Recent improvements on digital economy measurement in Chile

Measurement of the digital economy and trade in Latin America and the Caribbean
ECLAC-IMF-UNCTAD

Sebastián Rébora
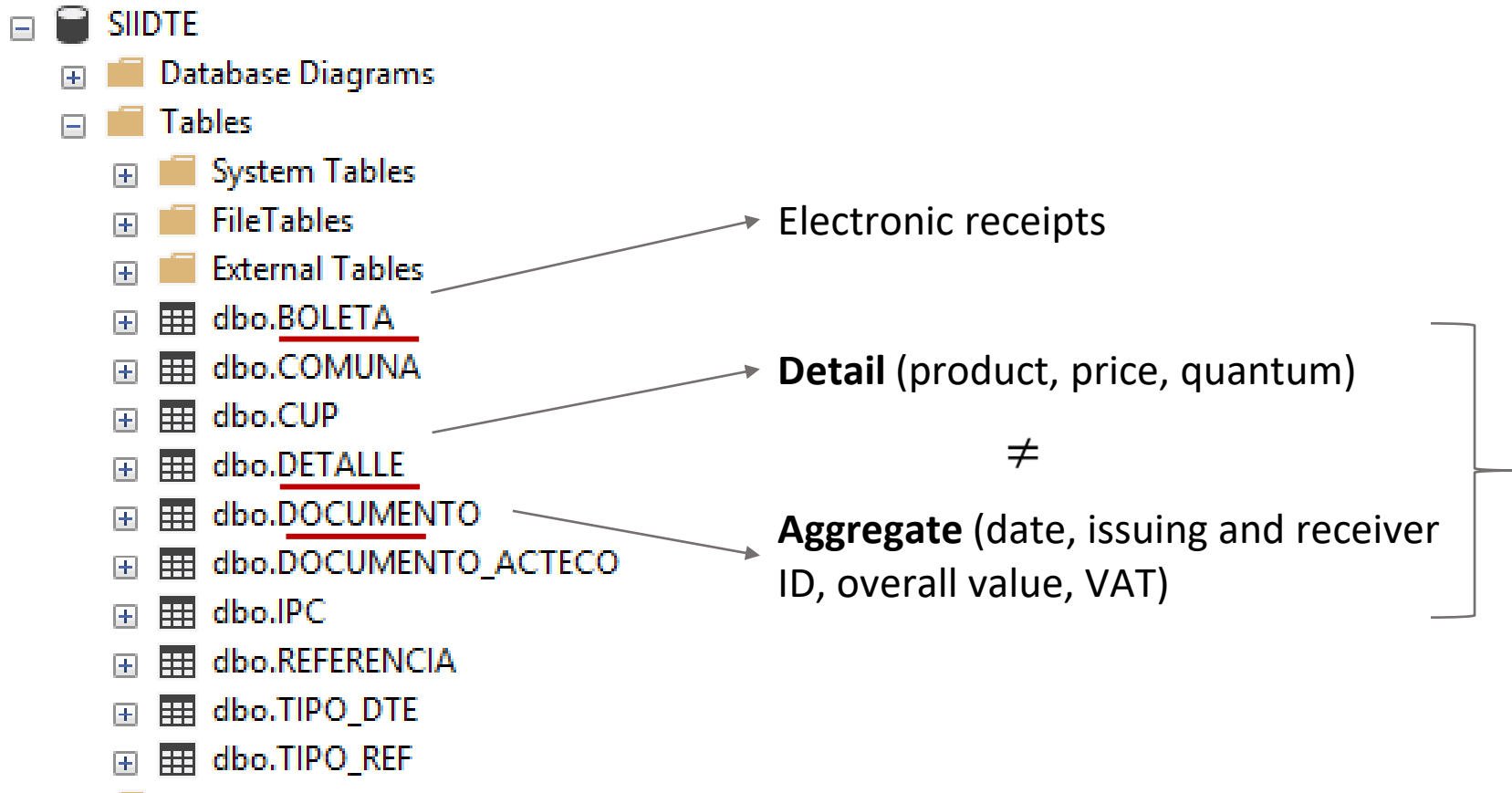Macroeconomic Statistics

November 8, 2022

Background

Last march, the Central Bank of Chile published a new Benchmark Compilation (BC) for the year 2018

- One of the main objective of this BC was to identify digital economy transactions in national core accounts statistics (GDP), strengthening some of them that were already explicitly or implicitly measured and moving forward to include missing transactions.

- The work focused in three main areas: strengthening the estimation of acquisition and own-account production of software, identifying resident firms involved in the digital economy and incorporating the imports of digital services (including digital intermediary platforms)

- To this purpose, new granular administrative records were used:

    1. Electronic tax documents (ETDs) for all firms.

    2. Balance sheets for medium and large sized firm as informed to Internal Revenue Service (IRS).

    3. VAT forms for digital services provided by non-resident firms

    4. Debit and credit cards transactions

Electronic Tax Documents

- The electronic tax documents (ETD) include a wide range of transactions:

    1. Invoices (B2B transactions)
    2. Electronic receipts (B2C transactions)

- Data is available on a daily frequency and is delivered weekly by the IRS.

- The mandatory nature of the ETD was implemented in three stages based on the firm size:

    1. Large companies since 2014
    2. SMEs since 2016
    3. Micro firms from 2018 onwards

Electronic Tax Documents - Data Structure

SIIDTE
- Database Diagrams
- Tables
  - System Tables
  - FileTables
  - External Tables
  - dbo.BOLETA
  - dbo.COMUNA
  - dbo.CUP
  - dbo.DETALLE
  - dbo.DOCUMENTO
  - dbo.DOCUMENTO_ACTECO
  - dbo.IPC
  - dbo.REFERENCIA
  - dbo.TIPO_DTE
  - dbo.TIPO_REF

Electronic receipts

Detail (product, price, quantum)

$\neq$

Aggregate (date, issuing and receiver ID, overall value, VAT)

- Product corresponds to free text description of the item.

- 7% of the invoices are not balanced between aggregate and detailed information

- The validation from tax authority is carried out on the aggregate data (tax collection)

banco central
Chile

Balance Sheets

- Annual standardized accounting information for approx. 25.000 firms (80% of total sales in Chile), which includes additional details according to the account charts of each firm.

- It includes information of assets, liabilities, income and costs.

- Additional accounts of each firms are named in a free text descriptor

- The data is available with an 8 month delay.

banco
central
Chile

Balance Sheets- Data Structure

Standardized account Id   Free text descriptor

Id_Cuenta	Nombre_Cuenta	Debitos	Creditos	Saldo_Deudor	Saldo_Acreedor	Activo	Pasivo	Perdidas	Ganancias
3.01.03.00	GASTOS ADM OBRAS 700	9833409032	9452973...	380435794	0	0	0	380435794	0
3.01.02.00	COSTODEVENTAMDS.AFECTAS	358782159	0	358782159	0	0	0	358782159	0
3.01.02.00	COMISIONES	70909711	111501	70798210	0	0	0	70798210	0
3.01.02.00	COSTO DE VENTA	3460749488	0	3460749488	0	0	0	3460749488	0
3.01.02.00	MERCADERIAS E INSUMOS	51379970	5	51379965	0	0	0	51379965	0
3.01.03.00	ARRIENDOS	4200000	0	4200000	0	0	0	4200000	0
3.01.03.00	COMUNICACIONES	2078091	0	2078091	0	0	0	2078091	0
3.01.03.00	SEGUROS	381130	0	381130	0	0	0	381130	0
3.01.03.00	GASTOS VEHICULOS	266717	0	266717	0	0	0	266717	0
3.01.03.00	CONTRATO LEASING	3110931	3110931	0	0	0	0	0	0
3.01.03.00	MOVILIZACION Y TRASLADO	2103237	0	2103237	0	0	0	2103237	0
3.01.03.00	GASTOS VARIOS	2579969	0	2579969	0	0	0	2579969	0
3.01.03.00	FLETES Y CORREOS	143191	0	143191	0	0	0	143191	0
3.01.03.00	ELECTRICIDAD	26665	0	26665	0	0	0	26665	0
3.01.03.00	GAS Y CALEFACCION	39622	0	39622	0	0	0	39622	0
3.01.02.00	COSTO DE VENTA	35917991	0	35917991	0	0	0	35917991	0
3.01.02.00	TRANSPORTE	30083500	0	30083500	0	0	0	30083500	0
3.01.02.00	ELEMENTOS SEGURIDAD	7354505	0	7354505	0	0	0	7354505	0
3.01.02.00	OTROS GASTOS MATERIAS PRIMAS	707338	0	707338	0	0	0	707338	0
3.01.02.00	REPUESTOS MANTENCION	7370316	1140287	6230029	0	0	0	6230029	0
3.01.02.00	INSUMOS MATERIALES Y DETERGENTES	52390836	0	52390836	0	0	0	52390836	0
3.01.02.00	COMBUSTIBLE	9683867	0	9683867	0	0	0	9683867	0
3.01.02.00	COSTO VENTAS PRODUCTOS DEL GIRO	492695728	43665588	449030140	0	0	0	449030140	0
3.01.02.00	COSTO DIRECTO POR SERVICIOS	1833700	0	1833700	0	0	0	1833700	0
3.01.02.00	PRODUCTOS QUIMICOS Y DE FARMACIA	6700497	489124	6211373	0	0	0	6211373	0
3.01.02.00	PETROLEO	1051755	397765	653990	0	0	0	653990	0
3.01.02.00	BENCINA	2488669	1813976	674693	0	0	0	674693	0

banco central Chile

To use the data at product level, the text description of ETDs and balance sheets must be labelled into a standard product classification system

- To classify transactional data at a product level, we used a supervised machine learning algorithm.

- This technique is based on using a training database which employs a hand-labeling classification. In addition, this is complemented with related databases at product level (custom records, web-scraping, among others) to improve the model's accuracy.

- Although the results show a good level of precision, there is room for improvement of the classification.

- Besides the digital economy and other national accounts components, this information was used to improve the classification of firms´ economic activity.

banco
central
Chile

Value Added Tax on Digital Services

- From July 1st 2020, it was established that remote remunerated services provided by non-residents must pay value added tax on monthly or quarterly basis.

Who must pay VAT on Digital Services?

✓ The Intermediaries of services rendered in Chile, whatever their nature, or sales made in Chile or abroad, provided that the latter gives rise to an import.

✓ Those who supply or deliver digital entertainment content, such as videos, music, games or other analogues, through download, streaming or other technology, including for these purposes, texts, magazines, newspapers and books.

✓ Those who supply software, storage, platforms or computer infrastructure.

✓ Those who carry out advertising, regardless of the medium or mediums through which it is delivered, materialized or executed.

banco
central
Chile

The Central Bank receives the VAT information of a list of foreign firms registered in the IRS using an anonymous ID

The recent progress in the measurement of the digital economy in Chile was made using the conceptual framework and the digital industries classification proposed by international organizations

Figure 1. Conceptual framework for measurement of digital economy

Source: OECD, adapted from OECD-WTO-IMF (2019)
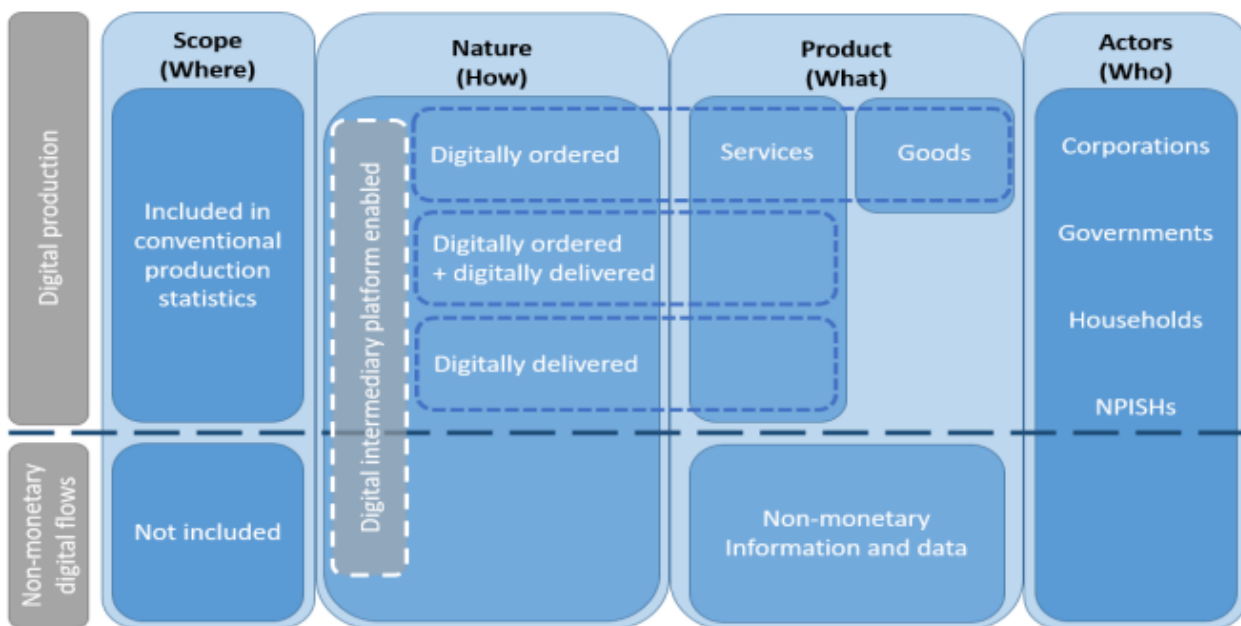
1. Digitally enabling industries

2. Digital intermediary platforms charging a fee

3. Data and advertising driven digital platforms

4. Firms dependent on intermediary platforms

5. E-Tailers

6. Digital only firms providing financial and insurance services

7. Other producers only operating digitally

Estimation of gross fixed capital formation (GFCF) in software

Acquisition of software

- ETDs, balance sheets and VAT form were used in addition to traditional sources to identify the acquisition of software.

- The product detail and the receiver of the transaction obtained from the invoices allowed a better allocation of the software supply by economic activity in the use table.

- A special survey was conducted to collect information of the financial services industry.

Own-account production of software

- A survey devoted to collect information of the use of ICT in business, conducted by the NSO, complemented the traditional business surveys on the estimation of own-account production of software.

GFCF in software was revised by 8.3% in 2018. Revisions were most significant for Business Services, Retail and Wholesale, Manufacturing and Financial Services.

GFCF in Software 2018 by Industry (thousand of million Chilean pesos)

■ BC 2013 ■ BC 2018
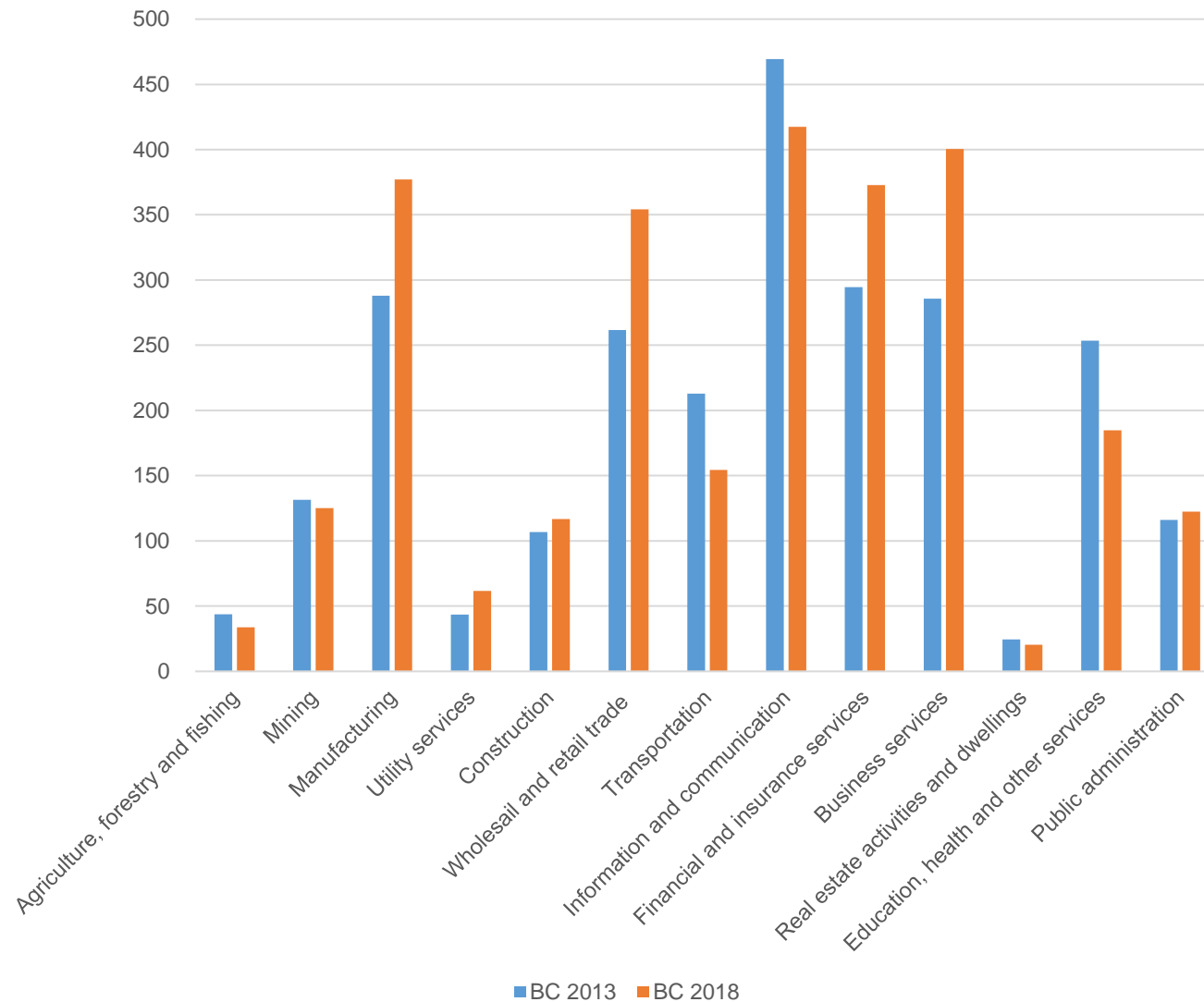
Identification of resident firms involved in digital economy

In the BC, it was possible to identify resident units involved in digital economy, previously measured implicitly in the accounts:

- The first step considered the identification of these firms in the Business Register, using the criteria recommended by the Guideline for Supply-Use tables for the Digital Economy.

- New tax record provided information to estimate all component of the production accounts of these units.

- In the case of digital intermediary platforms (DIP) charging a fee, new tax records allowed to implement the net approach records and to identify the firms dependent on intermediary platforms (including own-accounts workers).

- Traditional business surveys to resident firms were adjusted to capture some components of digital economy.
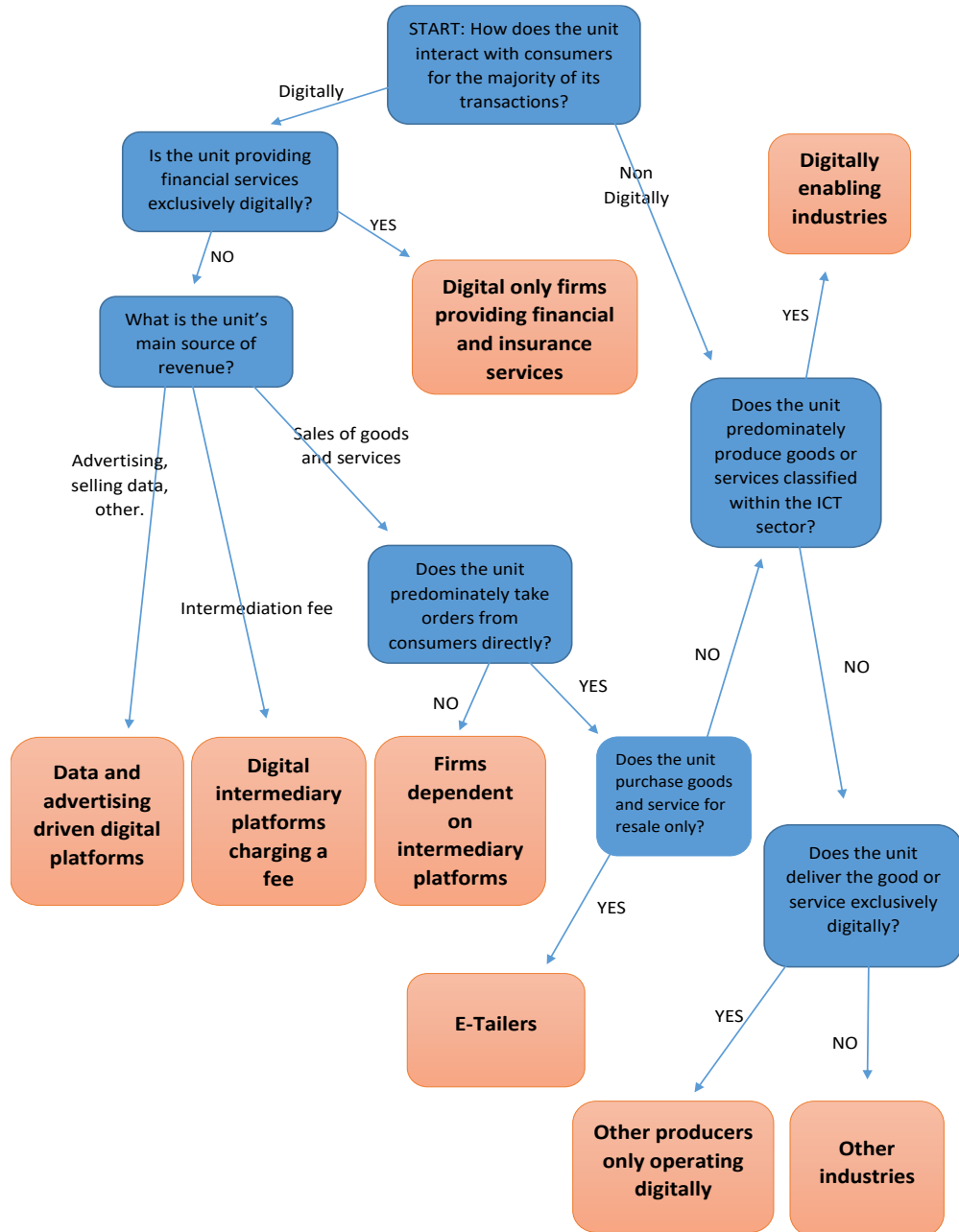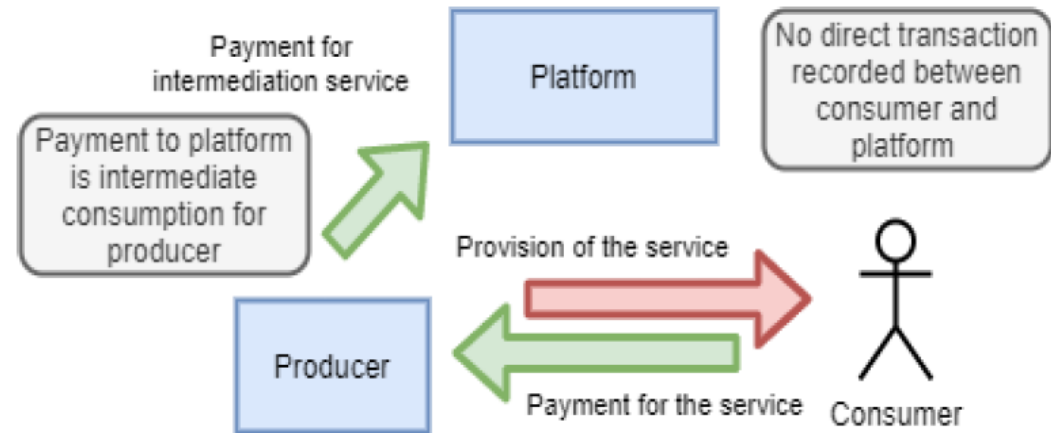
Digital industry decision tree
GUIDELINES FOR POPULATING DIGITAL SUPPLY-USE TABLES (OECD)

START: How does the unit interact with consumers for the majority of its transactions?

Digitally

Non Digitally

Is the unit providing financial services exclusively digitally?

YES

NO

Digital only firms providing financial and insurance services

What is the unit's main source of revenue?

Advertising, selling data, other.

Sales of goods and services

Intermediation fee

Data and advertising driven digital platforms

Digital intermediary platforms charging a fee

Does the unit predominately take orders from consumers directly?

NO

YES

Firms dependent on intermediary platforms

Does the unit purchase goods and service for resale only?

YES

E-Tailers

Does the unit predominately produce goods or services classified within the ICT sector?

Digitally enabling industries

YES

NO

NO

Does the unit deliver the good or service exclusively digitally?

YES

NO

Other producers only operating digitally

Other industries

Figure 3: Flow of transactions related to digital intermediation platforms, net approach

Payment for intermediation service

Platform

No direct transaction recorded between consumer and platform

Payment to platform is intermediate consumption for producer

Provision of the service

Producer

Consumer

Payment for the service

GN- DZ.9 - Incorporating Digital Intermediation Platforms into the System of National Accounts

banco central
Chile

Imports of digital services were **estimated** using the information of the new VAT form

- Non-resident units registered to pay VAT tax were classified under the Digital SUT criteria to identify the type of traded services

- DIPs were also recorded by net approach as the base of the VAT is the intermediation fee.

- The production of units dependent on non-resident DIPs was estimated using the information of fee rates of the main known platforms.

- As the VAT information of non-resident firms starts in 2020, credit card transactions and other related indicators were used in a backcasting exercise to obtain longer time series.

- Imports of digital services reached 13% of the total imports of services in 2021.

banco
central
Chile

Final comments and future challenges

Final comments

- The new tax records are a source of information with greater timeliness and granularity compared to those that were commonly used to compile national accounts in Chile.

- From the BC 2018, they have been used to contrast and complement traditional data sources in the compilation of national accounts, including digital economy.

- Data science techniques are needed to process the data and take advantage of the details of products/accounts.

- There is room to continue exploiting these new tax records for digital economy measurement.

banco
central
Chile

Future challenges

- Given theses improvements on digital economy in core accounts, next steps consider the compilation of an e-commerce indicator and some components of digital SUT for the Chilean economy.

- For this purpose, the new tax records, debit and credit cards transaction and business and households' surveys will be used.

- The compilation of these satellite accounts/indicators as well as the continuous improvements in core account will be compiled taking into consideration the recommendation arising from the context of the SNA update.

Recent improvements on digital economy measurement in Chile

Measurement of the digital economy and trade in Latin America and the Caribbean
ECLAC-IMF-UNCTAD

Sebastián Rébora
Macroeconomic Statistics

November 8, 2022