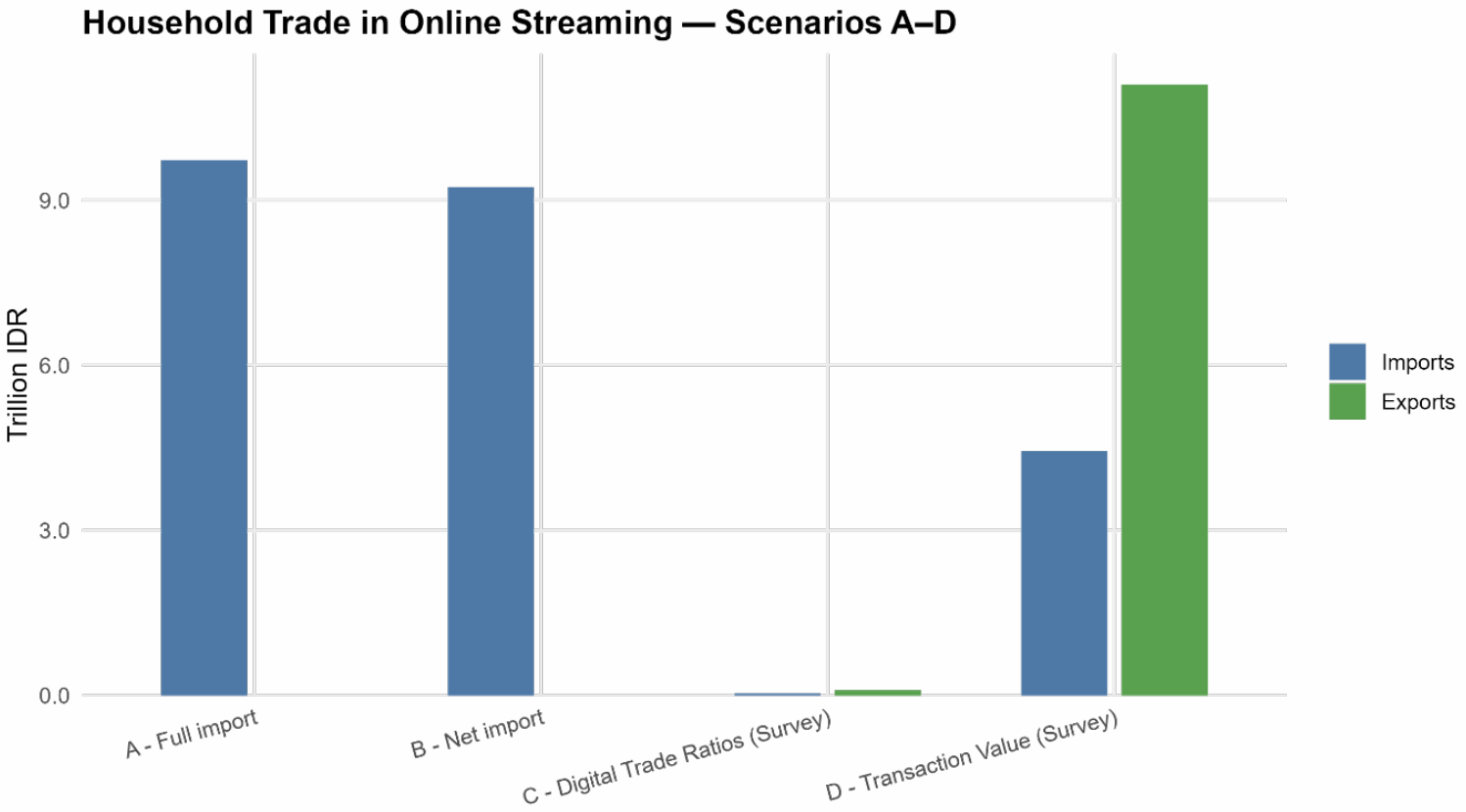


Figure 2. Household Trade in Online Streaming Services by Scenarios

- **Scenario D** has a potential of overestimating the value, especially the export value. It might include all digital services (not only online streaming services) because of the transaction value derived from the survey.

- Another possible cause is **scenario D includes all online streaming activities**, including streaming from marketplace and social media that are happening significantly.

Estimating Household Consumption of Free Digital Products

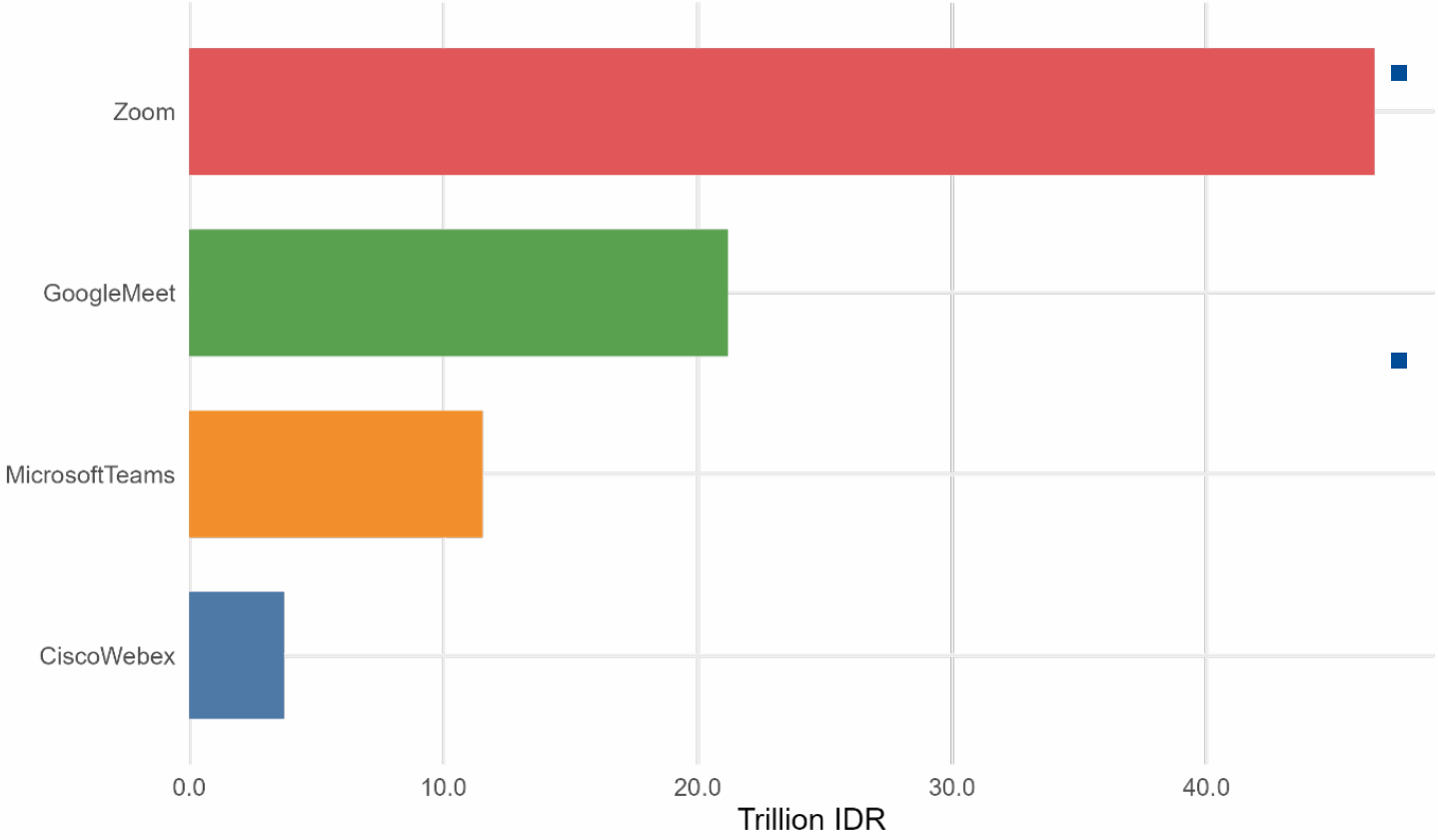


Figure 3. Household Consumption on Videoconferencing

- **Information collected**, such as plan type, subscription price per month, number of maximum participants allowed.
- Applying **hedonic regression**, then **bootstrapping** was also used for robustness of the estimated free services value. **Household consumption** on videoconferencing was estimated by integrating the value derived from the paid plans and free plan features.

Estimating Household Consumption of Free Digital Products

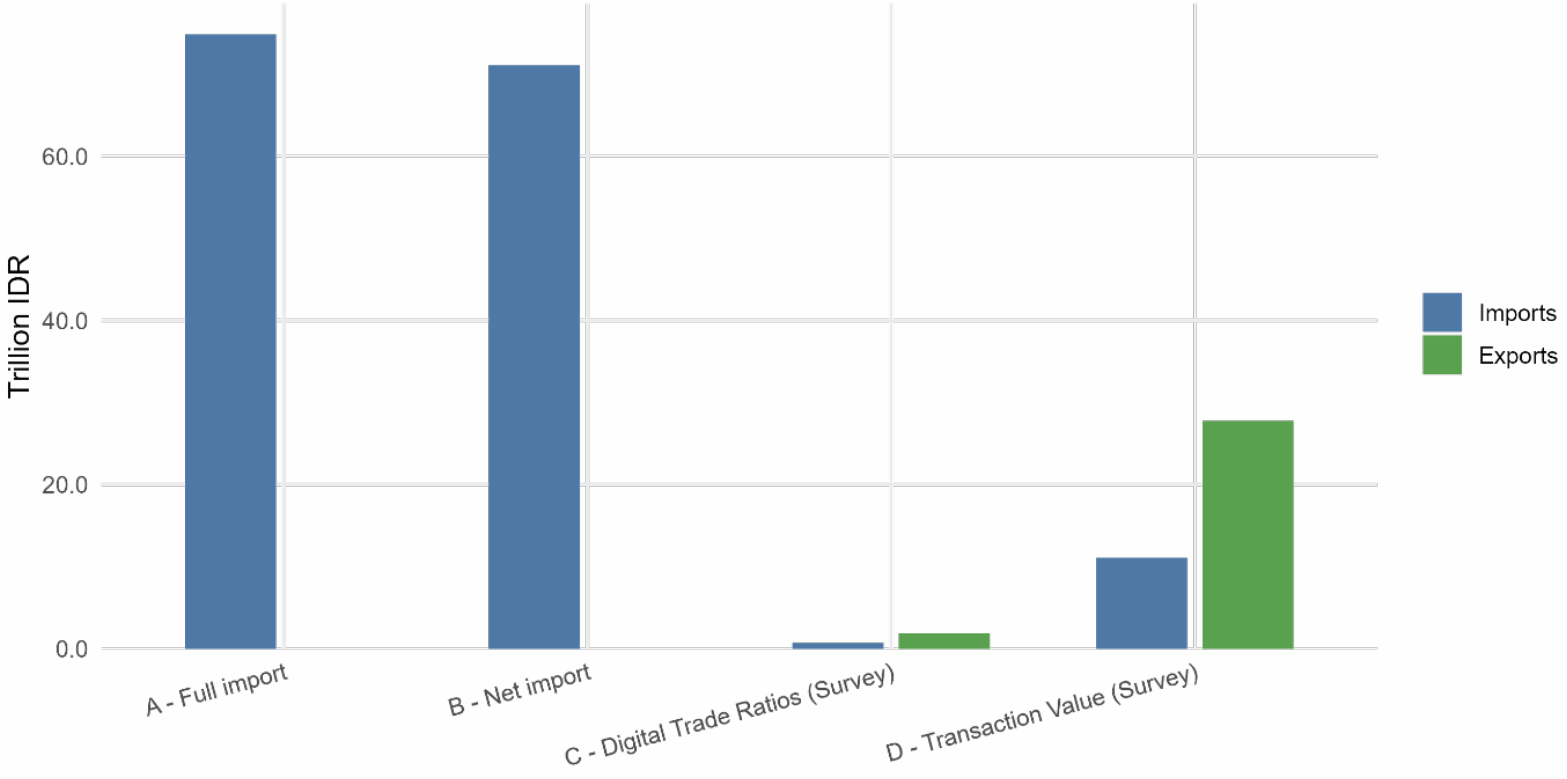


Figure 4. Household Trade in Videoconferencing

- The estimated **export value** in **scenario D** might include all communication apps (not only videoconferencing services) because of the transaction value derived from the survey capture a broader range of digital services.
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- On the other hand, the estimated **import value** in **scenario D** is likely to be underestimated if we look at the web-scraped data in scenario A and B.

Conclusions

- This study focuses on **mobile applications**, **online streaming platforms**, and **videoconferencing** services to give **experimental estimates** of household consumption and cross-border trade in digital services in Indonesia.
- The results of household consumption on digital services from mobile apps data and online streaming services are relatively similar.
- Meanwhile, the results of estimating household trade in digital services were varied by scenarios. Import values are consistently underestimated using Scenario C. Estimating the value of free digital services is very important, other methods should be explored.
- This paper recommends the use of official survey data and other sources of data in producing the value of digital services. Collaboration mechanisms with private sector will be helpful to obtain complementary data from market intelligence data sources.