Voorburg Conference Notes (2024)

Day 1 – Tuesday March 5, 2024

Opening Remarks & Meeting Agenda Overview
Voorburg Group co-chairs: Marcus Fridén (Sweden) and Bonnie Murphy (US BLS)
- Welcome to the 174 delegates who registered, representing 43 statistical agencies/countries and representatives from 4 international organizations, including the International Monetary Fund, Euro Stat, OECD and the World Trade Organization.
- Use of Zoom for the first time for the Voorburg meeting.
  - Meetings Tuesdays and Thursdays.
  - Email will be sent to get feedback on the new Zoom format – thanks to Mexico for organizing this feedback survey again this year.
- Notes organized by the Secretary and will be available on the Voorburg website.
- Tech help available through WhatsApp.
- Thanks to Israel Centre of Statistics for hosting this virtual meeting.
  - Special thanks to the technical group for setting up the virtual meeting so quickly.
- Thanks to session chairs and all those who provided contributions.
- Voorburg Bureau: Marcus Fridén, Mathieu Thomassin, Dorothee Blang, Mariagrazia Moschetta, Ariel Juarez, Rohan Draper, Christian Puchter, Craig Taylor, Ruth Vizner.
  - We have three vacancies (openings) – will accept nominations until Tuesday March 19, 2024.

Welcome Remarks by Statistics Israel

Merav Oren – Senior Director of Microeconomic Department at Israel CBS.
- Thanks to everyone who helped prepare for the conference.

[Video greeting from Prof. Yaron Felus](#) - Head and Chief Statistician of Israel's Central Bureau of Statistics.
- Uncertain economic times means measuring prices of service industries is more crucial than ever.
- Services are not homogenous and subjectivity makes them hard to compare.
- Traditional measurement methods relying on physical outputs hard to use for services.
- Hoping for better understanding of our ever-changing world.

Yoel Finkel – Associate National Statistician.
- Thanks to leadership of Voorburg group for quick understanding and quick turn around during conflicts in Israel.
- Very appreciative to be able to host it virtually this year though disappointed to not be able to have it in person as planned.
- [Video](#) played of Israel as conference not able to happen in person. Hopefully you will come to visit some day.

- 22 respondents/countries included in this year's survey.
- Thanks for all of the contributions – it helps to explore these topics and improve our understanding of alternative data use as well as coverage of these important indicators.
- Results explored and refresh of what to expect if you are new to completing the survey.
- Presentation of results
    - Previous and current results are shown in summary tables to allow for trend assessment.
    - Let Rohan know if your data is outdated – it should be the most current data.
- A number of requests have come from stakeholders, which has been encouraging as it is being used by some of the bigger organizations to set agendas and take price statistics forward.
- Value proposition
    - Data from the survey continues to provide value regarding investigations into CPI usage by PPI statistical programmes and has been picked up by further constellations of groups like the UN City Groups.
- Coverage
    - Increased coverage from 16 to 22 countries contributing to the results.
    - Results become more interesting and meaningful.
- Categories haven't changed, any feedback is welcomed by email or meeting request to Rohan.
- CPI remains dominant alternative data source, followed by administrative data, CPI, web scraping (manual) and corporate datasets.
    - Manual scraping more popular than automatic web scraping.
- Guidelines for using CPI as an alternative data source can be found on the Voorburg website.
- Comparison available for 2022 and 2023 – inspiration for where trends are coming from.
    - Keep in mind as coverage increases, this will also impact those numbers.
- Multi-source usage shows interesting results
    - At least two or more countries using a multi-source approach increased from 27 to 57 classes between 2022 and 2023.
    - That's the way that modern statistics are trending – beyond questionnaires.
        - Looking at how we can increase coverage by using multiple data sources together.
- Visualization
    - Example of how the data source can be used to visually show how many organizations are using a particular data source by industry classification.
- Excel document includes Visualizations
    - Shows frequency that each price collection method is being utilised on a per class basis.
- Survey and results guidelines
    - Please remember to expand the results category of industries with the + button.
    - So, complete your survey by expanding the plus symbols and then select your main data source.
    - In the "Results Per Country" sheet, data can be sorted by 4-digit classification via Column 2.
- What's next?
    - Administrative data visualization

- - Feedback and/or ideas from participants can be sent to Rohan for consideration by the Voorburg Bureau. If time permits, additions to the Excel summary document will be actioned by the 15th of March.

Bonnie Murphy: Useful tool presented at many conferences. Thanks to all of the members who have filled it out to expand the coverage. Thanks to Rohan for contributions and for being available to assist the other members.

Luis Centeno Martinez

I have a question about the multisource option, if a statistical office selects this option in the survey, did you add the types of sources in the survey plus the multisource option? Wouldn't they be missing in the total of the sources? Thank you.

Rohan Draper | Denmark

The multisource usage is not an option that is selected but rather generated from the responses. If a country selects multiple sources (for example: CPI and Admin Data) then a multisource score is recorded.

Future topics - Voorburg Group co-chairs: Marcus Fridén (Sweden) and Bonnie Murphy (US BLS)

- Planning for next two meetings – short virtual touch base meeting in September 2024.
    - Single, half day meeting where papers can be discussed by the Voorburg Group.
    - Think about a paper you would like to share and discuss with the Voorburg Group.
    - Volunteers to present will be taken throughout this conference – enter paper topic in Q&A or email paper topic to Mathieu Thomassin, Bonnie Murphy and Marcus Fridén.
    - Hoping to have 6 papers for this short session – if there are more some may be asked to move to the in-person meeting (long session).
- In-person meeting 2025
    - Looking for topics for this meeting also.
    - Suggested topics can be sent in Q&A or emailed in.
    - Co-chairs will also solicit topics again before touch base meeting in September 2024.
- Email Mathieu Thomassin, Bonnie Murphy and Marcus Fridén to volunteer contributions for two meetings.
- Will also be asking for Feedback on use of Yammer and creation of new newsletter.
    - 42 people registered on Yammer and more have been registering.
    - Thanks to the organizers of this initiative, Dorothee Blang, members from the UK and from Switzerland who worked on the newsletter.

- At the last meeting, several sector paper contributions were made on this topic. The issues paper written for the current meeting is a summary of papers from Sweden, Mexico, and the United States, regarding one core question - are existing surveys feasible to measure an internationally comparable SPPI for education? If so, how?
- First question to explore - what is education?
  - Education systems across Europe and America are quite different from each other.
  - Defining education is challenging on a detailed level – depends on the classification used in each country – which is determined by relevant society's perception.
  - Core definition of education is: Knowledge transfer achieved by teaching.
  - Three relevant aspects.
    - What is taught?
      - Field or profession.
      - Level of education.
    - How is it taught?
      - Form of education.
        - Course, training, tutoring, etc.
      - Means of communication.
        - Orally, written form, physical setting, digital setting.
        - Digital settings with the pandemic.
    - Who teaches?
      - Institutions.
      - Public vs. private sector.
  - Sector papers use a broader definition of education, they don't go into one specific detail but cover everything that can be regarded as education.
- Used classifications – industry level
  - ISIC – International.
  - NACE – Europe.
  - NAICS – Mexico & US.
  - ISIC and NACE are fairly similar but the NAICS focus on school types, especially focus on level of higher education with detailed information on school types.
- Used classifications – product level
  - CPC – International.
  - CPA – Europe.
  - NAPCS – Mexico and US.
    - Stronger focus on education programs, especially on relevant career steps in each program.
  - This shows fundamentally different approach to what is regarded as education or what should be the outcome of education.
- So given these differences, are there similar points of interest in the conducted surveys? If so, what are the comparable results?
- The papers look at turnover measures but they are quite different from each other.
  - Sweden
    - Education provided takes place mostly in the public sector but educating institutions discussed or reviewed for the paper were only providers in the

private sector because it's easier to measure turnover if you have companies that work for profit.

- Sweden regularly conducts two types of statistics which align with other countries in the European Union as they are all obligated to provide the statistics to Eurostat.
- Short-term statistics
  - Based on KAU level.
  - Based on VAT-data.
  - Production Value Index.
  - Turnover per service sector.
- Administrative data
  - i.e., number, sex, and salaries of employees, operating expenses, etc.
- Targeted turnover-coverage per strata of 90%.

o Mexico
- Statistical Business Register of Mexico (RENEM)
  - Economic Census
    - Detailed information on various economic factors for example, on income or on revenue, and also geographical factors are conducted.
  - National Economic Surveys
- Administrative data
  - i.e., number, sex, and salaries of employees, operating expenses, etc.
  - Reports of institutions and trade associations.
  - Available for national statistical institutions to be added on findings of the key surveys.
  - Similar administrative data to expand the reach of the service conducted because the regular direct data collection is mostly conducted with big enterprises.
- Mix between probabilistic and non-probabilistic measures.
- Both Sweden and Mexico use similar admin data to expand the reach of the surveys conducted because the regular direct data collection is mostly conducted with big enterprises so it's not as easy to get detailed information from smaller enterprises which are especially prevalent in the education sector.

o US
- International Price Program (IPP)
  - Import/export price indexes (MXP)
    - For the education sector only export prices taken into consideration.
    - US only looking specifically at one aspect of services taking place in the education sector.
- The US only looks at very specific aspect of all the services taking place in the education sector since they only looked at what foreign students (abroad and out of state) paid in tuition fees and room and board – it's a different content than the studies conducted by Sweden and Mexico.
  - Data provided by IPEDS – data system.
- Administrative data
  - i.e., number & origin (in-state, out-of-state, foreign) of students, etc.

- Sample provided by IPEDS data system.
- Can we use these existing surveys to calculate an international comparable SPPI? If not, what would be necessary?
  - Statistics Austria believes the current measures are too different from each other to be compared and create a comparable index between the countries.
- Have any other countries created an index on the topic of education?
  - Melanie Santiago – US BLS
    - Challenging to do something comparable because education systems are so different.
    - US trying to create price index for post-secondary education. Including 2 year and 4-year colleges/universities.
    - Test index has been created using a completely secondary source.
    - Calculating the index with the universe of colleges and universities – using data scientists help.
    - Methodology could be presented at a future meeting.
    - Includes both public and private institutions.
    - Services: tuition and fees, room and board.
    - No level of detail on type of courses and mode of instruction as the data is not available from the source data.
    - Discussion with Austria regarding a sample.
      - USA would not need to draw a sample they would have complete access to the full dataset.
  - Andrew Baer – IMF Statistics
    - Helpful to hear thoughts on whether a transaction is economically significant in education. Is there actually a market price and does the price actually cover the cost of the institution providing the education service? Discussions on where countries stand on this question.
    - Where is the line between an education and a publishing service? Some online courses might not have live instructor and have videos. Is that really an education service or is it a publishing service?
  - Rebecca: Specific to school type to determine if there is the possibility to put a price on an individual service.
    - Might be easier in the private sector compared to the public sector.
    - Substantial differences in what can be invoiced.
  - Bonnie Murphy – US BLS
    - Use of alternative source in order to increase coverage in the USA.
    - May also impact results on the alternative data survey.
    - Questionnaires sent to universities would be difficult to collect so having access to the data source is good.

Cross cutting topic (1) – Collaborative guidance paper on SPPI and output compilation during economic shocks

- Guidance paper – authors and presenters
  - Christian Stock (Austria)
  - Rohan Draper (Denmark)
  - Jonathan Weinhagen (Bureau of Labor Statistics, United States, not present)
  - Marie-Christine Bernard (Statistics Canada)

Christian Stock - Response rates and pandemic effects in business sectors
- Response rates – Economic Shock (e.g., COVID-19 Pandemic).
  - An economic shock affects response rates on collected data in many ways.
  - Not necessarily directly comparable to other global economic crisis (ex. Financial crisis).
    - Lockdowns in the pandemic as well as assistance programs from countries to enterprises and households.
  - Provided insights into possible effects on response rates in surveys from NSOs.
  - Different strategies implemented to keep response rates high since beginning of pandemic.
- Response rates – survey characteristics
  - Response rates measure the percentage of data received by a survey.
  - Different periodicities (ex. Monthly, quarterly, yearly) in SPPI as well as in output service.
  - Mandatory surveys vs. voluntary surveys.
    - Mandatory surveys (with a reminder system) are useful in practice.
    - Mandatory surveys in Austria include the SPPI.
    - Some countries cancelled financial penalties for surveys while in economic crisis.
  - Possible phases in SPPI survey (development, revision, ongoing collection).
- Response rates – strategies to keep response rates at a high level in economic crisis.
  - To allow for late prices and corrections.
    - This also applies to data provided from financial authorities.
  - To intensify contacts to respondents via online-meeting tools, emails, or telephone.
    - Focus on online meetings for the future.
    - Combination of online application in combination with other electronic communication tools and telephone calls.
  - Eurostat-OECD SPPI guide recommendation.
    - Ideally, new sample units should involve a personal visit. Telephone and virtual options available.
  - It is difficult to recommend a certain sample change with regard to response rates at that time.
    - Unclear if sample size should be increased, decreased, or unchanged.
    - Normally, response rates expected to decrease in economic crisis.
- Industries – ISIC Rev. 4 strongly affected by the pandemic
  - Air transport
  - Accommodation and food service activities
- Pandemic effects in business sectors (Tables and additional remarks to trends of economic variables)
  - Number of enterprises
  - Turnover

- o Newly founded enterprises
- o Business closings

Rohan Draper – Output compilation during economic shocks – Revisiting imputation
- Evolution in the way we think about imputation.
- Response rates were a challenge given unprecedented pandemic conditions and constraints.
- Widespread social upheaval with unprecedented constraint on movement.
- Imputation (how to impute)
  - o Making use of the best available information to provide an unbiased estimate of price and price movement.
  - o Localised item level focus, what are we explicitly aiming to estimate at the transaction level.
  - o Built on tried and tested methods with important underlying assumptions.
  - o Based on CPI Manuals, International Trade Manuals or the PPI Manuals.
- Preservation (what to preserve)
  - o The accuracy of the method relies on the veracity of the assumptions, not the quality of the explicit estimate.
  - o Holistic reflection on objectives and scope (and fundamentals) and their consistent application over time.
  - o Greater reflection beyond explicit imputation to what implicitly is being impacted.
  - o What are the questions to ask ourselves to support imputation decisions and can we structure it to enable metadata, machine learning and data driven solutions for future validation efforts.
- Contextualising our actions through understanding the preservation
  - o Suitability scenarios
    - ▪ Transaction has occurred but data could not be collected.
    - ▪ Transaction has not occurred but shifted to an alternative product/activity.
    - ▪ Transaction not occurred and there has been no substitution.
    - ▪ Missing data broad-based rather than localised and no neighbouring economic activity available.
  - o Preservation options
    - ▪ Price level
    - ▪ Historical price behaviour
    - ▪ Annual or periodic movement
    - ▪ Elementary aggregate, industry aggregate, total aggregate
    - ▪ Market behaviour (substitution)
- Excel document accompanies the paper (available upon request)– take a look and play around with it to see visually what that imputation option actually does.
  - o See carry forward is a reliable option for industries which have contractual information or prices that are locked in.
  - o Not recommended for other industries because it destroys seasonal factors that might be otherwise occurring within the index leading to annual change that is not reasonable.
- Conclusion
  - o Imputation in a time of economic shock.
  - o Preservation an integral part of imputation.
  - o Explicit and implicit impacts on the index.
  - o Structured approach to determining and recording imputation (and quality adjustment).

Marie-Christine Bernard – Output compilation during economic shocks

- Explored alternative data sources for advanced signals on operating revenues during economic shocks.
- Goal to see early estimates during the economic shocks.
- Motivation
    - Relying on alternative data sources.
        - Can help improve understanding of economic trends ahead of estimates based on annual industry survey data.
        - Timeliness during economic shocks.
            - Annual business survey estimates at Statistics Canada available with lags of 10 to 15 months after reference year.
            - Alternative data can provide more timely estimates (lags of just a few months).
- Sources of data
    - Tax data
        - Canada has made use of administrative data in place of survey data for many years. Mostly used personal income tax and corporate income tax data in the annual survey service industries program.
        - For the advanced indicators used administrative data from Canada Revenue Agency – goods and services tax (GST) remittances.
        - GST is a value added tax levied by the federal Canadian government and is essential bore by the final consumer.
            - An auxiliary source of data for editing and imputation when respondent data is not available in some monthly surveys, such as the monthly Food Services Survey or the manufacturing shipments monthly survey.
        - GST not formally used as a replacement for annual survey data in Statistics Canada Service Industries program.
            - Used in monthly survey program.
    - Comparability
        - The GST files were also reviewed to ensure consistency and comparability with the Service Industries Program's annual business survey estimates.
- Comparability
    - Advance estimates compared to survey data for select service industries 2020-2022
        - Growth rates of advance estimates were in the same direction and within the same magnitude as the growth rates of survey estimates for all reference years.
        - Advanced estimates based on administrative data were at least 90% accurate compared with survey estimates
        - The GST data was found to be historically comparable mostly for professional administrative culture, art, entertainment and recreation services.
        - Service industries with the biggest growth – travel arrangement and reservation services and accommodations services had the lowest growth rate accuracy using administrative data. In the case of using the GST data, there are concessions on accuracy in some instances but there are gains in timeliness.
    - Accuracy vs. Timeliness
        - Accuracy is one component of data quality. But in the case of using the goods and services tax data, conceding on accuracy for some service industries, but gaining on timeliness.

- Take aways from use of administrative data during economic shocks
  - Good proxy
    - Timeliness at a time of economic uncertainty and volatile times.
    - Provides more cost efficient and quicker understanding of economic trends.
    - Other use for GST data files.
    - Monthly econometric nowcast models of the GST have been developed for most service industries where there are no monthly estimates.
      - The nowcast estimates of the GST are inputs into Statistics Canada's monthly industry real GDP advanced estimate.
  - Limitations
    - Not necessarily subjected to same data quality and consistency checks.
    - Do not correspond exactly with variables targeted on surveys.
    - Not good proxy for all industries.
    - Operating revenue biased by industry misclassifications in the GST remittances.
    - Estimates based on administrative data may not be at same granular level as survey estimates.

Comments
Bonnie Murphy - USBLS
- To Marie-Christine Bernard – Statistics Canada has made great and quick progress.
- To Christian – thank you for developing the paper so quickly.
- Need to continue these discussions – setting up short meetings and discussions outside of the Voorburg Group meeting is highly encouraged.

Cross cutting topic (2) – Experiences using a generic questionnaire with dynamic elements in SPPI - Trym Langballe (Norway)

- Objective
  - Create a questionnaire that:
    - Can be used on multiple industries – mainly service industries.
    - Easily changeable.
    - That is relevant for each industry.
      - Different price determining factor
      - Price methods
      - Unit of measurement
- Why did we create a new questionnaire?
  - Old solution – not optimal, one questionnaire for each industry.
    - Difficult to update.
    - Time consuming to produce indices.
    - Outdated? Old system written in code that is not compatible with modern technical solutions.
  - A lot of similarities but not harmonized.
  - To get data on same format to create a better production system.
  - We need a flexible and dynamic tool to meet new regulation (IBIS).

The Questionnaires
- Main features
  - Questionnaire with dynamic elements.
    - Elements can be easily adjusted based on individual respondents' needs.
  - Some text is static but adapted to handle dynamic elements.
  - Different price methods available for each industry.
  - Data in same format between industries making it easier to create indices in a common production system.
- Questionnaire divided into two parts.
- Part 1 - Recruitment: Identify service groups and weights.
  - Forms that the business receives the first time they are asked to report.
  - Identify which type of service each firm produces.
    - Based on lowest level of CPA codes.
  - Identify secondary activity.
    - Asking respondent to report revenue shares between available service groups.
  - Collect elementary index weights – Share of turnover per service group.
  - Example of questionnaire
    - Service groups based on CPA-classification.
    - Secondary Activity (activities outside of the main industry).
    - Share of revenue turnover between service groups (totals 100%).
    - Categories with significant turnover included in next part.
    - Specify service within each category and price-determining factors.
    - Unit pricing method report: reporting revenue, waste amounts, and units sold and the system automatically calculates unit price for the firm using the collected values.
- Part 2 – Reporting: Price collection and service resampling
  - Survey received the second time the respondent gets the questionnaire.

- o Give information if the service has been sold in current period.
- o Report price on specified service if it is still being sold.
- o If not sold why:
  - Temporarily unavailable.
  - Permanently unavailable - Replace service with new specification.
- o Survey example
  - Report of specified service when recruited.
  - Service sold in period.
  - Price of service.
- Controls
  - o Temporarily/permanently unavailable.
  - o Price control +/- 20% price change.
    - Respondents provide explanation for price change – were they wrong last time, has there been another change?

Experiences
- Overview
  - o 14 different industries
    - Ranging from transportation and storage to security and investigation services.
  - o 1 questionnaire-solution
    - 14 different questionnaires
    - 3 different price method.
  - o Gradually increasing sample sizes
    - Longest series: 2 years
    - Shortest series 1 quarter
    - Only two indices are published using the one with the largest sample sizes and the longest time series.
- Positive experiences
  - o Easily modifiable questionnaires for different industries.
  - o Large degree of autonomy
    - Able to make and implement new questionnaires when demand rises.
    - Do not require assistance from other departments in Statistics Norway to implement the changes, not a lot of bureaucracy to implement the questionnaires.
  - o Highly specified services - easy to compare services over time
    - 6 pricing factors (characteristics)
    - Several available pricing models
  - o Similar data structure
    - Structure of service catalog is similar for all industries.
    - One common system for preparation and dispatch of questionnaires.
    - Code for calculating indices is reusable for all industries.
      - Main benefit to have common production system for calculating the SPPIs.
  - o Quality of data remains stable and comparable over several periods.
- Challenges
  - o Highly specified services
    - Difficult for the firms to report on the same service over time – might bet shorter time series.
  - o General formulations/Hard coded text

- Some misinterpretations of our questions - Prices for service in the quarter vs. prices of contracts.
  - One (predetermined) price model for each service group.
    - Limiting to the firms and can lead to some supervising from Statistics Norway.
    - Firms not able to choose their own price model.
- Improvements
  - Several services within each service group.
    - Currently each firm can only rapport one price for each service group.
    - Would enable a better solution for hourly rates with different rates for different types of employee character categories.
  - Reporting of revenue in its own questionnaire.
    - We have no good method for updating revenue-shares between service group.
    - Enables more frequent updates of elementary weights.

Questions

Rohan Draper: Do you collect metadata if you get a certain type of response from the questionnaire? For example if a if a provider says we can't provide a price for that product this month, we've selected a new one, or if they say there was no transaction this month. is that data that's being collected, and all the all the information about the choices that the firms make?

Answer: Yes, all of the information is collected and stored in the database. Type of questionnaire, type of price, everything recorded in the system.

Bonnie Murphy: Did you find that you needed more than 6 pricing factors to describe the service. And what you do about that?

Answer: For now we are limited from a technical standpoint to only 6 pricing factors. We would like more, but our experience is when we provide more specifications, respondents also find it harder to answer. So it's a balance between our need to control the quality and their willingness to respond to the survey.

Cross cutting topic (3) – New methods and challenges employed by NSOs post-pandemic to collect data "electronically" in lieu of in-person

The relevance of the combination of data collection methods in the Business Surveys during and after the COVID-19 pandemic in Mexico - Ariel Juárez (Mexico)
- Start of the Business Surveys in Mexico.
  - Began in 1963 for the manufacturing industry with an annual survey.
  - Integrated system is made of 5 statistical programs – 5 are monthly and 5 are annual.
  - Integrated System of Surveys in Economic Units (SIEUE)
    - National Economic Information System Law
    - Sources of information:
      - National Economic and Agricultural Censuses
      - Integrated System of Surveys in Economic Units (SIEUE)
      - Administrative records
  - Objectives:
    - Technical and methodological homologation
    - To offer technical, normative, and methodological elements
    - Linking systems: National Accounts, Economic Censuses, and price indexes
    - Integrated system of surveys
      - Internal Users
      - External Users
- Data Collection of the Business Surveys
  - Collection methods evolution
    - 1964 – Paper questionnaire
    - 2003 – Computer Assisted Internet Interviewing (CAWI)
    - 2011 - Computer Assisted telephone Interviewing (CATI)
    - 2012 - Computer Assisted Personal Interviewing (CAPI)
  - Combination of collection methods before, during and after the pandemic.
    - Post-pandemic period the importance of Internet collection has continued.
  - Use of internet was the main means of collection from 2012 onwards, increasing level to almost 75% in 2018.
  - Field strategies during the COVID-19 pandemic.
    - Privilege information gathering by Internet, telephone, and digital media.
    - Use of new operative condition codes.
      - Special codes assigned with the status of economic units impacted by the pandemic.
    - Special information gathering for economic units temporarily closed due to sanitary contingency.
      - Focus on information on employment.
    - Dissemination by means of notes for users about changes made to the use of information with reserve.
  - Level of business surveys gathering during the pandemic.
    - Monthly surveys – CAWI most used source of gathering information during the pandemic.
    - 2020 – "Other Media" source appears – using other sources to get information during the COVID pandemic.
- Survey on the Economic Impact Generated by COVID-19 on Businesses (ECOVID-IE).

- o Observation unit - The company
- o Study Domains
  - National-sector
  - National-company size
- o Sampling Frame: 1,873,564 companies with telephone
- o Three events (reference period)
  - April, 2020
  - August, 2020
  - February, 2021
- o Geographical Coverage: National
- o Results by stratum: MICRO, SMEs, LARGE
- o Sampling Parameters:
  - Confidence 95%
  - Relative error from 3% to 5%
  - Average number of enterprises affected by COVID-19 50%
- o Data collection logistics
  - Interviews via CATI (home office) – 48 interviewers on average – 15k calls made for each of the 3 events – average length of interview was 25 minutes.
  - Data Collection
    - May – June 2020
    - September – October 2020
    - March 2021
  - To reach the sample, more than 15 thousand calls were made.
- Strategies after COVID-19 pandemic
  - o The previous use of digital means of collection for business surveys allowed the Institute to reinforce its use to maintain it definitively.
  - o The information collection strategies have been adjusted in accordance with the standardization of economic, statistical and geographic activities, with the end of the COVID-19 health emergency on May 9, 2023 by the Mexican government.
  - o INEGI has designed and structured plans of action for contingencies like this and similar types.
- Aftermath
  - o The set of collection means, particularly CAWI, represented the main strength to face the prevailing conditions during the pandemic.
  - o The set of collection strategies implemented made it possible to maintain the dissemination of all the indicators from the business surveys, without modifying the dates established in the dissemination calendar.
  - o The main lesson learned was the capacity of informants and collaborators of the business surveys to adapt to all the changes.
  - o The availability of action plans designed and structured to deal with contingencies of this nature or with complicated scenarios represents one of the most important lessons for the performance of national statistical offices in the future.

- I will be sharing on the system used in Singapore to collect and compile PPI data – Price Indices E-Survey System (PIES).
- The Producer Price Indices compiled by Singapore Department of Statistics (DOS) are:
  - Services
    - Accounting Services Price Index
    - Computer Consultancy & Information Services Price Index
    - Warehousing & Storage Price Index
    - Telecommunications Services Price Index
    - Freight Forwarding Price Index
    - Sea Freight Transport Price Index
    - Cargo Handling Price Index
    - Air Transport Price Index
  - Goods
    - Import Price Index
    - Export Price Index
    - Singapore Manufactured Products Price Index
    - Domestic Supply Price Index
- DOS's Digital Transformation
  - As part of DOS's digital transformation, we are constantly adopting and implementing digital technology to facilitate the compilation of the various price indices. Our operations have been supported by the following software and systems. The timeline below shows how our data systems have evolved over the years, mainly driven by respondent preferences and resources availability:
    - 2015-2021 – Microsoft Excel Visual Basic for Applications (VBA)
    - 2016 – 2021 – Producer Price Indices Online E-Survey System (POES)
    - 2018-2021 – Producer Price Indices System (PPIS)
    - 2022 Onwards – Producer Price Indices E-Survey System (PIES)
- Back in the early years, respondents were still very much inclined towards postal surveys. POES was created to collect data from certain industries more receptive to email/online survey. Subsequently, PPIS was created to help automate some data processing/compilation from these collected data.
  - Producer Price Indices Online E-Survey System (POES)
    - Data Collection system developed in 2016 for surveying respondents via email or online.
    - Features
      - Allows users to generate survey forms to conduct surveys via email or online.
      - In-built validation checks to ensure the data entered by survey respondents are sensible.
  - Producer Price Indices System (PPIS)
    - Data processing and index compilation system developed in 2018.
    - Features
      - Enabled users to compile producer price indices based on the defined index structure using the selected index formula.

- Allow users to carry out price imputations such as carrying forward previous month's prices or applying a weighted average price change of a group of linked items within the price index.
- Limitations of having 2 separate systems POES and PPIS
  - With 2 separate systems developed by different vendors, resources were expended to ensure smooth communication between both systems.
    - For example, POES output files had to be modified to meet the input requirements of PPIS to be transferred and uploaded successfully. Hence, DOS officers must also take the additional step to verify the accuracy of data transfers between both systems.
  - Additional costs were incurred to host and maintain 2 systems.
  - Time and effort were spent to manage 2 different vendors.
  - Survey forms generated by POES were not customisable to incorporate any new data items to reflect relevant changes in the industry. The lack of any customisability also resulted in costs incurred as the vendor of POES had to create bespoke modules to meet the requirements of newly developed or rebased price indices.
  - As a stop-gap solution, DOS officers wrote Visual Basic for Applications (VBA) Macros using Microsoft Excel to generate the customised survey forms externally from POES. However, significant manual effort was still required by DOS officers to actively manage and debug the codes for the respective price indices. Furthermore, the data transfer issue caused by managing 2 separate databases persisted.

- Development of PIES
  - Considering the limitations of POES and PPIS, and the accelerated digitalisation exacerbated by the COVID-19 pandemic, DOS initiated the development of Producer Prices Indices E-Survey System (PIES).
  - An integrated system whereby data collection, data processing and index compilation can be conducted on a single platform.
  - Addressed most of the limitations of POES and PPIS as it is cost effective and saves resources and manpower.
- Development of PIES: The development of PIES is outlined here. Requirements for the system were provided to vendor and refinements were made along the way. The system became officially live on Jan 2022.
  - Initial Fact Finding
    - Sharing of DOS officers' requirements with vendor.
    - Vendor assisted to gather, analyse and confirm the requirements for development.
  - System Design and Planning
    - Sharing of DOS officers' requirements with vendor.
    - Vendor assisted to gather, analyse and confirm the requirements for development.
  - System Development
    - Development of PIES based on finalised system design.
  - User Acceptance Testing
    - System testing performed by DOS officers and vendor before PIES went live.
  - System Commission
    - Data migration from POES and Microsoft Excel VBA database.
    - System was commissioned and went live on January 2022.

- Functions of PIES: PIES was built to be customisable and scalable. The main functions of PIES are listed:
  - o Setup index structure, product details and weights.
  - o Upload and maintain firms and respondents' information.
    - ▪ Captures all respondents' details (e.g. contact details),
    - ▪ Allow DOS user to specify the file name and format of the password-protected survey form,
    - ▪ Unique access code for respondents to login and access the e-survey.
  - o Design survey templates for customised survey forms
  - o Send out survey forms and collect survey data via (1) Email or (2) Online E-Survey.
  - o Process survey returns and undertake imputations.
  - o Compile indices and generate reports for dissemination and servicing of data requests.
    - ▪ Compiled data are generated from PIES and subsequently used to prepare the report for dissemination.
- Conclusion
  - o Covid-19 had changed the way people work and influenced their willingness to adopt digitalisation.
    - ▪ Before the pandemic, people were not as open to electronic questionnaires by email.
    - ▪ Now, postal surveys are not as effective as people shift to working remotely. DOS seized the opportunity to accelerate the digital transformation of survey operations. There was a push for survey responses to be submitted by email/online instead of post. This resulted in a spike in submissions via email and e-survey.
    - ▪ Of course, consideration need to be made for digital illiterate respondents which are quite prevalent in certain industries. (e.g., cargo handling)
  - o In conclusion, the development of PIES has improved work productivity and provided greater convenience to our respondents.

- Special survey
  - The special surveys during the corona crisis.
  - The cooperation with the central bank and the motivation for reduction of the response burden.
  - Both organizations worked together to develop a unique and flexible survey.
- Motivation-Special surveys during the Corona.
  - NSO formal estimates had significant time lags in releasing employment and business estimates pre-COVID-19, from 45 days to a year. These time lags are accepted and within the international standards during regular periods.
  - The extraordinary economic conditions and fluctuations during the crisis rendered these estimates obsolete.
  - 11 flash surveys were conducted that reflected the current and rapidly changing environment.
  - Knowledge and capabilities were gained in questionnaire design and quick data collection.
  - This prompted global NSOs to initiate special surveys for policymakers.
    - Created new capabilities and a high standard of relevance of the National Statistics Office.
    - Required Substantial resources that might damage the management of the regular surveys.
- The companies survey of the central bank
  - The Bank of Israel's quarterly survey, which has been conducted since 1982, is similar to the BTS conducted in OECD countries.
  - The Central Bureau of Statistics (CBS) established a monthly Business Tendency Survey (BTS) with improved methodological and representative elements compared to the Central bank Companies Survey.
  - One advantage of the Companies Survey over the CBS Survey was the special section with different questions each quarter.
- Motivation-Reduction of Response Burden
  - Reduce the response burden on the business sector.
  - The Central Bank would cease the Companies Survey and would use the monthly. Business Tendency Survey (BTS) estimates solely.
  - The CBS developed a special section with technological capability for different questions in each month.
- Business Tendency Survey
  - What is the BTS?
    - Economic data from short-term business surveys, such as production and revenue indices, are crucial for shaping global monetary and fiscal policies.
    - Traditional data processing methods for these surveys are time consuming, taking from one and a half to six months to complete.
    - To bridge this time gap, qualitative business surveys have gained importance as they provide forecasts well in advance of data collection and analysis completion.
  - Survey respondents are asked to answer various variables on their company's business
    - Inventory/sales/employees.
    - past/present/expectations for the future.
    - qualitative rating scale (1-very high to 5-very low).

- o The questionnaire
  - ▪ Short and high quality.
  - ▪ The first survey that published for a specific calendar month.
- o Short publication time
  - ▪ Preliminary indicator for quantitative surveys that are published late (production index, revenue indices from VAT sources...).
- o Background
  - ▪ In this survey company managers in Israel evaluate the business performance of their company in the last month and its performance in the next month.
  - ▪ The survey is qualitative: it includes questions about the positions and personal assessments of the managers and does not collect financial and quantitative data.
  - ▪ The purpose of the survey is to identify turns in the business cycle in the business sector and predict the directions of its development.
- o Data collection
  - ▪ The data is collected through a self-completion online questionnaire.
  - ▪ If necessary, the CBS reviewers complete the data in a telephone interview.
- o Main uses
  - ▪ Forecasting the quarterly GDP by a Bank of Israel model developed in a joint study with the CBS.
  - ▪ Examining the business situation and identifying business cycles and limitations (such as credit limit).
  - ▪ Examination of relevant issues critical to economic policymakers – Special survey by demand.
- Special survey by demand
  - o As part of the Bank of Israel's business survey section, it was decided in collaboration with the research division to develop a survey's chapter with alternating questions in order to examine the critical variables for economic policymakers.
  - o Developing a dynamic section in the BTS monthly questionnaire.
  - o If new questions added they can be added on the next month's questionnaire.
- The morbidity effect from the Omicron wave on businesses activity
  - o Government decided to change strategy compared to previous waves of the pandemic.
  - o Large businesses barely impacted in this wave.
  - o Industries impacted also differed.
- The effect of the propagation of the omicron wave on businesses – March 2022
  - o The chapter's estimates received a major volume in the media and helped the Bank of Israel and the Ministry of Finance to understand the variation in damage to the various industries and the difference between large businesses and small businesses.
- The effect of the war between Russia and Ukraine on business in Israel – April 2022
  - o The managers were asked in the alternating part of the survey questionnaire about the effects of the war between Russia and Ukraine on their business.
  - o Most businesses were asked 3 questions: *Businesses in the industrial sectors were asked another question that is more relevant to their field.
    - ▪ To what extent has the war between Russia and Ukraine affected your company's activities so far?
    - ▪ To what extent will the war between Russia and Ukraine affect the future activities of your company?

- To what extent did the war between Russia and Ukraine cause an increase in the prices of the raw materials used by your company?
- Labor productivity and barriers to investments in machinery and equipment in the business sector – May 2022
    - The survey questionnaire is the result of a research collaboration between the Aharon Institute for Economic Policy at Reichman University, the Central Bureau of Statistics and the Bank of Israel.
    - Purpose: identify the various barriers to capital investments in the business sector.
    - Three topics:
        - The main factor affecting productivity per working hour.
        - Evaluation of the technological equipment in the company.
        - Barriers to investment in technology and innovation.
- Special survey- importance
    - The survey allows us to examine critical and important issues within a short organization time.
    - The information collected in the changing chapter is analyzed in depth and many insights are extracted from it that are used by the policy makers.
- Conclusion
    - The special survey as an additional section in regular monthly survey is a technological development that allows quick estimates on critical issues with minimal NSO resources.
    - This development strengthen the relations and cooperation between the CBS to other governmental offices and enables critical estimates during disruptions that unfortunately become more frequent.
    - This innovation has the potential to revolutionize NSOs' data production, providing policymakers with timely and relevant economic indicators for better decision-making.

Questions & Answers

Christian Stock (Statistics Austria): We have two questions, one for Mexico, and one for Kelvin. The first question for Mexico is it was on your maybe on your last slides, where you highlighted the characteristics of the of the survey where you mentioned the sample, size and zone, and there you pointed out that 50% of the enterprises have been affected by the Covid pandemic crisis. So what exactly is the definition of have been affected? Was that a complete loss of information. Or what do you mean with that 50%?

Ariel Juárez Answer: That 50% was just for a parameter for the sample design, to calculate the size of the sample at that moment as we don't know how many enterprises were affected by Covid. We don't know explicitly what kind of what number of enterprises were affected. That was just for the statistical parameters, for calculate the sample.

Christian Stock (Statistics Austria): The question for Kelvin, you mentioned that the respondents have the choice to choose to respond via email or via online application. So do you use any kind of encryption for your email responses. Because, let's say, for the pricing part is our very critical information that should not be sent via email unencrypted.

Kelvin Teh Answer: So what we do is for email survey form is that we encrypt with a password. So that it is protected. And this applies for in some way for the online E service system, in the sense that only the respondent themselves or people with the authorized access have the unique respondent ID, or the password to access the survey.

Melanie Santiago (US BLS): I have a question for Daniel about the dynamic questions that you added to the business survey. I was curious if adding, these additional questions at various times in the survey, has that affected your response at all. We always have additional information we'd like to get from like our existing survey respondents. But we worry that adding a question will cause, overburden at times, and we don't want to have them stop participating in our regular survey by trying to get additional information. So what is your experience been with response and the additional questions?

 Daniel Roash Answer: We say it really depends on the question. We ask questions about super relevant issues, like the interest rate and the inflation in the Covid crisis and the war. And from my experience the firms really like this question, we get more response in our business tendency questionnaire and the regular questionnaire where there are questions that are not so relevant. For example, we ask about what is the exchange rate, what do you think will be the exchange rate for the US. Dollar in the next 3 months, and people are not in this issue, and they tell you why you ask me this. So the flexible surveys ask questions that get full cooperation while there are other questions that are doing the opposite.

Bonnie Murphy – USBLS: Do you ever follow up and ask the same question again at a later period of time to compare the results or do you plan to?

 Daniel Roash Answer: We made it in July 2022 and July 2023 we had a special survey and we can compare this estimate because in 2022 there was a crisis or signs of a crisis in the technology in firms in the USA and we asked the firms in Israel and they were very optimistic. But then we conducted it in July 2023 after the great interest rise and other aspects and we did this comparison.

Questions from the chat:

- **Zsófia Mikó - Hungarian Central Statistical Office**
  - What is DCM?
  - **Mexico_INEGI_Ramón Bravo**
    - Thanks for the question, DCM means mobile computing device, e.g., a tablet.
- **Eveli Šokman - Statistics Estonia**
  - I have a question about the questionnaire for SPPI in Norway. What kind of software is used for working out the electronic questionnaire?
  - **Trym Langballe - Norway**
    - It is a proprietery software solution of the norwegian government, called Altinn Altinn is an "internet portal for digital dialogue between businesses, private individuals and public agencies" (https://info.altinn.no/en/about-altinn/what-is-altinn/).
- **Yasin Altın_TÜRKIYE**
  - Hi, Mr. Langballe, I would like to ask about the situation where a firm wants to choose a separate price method for each service, depending on its activity in different sectors. I have been wondering if multiple price method selection is possible?
  - **Trym Langballe - Norway**
    - No, the firms are not able to change the pricing methods themselves. We decide on one pricing method for each service group (elementary Level). The companies then must rapport prices using that model. For our part this makes it easier when we compile the index, however we do see some limitations as some firms might find it difficult to rapport the correct price. If a firm rapport several prices (i.e., several service groups) the service groups might have different pricing methods, but again, it is up to us in Statistics Norway to decide which pricing method they must use.
- **Anonymous Participant**

- Mr Aviv, I want to know about the sampling frame of BTS. Thank you.
- **Daniel Roash Israel CBS**
    - The sampling frame is all businesses in the business sector with at least 5 jobs, it represents about 70K businesses in the frame.

- Transitioning from theory into framework that is ratified by group members and colleagues in CPI.
- Modernising CPI Production: PPI as an Official User Introduction
  - Meeting Outcome - Group of Experts on CPI, June 2023
    - A summary version of the framework plus the case studies was presented at the Group of Experts on CPI Conference and was well received.
    - Work subsequently progressed and was raised at the International Working Group on Price Statistics (IWGPS).
    - The IWGPS agreed to review both papers and are happy to refer to the papers on the IWGPS website. The group also agreed to consider the material in the update of the PPI Manual.
    - The IWGPS has provided consideration and valuable feedback which are currently under review.
- Modernising CPI Production: PPI as an Official User Case Studies
  - Case studies come from Sweden, Canada, Switzerland and Finland.
- **Use of CPIs in PPI Statistics Canada Case Study (Xin Ha)**
  - CPI and PPI Overview
    - PPI data is collected directly from respondents whereas the CPI data is collected by price collectors that go into the retailers and collect the prices directly.
    - Main Sources of Data Collection
      - PPI: Electronic Questionnaire, administrative Data, web scraping.
      - CPI: Manual data collection, administrative data, web scraping.
    - Calculation System
      - PPI: CYGNUS (Statistics Canada Corporate Tool), R based pipeline – GitLab, Automated Processes.
      - CPI: CYGNUS (Statistics Canada Corporate Tool).
  - Use CPIs in PPI
    - Four uses
      - Data Sharing: Using microdata to calculate a price index fit for PPI use.
        - Use of retail scanner data to create fit for use.
      - Proxies: Use of CPIs as proxies to deflate GDP before official PPI numbers are available.
      - Modelling: Use of CPIs to model PPIs.
      - Total Replacement: Use of CPI as a total replacement in PPI for certain industries.
  - Collaboration of CPI, PPI and National Accounts
    - Constant communications among all three parties.
    - To establish needs of National Accounts.
      - Improvement on existing price indices.
      - Future needs.
    - To establish methodology coherence on price concepts.
    - Sharing of administrative data sources.

- **The use of CPIs in PPI – Statistics Sweden Case Study (Marcus Fridén)**
  - Micro data usage
    - Where taxes (other than VAT) affects the individual price observations the tax needs to be removed before calculating the index.
      - Ex. Electricity.
    - Removing taxes also effects the weights between companies so the weights are a bit different for PPI than in CPI.
  - Direct use of CPI indices
    - Make sure changes in taxes or VAT do not affect the index.
    - Indices are at a national product group level, below COICOP sub-class.
    - Indices are typically used at the 6-digit CPA level in PPI (low level).
  - B2C or B2All
    - Supply-Use tables from National Accounts are used to identify the share of business to consumer.
    - If business to consumer is dominating, or the prices are assumed to develop similarly, the CPI will represent business to all.
    - If business to business is large enough, a separate SPPI for business to business is produced, and CPI represents only business to consumer.
  - Where business to consumer represents business to all
    - Even though the price levels are different, we assume that the price development in the long run will be the same for both business to business and business to consumer.
      - 49.32 Taxi operation services.
      - 52.21.24 Parking lot services.
      - 58.13.10 Printed newspapers.
      - 59.14 Motion picture projection services.
  - Where business to consumer represents only business to consumer
    - 61.10.1 Data and message transmitting services.
    - 68.20.11 Rental and operating services of own or leased residential real estate.
    - 68.31.1 Real estate agency services on a fee or contract basis.
    - 79.12.11 Tour operator services for arranging and assembling tours.
- **CPI and SPPI's partnership at Statistics Finland – A Case Study (Siiri Pesonen)**
  - SPPI utilizes CPI data in three ways
    - Customized data collection
      - CPI team collects both consumer and producer price observations from the same enterprise at once.
      - Only one price survey filled out with prices for both observations.
        - Can be done when one enterprise is a respondent for both consumer and producer price indices.
    - Joint data collection and calculation
      - CPI collects both consumer and producer price observations from the same enterprise at once, calculates price changes and handles methodological updates.
      - API and large datasets.
      - CPI receives the data and processes it and gives it to the PPI team.
    - Direct use of CPI indices

- Published CPI indices are either processed as a part of SPPI's price observations or used alone as a direct replacement of SPPI.
  - o CPI also benefits from PPI data
    - CPI can also use data that PPI team collects – e.g. electricity prices and volumes – the PPI team is responsible for it and the data come in a way that CPI can also use it (can add taxes to it, etc.).
    - Example: Electricity
      - Producer price team handles EU regulated survey on electricity prices.
      - Includes average prices and volume (MWh) for business and household consumers grouped by consumption.
      - Data comes in a way that CPI can also use it - CPI can use this data for calculations for their needs by forming their own consumption groups and adding taxes to calculate their indices.
    - Price and volume data for households is suitable for CPI's use.
  - o The Deflator Group – formal method set up in 2016 which brings together all the price statistics, National Accounts, Short-term Business Statistics to promote consistency in deflator use.
    - Facilitates cooperation
      - Creates a common forum for national accounts and business, price and volume statistics since 2016.
    - Targets at coherent deflator use
      - Main goal is consistent use of deflators across statistics; a product is always deflated with the same price index.
    - Enables information sharing
      - Regular meetings create a channel for sharing current news and developments between the statistics.
      - Teams channel for communication between the meetings.
    - Maintains deflators in one application
      - All methods, structures and product-price links of deflators are maintained in a common production system Deflaattori.
  - o Other success factors
    - One team to collect and process price data
      - Located under different divisions but only one team focuses on the collection and processing, making it easier to know what's going on for a day-to-day basis.
    - One production system for price statistics called HITS
      - Makes it easy for the data to flow from one price statistics to another.
      - Shared processes and methods – easy to understand what the other statistic is doing.

- **CPI and SPPI's partnership at Swiss Federal Statistical Office – Case Study (Angela Hernandez)**
  - o Previously lacking principles to facilitate, regulate, and ignite collaborative and systematic use of CPIs as an established alternative data source for SPPIs.
  - o Importance to determine centralized and same methods for CPI usages.
  - o SPPI utilizes CPI data in two ways.
    - Direct use of CPI indices: At Index level. The CPI index is used for the business to consumer segment of the business to all aggregate.

- Direct use of CPI prices: At prices level, the CPI prices are used to calculate the business to consumer segment of the business to all aggregate.
- Treatments required depending on which branch we are looking at.
    o Areas of cooperation
        - CPIs inspired by PPIs
        - PPIs inspired by CPIs
    o Other areas of cooperation
        - Shared technics of data collection, ex. Web scraping
        - Methodology ex. imputations
        - Index uses
- **Modernising CPI Production: PPI as an Official User Conclusion (Rohan Draper)**
    o Establishing common ground for sustainable collaboration
        - Sense of cooperation, communication, and community across the different programs can create value added, especially for those with more limited resources.
        - Tapping into knowledge and infrastructure that is consistent across the different programs.
    o Technical framework
        - Valuation basis
        - Classification concordance
        - Imputation
        - Quality adjustment
        - Publication timing and frequency
        - International trade
    o Practical considerations
        - Communication and data-sharing
        - Resource optimisation
        - Burden minimisation
        - Transparency
        - Coherence

Q&A Session

Bonnie Murphy: Congratulations to this group for making it into the future PPI Manual and the future CPI Manual. Something to be celebrated for the Voorburg group. Question: Is there a concern about the release schedule of CPI and PPI indexes if they are not on the same day that you are releasing one piece of one index before the other? Or do you publish on the same day to take care of that issue?

Answers to Bonnie Murphy's Question:

Siiri Pesonen: Finland CPI is published about 10 days before PPIs. We get the data for our needs easily, but for example CPI using PPI's data for electricity, it is delayed by one month.

Xin Ha: StatCan uses multiple measures for the PPI, all published at different timelines. A couple of days difference usually between the published measures. Looking into producing a composite PPI in terms of final demand. Note: StatCan doesn't have a composite PPI yet. Its PPI contain multiple price indices that measure different industries. The most quoted PPI is the IPPI which measures the manufacturing sector. This is released on a monthly schedule and is usually within a couple of days of the CPI release sometimes earlier sometimes later.

Angela Hernandez Santacoloma: Same strategy as Finland.

Rohan Draper: If you are a country that's looking to implement the use of CPI on your PPI for the first time, have a chat with your national accounts. They might be already doing a similar task, and they might have built into their compound indicators or their compound deflator indices pulling in a CPI, and therefore pulling in a PPI, which they consider to be just business to business. So if you proceed down this road, shifting from business to business, to business to all, have those discussions. You don't want to be accidentally biasing towards a double sort of input from the CPI.

Questions:

Rebecca Perl-Kapferer *(Austria)*: Canada – you want to ensure methodological coherence – can you elaborate on this, what you mean and how do you do it?

Xin Ha: We have administrative data sources, scanner data that is being used in the PPI to create indices but not yet in the CPI data. It is something that is being looked into as we don't want to do something completely different when this is introduced, we want it to be coherent with the other strategy and make sure that the two programs aren't doing something that's totally in contradiction to each other. This is done for any new developments, as well as when the CPI has new developments, getting feedback from all associated parties.

Rebecca Perl-Kapferer *(Austria):* For Sweden: You tried to ensure if there are changes in the tax rates, that they don't impact the indexes – how do you do that? How has this been impacted by Covid pandemic?

Marcus Fridén: Usually every 6 months, there is a list of the tax changes from the CPI so that the changes can be made as needed. They are held constant based on the list.

Day 2 – Thursday March 7, 2024

Marcus Fridén – opening remarks for Day 2:

- Today there will be 2 sessions on a similar topic – imports of services, where there will be 4 presentations in total:
  - Use of PPI time series of countries from which we import products/services as a proxy (Session leader: Nicklas Elversøe (Denmark), Sahoko Furuta (Japan), Katherine Chant, Robert Bucknall (UK)).
  - Measurement challenges for import services (Mikael Nordin (Sweden), Agnieszka Matulska-Bachura (Poland)).
- Followed by 3 presentations on digital services:
  - New Handbook on Digital Trade (David Brackfield, OECD).
  - Mini-presentation – mobile games (Siiri Pesonen, Finland).
  - Mini-presentation – Developing SPPI for Computer programming, consultancy and related activities in Israel (Michael Elizarov and Moriah Hazi, Israel).
- The last session of the day is an update on the improvements to national accounts and the deflator gateway in the UK:
  - Update on improvements to National Accounts and UK deflator gateway (Robert Bucknall, UK).

Cross cutting topic (5) – Use of PPI time series of countries from which we import products/services as a proxy Session leader: Nicklas Elversøe (Denmark)

Session leader: Niklas Elversøe remarks
- In this session we will see different takes on how you can utilize these PPIs from other countries

Use of PPI time series of countries from which we import products/services as a proxy - Sahoko Furuta (Bank of Japan)

- Motivations of using PPI of other countries are;
  - Partially, we use "PPI/EPI * exchange rate" of the exporter as an alternative way to gather reported import price from respondent for Import Price Index.
    - For example, in a situation where Japan imports smartphones from the US, and the smartphone importers refused to report the transaction price, the Bank of Japan would use PPI of smartphones from the US as the next best thing.
    - A strong assumption that a product is traded at the same price for the domestic, foreign, and Japanese market.
      - Sometimes an inappropriate method to use.
  - We use PPI of the importer for Price Index of patent licensing services.
    - Appropriate and efficient price index compilation.
  - Today, we introduce the second motivation with case studies.
- Summary
  - We use other country's PPI as a proxy to compile the index of patent licensing services.
  - A typical example of patent royalty formula is; (a fixed amount plus) a percentage of sales achieved by the patent:

$$\text{Price of patent licensing services} =$$
$$\underbrace{\text{Unit price of product produced by the license}}_{(A)} * \underbrace{\text{A rate of license usage}}_{(B)}$$

- o We ask respondents to report only (B) and use PPI as a proxy for (A) to reduce response burden.
- Intellectual Property
  - o Definition – Patents
    - "Patent licensing" is a service that permits other companies to use the company's patent rights and know-how.
    - In export price, we surveyed transaction price in which a domestic company licenses the use of its patent rights to a foreign company (including intercompany transaction). Imports are the opposite.
    - Example: Licensor (research laboratory) allows licensee (product manufacturers) to produce medicines using licensed intellectual property.
- Market size of patent rights
  - o Market size of patent rights has increased due to the expansion of global supply chains.
  - o Japan has a particularly large export value of patent rights compared to import trade
    - e.g., Licensing of patents by automakers to their own overseas plants.
  - o In 2015, Bank of Japan started the survey of import/export price index of patent rights ahead of domestic price index.
- Price Mechanism
  - o A price of patent licensing services is defined as "a price of licensing services per unit of products produced using the licensed patent rights".
  - o In principle, the real value of patent licensing services is proportional to the real supply of products produced using patent rights.
- Price Calculation
  - o In practice, a price of patent licensing services per unit of product is calculated by multiplying the license rate (reported from respondents) by PPI corresponding to the product produced using patent rights.
  - o As shown in the example, a price of a patent licensing service per unit of products is derived from the total patent royalty divided by sales of the amount of the product and can be expressed by the formula on the right side (calculated by using reported license rate and PPIs corresponding to the product produced using patent rights).
- How to use Price Index as a proxy
  - o In export transaction, we assume that overseas companies produce locally using patent rights owned by Japanese companies.
    - Proxy: PPI of exporting destination
  - o In import transaction, we assume that Japanese companies produce in Japan using patent rights owned by overseas companies.
    - Proxy of product price: PPI of Japan
  - o When using PPI as a Proxy, it is important to select an appropriate item in PPI. Ideally, we should select PPI that is perfectly corresponding to the product produced using patent rights.
  - o In reality, there is not always an appropriate item in PPI. In such cases, the upper-level indexes should be selected. Price trends for products other than those produced using patents would also affect the Price. Therefore, the item should be selected carefully.
  - o Example of automotive engine – in this example we survey the price of patent rights of automotive engine – if there is a PPI of automotive engine we can use it, but if not, we should consider using PPI of another product.
    - In such cases, the upper-level indexes (PPI of automobile parts) should be selected.

- As a result, price trends for products other than those produced using patents would also affect the patent price.
- However, price trends of products from the same product group are expected to be similar, so it is not a serious problem.
- Quality Adjustment
  - We need to survey not only a license rate with constant quality but also a price of the product with constant quality.
    - Quality adjustment for both license rate and product price is necessary.
  - The use of the quality-adjusted price index as a proxy for product prices is appropriate.
- Example: patent price of automotive engine functions
  - Supposing that there is no PPI for automotive engines, and we use PPI for automobile, and then one day the quality of the patents improved due to a new invention of automotive engine, then suppose the automobile price increased by 10% reflecting the improvement of the engine performance.
  - On the other hand, the license rate rose by 10%, reflecting the improvement of the patent rights of engine functions.
  - In this case, the patent price would increase by 20%.
  - On the other hand, when adjusted PPIs of automobile and license rates are unchanged and used, the patent price remains unchanged because the price changes are considered to be entirely due to the improvement of the engine function and the pure price was unchanged.
  - Is it really appropriate to use "Quality-adjusted price index" that reflects quality changes unrelated to the patent?
    - In this example (slide 12) the quality of patents improved, due to the new invention of suspension systems, and automobile price increased by 10% reflecting the improvement of suspension systems.
    - On the other hand, the license rate remained unchanged because engine function was unchanged.
    - In this case, it is very good to use PPI as a proxy if the adjusted PPI of the automobile and the adjusted PPI of the automotive engine are perfectly correlated.
    - When we use the upper level indexes, quality changes for products other than those produced using patents would also affect the patent price.
- Price Trends - Patent rights
  - Looking at the price of patent licensing services, the price index has fluctuated due to exchange rates and PPIs, while license rates have generally remained almost flat.
  - Changes in license rate seldom occur, and price of patent licensing services is largely affected by changes in the prices of products produced using patent rights.
- Conclusion
  - When compiling the price index of patent licensing services, we ask respondents to report only a rate of license usage and use PPI as a proxy for the product price.
  - In particular, in export prices, the product price of exporting destination is used. Therefore, we use the quality adjusted price index of another country as a proxy.
  - Changes in license rate seldom occur, and price of patent licensing services is largely affected by changes in the prices of products produced using patent rights.
    - The licensor doesn't change the license rate much, so the price of patent licensing services is largely affected by the changes in the price of the products produced using patent rights.
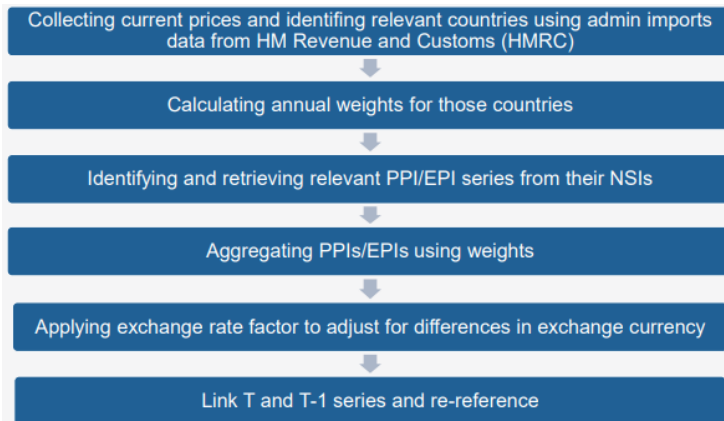
- o Such an approach can be used not only for patent rights services, but also for other intellectual property, such as copyrights.
  - ▪ This method can support appropriate use of PPI as a proxy for price indexes.

Using PPIs and EPIs as proxies for IPIs - Robert Bucknall (UK)

Exploring new ways to adjust import prices when traditional methods aren't available or suitable.

In this presentation, we'll discuss using a proxy approach by combining producer price indices or export price indices from other countries, and this method can serve as a tool to evaluate existing data quality or as an alternative deflator when needed and we'll also compare it with initial results from using unit value indices.

- Motivation
  - o Concerns raised regarding the quality of some IPIs used by ONS.
    - ▪ Have not met target sample size, impacting their quality.
    - ▪ Lack deflators for many services as well, ongoing area of research.
  - o We are therefore investigating alternative methods to create IPIs to supplement current series.
    - ▪ Currently use PPIs where appropriate IPIs are unavailable.
    - ▪ Primary development work on using Unit Values Indices (UVIs) to deflate trade of homogeneous products (in first instance).
    - ▪ This presentation is on experimental work investigating the possibility of using an aggregate of PPIs or EPIs from other countries as a proxy for our IPI – to be used as a tool to assess current IPIs or to replace them if appropriate.
  - o Import price indices haven't met their target sample size in quite a few years, impacting their reliability, and we're actively improving our business price statistics following a recent recommendation by the Office for Statistics Regulation.
  - o We are also looking for alternative deflators for imports when our current methods are unreliable.
  - o Primarily focusing on unit value indices for homogenous products but need more options until our sample and coverage improve.
  - o In addition, currently, we lack suitable trade deflators for any services which is an ongoing area of research.
- Method
  - o Creating proxy index from PPIs and EPIs published by other NSIs to create an alternative deflator.
    - ▪ We are creating a proxy index using PPIs and EPIs from other national statistics institutes to serve as an alternative deflator.
  - o Countries chosen based on which are sources of imports.
    - ▪ Split into EU and NEU.
- Diagram outlining method for creating the proxy index:

Collecting current prices and identifying relevant countries using admin imports data from HM Revenue and Customs (HMRC)

Calculating annual weights for those countries

Identifying and retrieving relevant PPI/EPI series from their NSIs

Aggregating PPIs/EPIs using weights

Applying exchange rate factor to adjust for differences in exchange currency

Link T and T-1 series and re-reference

- o Method for creating proxy index
  - Collecting current prices and identifying relevant countries using admin imports data from HM Revenue and Customs (HMRC).
  - Calculating annual weights for those countries.
  - Identifying and retrieving relevant PPI/EPI series from their NSIs.
  - Aggregating PPIs/EPIs using weights.
  - Applying exchange rate factor to adjust for differences in exchange currency .
  - Link T and T-1 series and re-reference.
- Results
  - o Case study 1 – CPA C201 - Basic Chemicals, Fertilisers and Nitrogen Compounds, Plastics and Synthetic Rubber in Primary Forms.
    - This case study was chosen because their current IPI is good for EU imports but poor for non-EU imports so they've created a proxy index using both PPIs and EPIs.
    - Product selected is Basic Chemicals, Fertilisers and Nitrogen Compounds, Plastics and Synthetic Rubber in Primary Forms.
    - Chosen as current IPI is considered "good" for EU Imports, but "poor" for NEU imports, based on current sample size and coverage.
    - Created proxies using PPIs and EPIs.
    - Proxy created uses Belgium, Germany, Netherlands, Ireland and France revealing several key insights as they generally follow similar movements to our IPI supporting its use or serving as an alternative deflator.
    - A noteworthy observation is the enhanced accuracy of the proxies in mirroring the IPI especially evidenced since 2021, which suggests a closer alignment between the proxies and the official data source in recent years.
      - One plausible explanation for this could be the widespread supply chain disruptions and rising inflation across the EU and many other countries.
        - o Many countries are grappling with these challenges potentially leading to converging trends among PPIs, EPIs and IPIs, as margins may have shifted.
    - There are challenges in creating the proxy for non-EU imports – e.g., including different classification systems and data availability.
      - Despite these challenges, proxies provide valuable insights.
    - Slide 8 and 9 - In this scenario, the PPI based proxy relies on indices from the US, Norway and Japan, whereas the EPI proxy also incorporates data from Switzerland.

- There are notable differences between our existing EPI and the proxies.
  - Worth noting that for a substantial portion of the time series, the IPI and proxies exhibit similar trends and this similarity provides some reassurance regarding the reliability of our IPI.
  - Additionally, the uptick in our IPI since early 2021 mirrors that of the PPI proxy, indicating the authenticity of this trend in our IPI.
  - And the periods of significant divergence from the proxies coincide with rapid fluctuations in exchange rates between pounds, euros and dollars – notably in 2008, 2009 and 2016.
- Case study 2 – CPA B061 Crude Petroleum
  - Chosen as one of the products for which we are researching the use of UVIs.
    - UVIs provide a straightforward method for calculating price indices by quantifying the average price per unit of a product or service, without adjusting for quality differences.
    - However, UVIs are only suitable for homogeneous products or services where quality adjustments are unnecessary. In the context of this study EU imports are excluded because the vast majority of crude oil imports to the UK originating from the non-EU countries.
  - Countries included in proxy: (95% of total crude oil imports are outside of the EU).
    - Since 2008 non-EU countries have consistently accounted for over 95% of total crude oil imports, the top 5 contributors being Norway, US, Nigeria, Algeria and Russia.
    - PPI data are available for only 3 of these countries: Norway, the United States and Russia. The absence of data from Algeria and Nigeria poses challenges in constructing a fully representative proxy deflator.
    - Furthermore, the UK's ban on Russian imports oil imports effective since December 2022, it eliminates the rationale for including Russian price data in the proxy.
  - NEU only due to very few EU imports.
  - When compared with other sources, proxy initially runs under the other data sources but beginning in 2016 it aligns more closely with the other sources.
    - Coincided with US increasing contribution – diluted Norway's influence on the measure.
  - Graph slide 12
    - Proxy initially runs below the UK IPI, US PPI and the IMF closely tracking the statistics Norway series from 2016, closely aligning with the current IPI series.
    - Between 2008 and 2015, Norway made up nearly 60% of crude oil imports, while Russia and the United States were much smaller contributors at 8.3% and 0.1%, respectively.
      - So Norway's PPI had a bigger impact on the proxy at a time when it was behaving quite differently to our IPI.
    - But in 2016 the proxy started to differ from Norway's series and closely matched the current IPI - this change coincided with the United States increasing contribution.
      - So this shift diluted the influence of Norway's data on the proxy.

- ▪ Graph Slide 13
  - • This plot illustrates the trends for the IPI proxy and the experimental UVI series, as well as well as the current UK IPI or crude oil.
  - • Given that our experimental UVI figure lies between the existing IPI and the proxy series, this lends further support to the potential of using UVIs to deflate imports of crude oil.
  - • From 2015, all 3 series are closely aligned, suggesting both that our existing IPI may be a better measure of import prices of crude oil in more recent periods as well as again supporting future use of UVIs.
  - • Low values in the proxy series pre 2015 are likely a consequence of Norway's substantial influence on the proxies during those years.
  - o Case study 3 – CPA H53 Postal and Courier Services
    - ▪ This case study was selected because we lack appropriate trade deflators for most services and it's challenging to create them.
    - ▪ No suitable deflator for trade in Postal and Courier Services currently.
    - ▪ Created a new deflator using other countries' SPPIs.
      - • In 2023, the ONS trade team requested some research into establishing an index for trade of postal and courier services, or alternatively justifying the use of our SPPI.
      - • For this purpose, we conducted this investigation by aggregating the SPPIs from Germany, Netherlands, the US and France to create a proxy index following the method described earlier.
    - ▪ There was a minimal difference between proxy index and current SPPI; ONS is now considering using existing SPPI with exchange rate adjustment to deflate imports of these services.
- • Findings and conclusions
  - o Findings
    - ▪ First case study: Both the proxies created using PPIs and EPIs closely tracked the IPI, indicating that these proxies may be reliable measures of import price trends in the UK.
    - ▪ Second case study: Experimental UVI may be better measures of prices than our traditional IPIs. Our proxy approach may have use for comparison purposes.
      - • After 2015 with better coverage, data improved.
    - ▪ Third Case study: The SPPIs for the countries with which we engage in trade experienced similar trends in price movements as the UK's SPPI and a proxy IPI for services could be generated. Further investigation into the use of this would be required.
    - ▪ As a national Statistical Institute, we often encounter situations where an ideal index is unavailable for various reasons. In such cases, having a proxy index is preferable to not having one at all.
    - ▪ In the first case study, we compared the proxy series with a high-quality EU import price index for specific products.
      - • Both the PPI and IPI proxies closely mirrored the IPI supporting the trends in our existing index.
      - • Although the non-EU IPI for these products had limitations, the proxies exhibited similar trends providing reassurance for our current series.

- In the second case study, we evaluated the proxy alongside an experimental unit value index for crude oil and the current deflator.
    - Before 2015 the UVI and UK IPI series were closely aligned.
    - After 2015, with improved coverage the proxy index aligned more with the UVI and UK IPI, supporting potential future use of UVIs.
- In the third case study, we created a proxy for postal and courier services due to the lack of trade indices for services.
    - Our analysis indicated that the SPPIs for countries we trade with exhibited similar price movement trends.
        - suggesting the potential for generating a proxy IPI for services using the methodology discussed in this paper.
- Conclusions
    - Useful tool to compare to existing deflators or other alternatives.
    - May be viable in some situations.
        - Needs to be considered on case-by-case basis.
        - Based on comparability of sources and reliable availability of indexes over time.
    - Use of PPIs may help to address areas where quality adjustment is needed if it's already been applied in the source-index.

Questions & Answers

Rohan Draper (Denmark): Have you had any explorations into Bank prices when looking at the proxies as a source of data. For example, the missing data from Algeria?

Robert Bucknall Answer: We haven't as this is the early stage of the research. It is a tool to verify our own IPIs at the moment but looking forward to exploring it further. It's a tool they can use to verify their own IPIs at the moment but would be happy to explore with further ideas.

- Rohan then expressed that he likes the idea that it could be used as a quality assurance tool, and not just a proxy or just for publication and thanked Robert for his efforts.

Bonnie Murphy (USA): To Sahoko – The rate of license usage that you collect – is it an estimate of license usage for the current period, or some period in the future, or is it from a period in the past? So, is it a license usage now, or an estimate based on the past?

Sahoko Furuta *Answer:* It's a transaction price in the past.

Bonnie Murphy (USA): To Robert – do you use the domestic, for the crude petroleum example, do you use the domestic PPI from the US, for example, or we have an export only PPI in the US – which one of those do you use?

Robert Bucknall Answer: We produced 2 proxies – one which was using PPIs of the other NSIs and one which used the EPIs of the other NSIs and used those in our comparison

Bonnie Murphy (USA): Okay so you did both? Because our international price program calculates an export only price index and the domestic PPI would include not only domestic production of crude petroleum, but our exports as well, so it would include both, but I wondered if you wanted to isolate just the export?

Robert confirmed that he thought they'd used both, but he may be wrong and would check back to see how they compare.

Rohan Draper (Denmark): To Sahoko – Are there opportunities in Japan where you have a patent registry of patent ownership? Can you follow patents or do you have to follow, and be reliant on, companies?

Sahoko Furuta *Answer*: Sorry, this might be a tricky one, I don't know much about it – I will confirm details and respond to you later.

Rohan follow up: the context to that question is, I've looked in the past at can we see exchanges of ownership of patents and then seek to understand if there's quality changes going on if we can follow that flow and that would add a level of knowledge about our indices, and where those patents lie, it could help us to make certain decisions. In Sweden, when I was working on this, I couldn't find that in Denmark, and haven't been able to find that. And I'd be really keen to know if that exists in Japan or somewhere.

Nicklas Elversoe: I guess, like you see these uses of other countries PPIs as an analysis tool most of the time, I've heard talks and trade statistics where they talk about actually not using import data anymore and just relying on export data from other countries in their regulations. Do you think there's an argument for doing the same in the PPIs at some point, and what kind of flaws and stuff is missing for us to do something similar?

Robert Bucknall *Answer*: I think there is a good case for doing that. I mean one of the challenges that we've faced here at the ONS is that a coverage of our import price indices isn't meeting with targets really, so that was the motivation for looking at this. Having these proxies available is better than having nothing at all, and we're also looking at other methods now as well for imports which is a new method that we've started to look at for homogeneous products, unit value indices. Certainly moving away from the traditional survey of imports is a way forward, in my opinion.

Andrew Baer (*IMF Statistics*): Thank you for sharing the work of the Bank of Japan. As part of the Systems of National Accounts update there will be some work on new guidance on price and volume measurement of marketing assets. The BOJ's experience will be very valuable for this work.

Cross cutting topic (6) – Measurement challenges for import services

Sweden's experience in developing SPPI for imports - Mikael Nordin (Sweden)
- Statistics Sweden have compiled SPPIs for imports since 2020.
  - Motivation for developing SPPI for imports was increased interest from national accounts for pricing since Sweden's international trading services have increased over the last decades.
- SPPI for imports are compiled by the section of producer prices.
- Main challenges
  - Create the data frame for sampling and weight calculations.
  - Establishing representative price measurements for the complex services.
- General methodological aspects
  - Viewing SPPI for imports from a domestic point of view.
    - Residents purchasing services from non-residents.
  - SPPI for imports is an input price index.
    - Represents the average price development for services purchased from non-residents.
  - Compiled on a quarterly frequency.
  - Coverage of purchasers is restricted to B2B transactions – B2C transactions are excluded.
    - This coverage is also used when we compile a monthly import price index which mainly covers goods.
  - Coverage of service concentrated to sections H,I,J,M,N, following a national version of the CPA.
    - In practice, the Swedish SPPI follows a national product classification that is called SPIN.
  - Methodology is generalized to be consistent across SPPIs markets.
    - Observation unit: combination of enterprise, service and market (import).
- Main user: National Accounts which uses SPPIs as price deflators.
  - But it can also be used in other areas as well, such as economic and license, etc.
- Data frame – sampling & weights
  - The main thing we looked for when creating this data frame was a data source that we could use to identify enterprises, services, and trade values.
- We were lucky to already have a survey within Statistics Sweden that satisfied our needs – the Foreign trade in services.
  - Provides estimated trade values of the Swedish exports and imports of services – compiled on a quarterly basis.
  - Swedish central bank was previously producing this survey, but since 2003 the survey is produced by Statistics Sweden on behalf of the Swedish central bank.
- Domestic enterprises and services collected in the survey are defined internally by Statistics Sweden but follows the EBOPS classification.
  - The trade values are aggregated according to the EBOPS, but then the collection is done using the internal classification which to some extent provides a little more detail in the specification of the services.
- Issues with using this data source
  - No direct concordance between the two surveys classifications.

- o Had to map the services to the SPIN classification in order to use the data source for sampling and weight calculation.
- Solving the issue
  - o Solution 1: Manual text matching
    - ▪ Services text-matched manually to suitable SPIN classification
    - ▪ 1-to-1 mapping
    - ▪ Generates an "asymmetric" product link
      - Services are mapped to different SPIN levels
        - o Created some issues
    - ▪ Needed to extend the product link to get the lowest level of the SPIN classification
    - ▪ There were only about 70 services that existed in the foreign trade statistics so we could map these services quite easily to our SPIN classification.
  - o Solution 2: extend the product link to more detailed SPIN levels
    - ▪ To reach more detailed SPIN levels and extension is sometimes needed.
    - ▪ Manual allocation of enterprise
      - Based on information about the enterprises.
      - Questionnaire sent to businesses – reported information was used to allocate the enterprises to lower SPIN levels.
      - Annual reports and other relevant sources also examined.
      - 2 years of test period – 2018 and 2019 – sent out questionnaire to a set of enterprises sampled from data frame that was based on the initial product link.
        - o Enterprises were asked to specify a service within the classification they had been assigned to.
        - o In 2020 – we had a much more detailed data frame than they would have if they had only relied on the initial product link with the manual text matching approach – so we were able to draw samples and calculate weights on lower SPIN levels.
    - ▪ Still collecting services information as of today – and any misclassified enterprises get updated in the data frame for the coming years if necessary – iterative process to maintain an updated data frame over time.
    - ▪ How much "extension" is enough?
      - Ideally, would like to have the data frame on the lowest level of SPIN which is the 7-digit level.
      - In practice, varies on a case-by-case basis.
        - o Resource constraints – many manual edits and time spent talking with respondents – balance quality of data frame with cost of maintaining data frame.
- Main Results
  - o 2023 survey year, there were 1200 enterprises after removing those with lower import value than 10 million - this is the best coverage we can get for this population.
  - o The sample is dominated by a few large enterprises – 24 enterprises with the largest import values make up 50% of the total import value.
    - ▪ These enterprises are usually multinational and have foreign affiliations.
  - o Usage of transfer prices?
    - ▪ Accepted but closely monitored.

- Might not always be representative of market prices.
- Usefulness of the transfer prices in the price index could sometimes be questionable.
- In order for us to identify these potentially problematic prices, we collect what type of transaction the price is based on to monitor the transfer prices and validate with the respondent if they find any unusual deviations.
  - o Weights
    - Concentrated to information and communication services.
    - Section I only covers accommodation services.
  - o Pricing methods
    - Wide range of services requires different pricing methods.
    - Contract pricing, time-based method, percentage fee method mainly used.
  - o Specification
    - We encourage respondents to specify up to 5 price term characteristics which are used to identify quality changes in the reported services.
  - o Quality adjustments
    - Made on a case-by-case, mainly implicit.
  - o SPPI for imports and exports trend closely together but different from domestic SPPI.
- Improvements and further development
  - o Cooperation with National Accounts.
    - When we wrote this report, the National Accounts did not use the SPPI for imports as price deflators, but lately we have had fruitful meetings with the National Accounts and increased our collaboration – so currently the National Accounts are looking into SPPI for imports and try include the indices in their calculation in the near future.
  - o Developing price measurements for complex imported services – one thing we will continuously work on is to increase our knowledge and make better price measurements.
    - Some services are more difficult to measure than others.
      - E.g. advertising services, different types of licensing fees.

Import of services – Polish experiences in international trade in services statistics - Agnieszka Matulska-Bachura (Poland)
  - o Similar to other countries international trade in services has been developing for many years.
  - o Import of services have almost doubled from 2010-2022 and for exports the growth dynamic was even higher.
  - o Poland is net exporter of services.
  - o Import/export of services according to balance of payments – positive balance is growing.
  - o Services become more important compliments of current account of balance of payments.
- International trade in service survey (ITS) – methodology
  - o Regular survey carried out by Statistics Poland in co-operation with Narodowy Bank Polski (NBP) since 2009.
    - Before, it was conducted based on payment systems with the National Bank.

- o Conducted in compliance with the Commission Regulation (EU) No 555/2012 of 22 June 2012 amending Regulation (EC) No 184/2005 of the European Parliament and of the Council on Community statistics concerning balance of payments, international trade in services and foreign direct investment, as regards the update of data requirements and definitions.
  - o Data sources:
    - Online applications for data collection: DNU-K - Quarterly questionnaire on international trade in services, DNU-R - Annual questionnaire on international trade in services.
    - Datasets on travel & the financial services measured indirectly (FISIM) compiled by the central bank (NBP).
    - VAT data on import of services.
- ITS survey – online applications for data collection
  - o Quarter/annual questionnaire on international trade in services.
  - o Data on transactions between residents and non-residents: type of services by EBOPS (extended balance of payment classification) 2010, country of residence of partner transaction, value of services provided/purchased.
  - o Population frame - all residents of national economy who run the international trade in services:
    - quarterly data collection - residents whose revenues or/ and expenditures from international trade in services exceeded in the previous reporting year or during the current reporting year the threshold of 2 million PLN.
    - annual data collection – other residents engaged in the international trade in services (with services turnover below the threshold).
  - o Imputation methods for quarterly data for values of services below the thresholds (2 million PLN) or lack of response.
- Challenges in the measurement of services import – regular survey
  - o Identification of population engaged in import of services.
    - When the survey was taken over by Statistics Poland, that first population frame for the 1st quarter of 2009 was determined by the central bank and accounted for 1,8 thous. entities.
    - Since then, population frame has been regularly supplemented using information from collected data within the ITS survey and also from VAT data on imports – for 2022 it expanded to about 30 thous entities in annual data collection and almost 14 thous. of entities in quarter data collection.
    - Due to the growing number of entities in the frame modification of survey considered (sample survey instead of census survey) – there is necessity to look for data to impute information for entities with trade in services below the thresholds.
  - o Searching for alternative data sources – based on the experiences with informative system of the Ministry of Finance (VAT data) – access to data on the import of services.
    - Regardless the non-statistical data sources some assumptions needed in order to adjust data to the statistical needs (for example -information on the type of services traded);
    - For exports side – VAT Information Exchange System used to exchange information between European member Countries seen as potential data source.
  - o Asymmetries in data between countries:

- Participation in the works managed by Eurostat in compliance with the Asymmetry Resolution Mechanism (ARM).
- Analysis conducted in three stages: methodologies of surveys, unidentified unit data and identified unit data.
- Law constraints related to sharing unit data with Eurostat and other EU countries.
- New data requirements
  - International trade in services by the enterprises characteristics (STEC).
    - Information compiled according to requirements of Commission Implementing Regulation (EU) 2020/1197 of 30 July 2020 laying down technical specifications and arrangements pursuant to Regulation (EU) 2019/2152 of the European Parliament and of the Council on European business statistics repealing 10 legal acts in the field of business statistics.
  - Breakdowns of ITS data (export & import of services) by:
    - Enterprise size class and NACE activity.
    - Dervice item (EBOPS 2010) and NACE activity.
    - NACE activity and type of ownership.
  - Linking ITS data with the Base of Statistical Units (BJS) - REGON (identifier of national economy entities) used as a key for linking data from different administrative sources
    - Can link data from ITS data which are collected at a very detailed level with their base of statistical units – a key for linking data for different data sources (administrative data sources).
- New data requirements - International trade in services by modes of supply (international supply of services):
  - International supply of services – broader concept than international trade and services – it covers not only the value of services traded between residents and non-residents but also the value of services supplied through the operations of foreign affiliates .
  - Breakdowns of ITS data (export & import of services) by:
    - cross-border supply of services (1)
    - consumption of services abroad (2)
    - commercial presence of a company abroad (3)
    - presence of natural persons abroad (4)
  - The Eurostat MoS Model applied when the value of trade distributed into different modes of supply they use the model developed by EUROSTAT.
  - Data from the ITS survey combined with information collected within other statistical surveys: business statistics surveys (including IFATS and OFATS), foreign trade in goods statistics using REGON (identifier of national economy entities) as a key.
- Import of services according to the international supply of services concept by modes of supply - – main components:

  1 - Services purchased by residents from non-residents diminished by the value of services imported by IFATS from their mother company as well as affiliates (MoS 1,2,3 & 4).
    - Data sources: ITS survey, Annual business survey of enterprises, Eurostat's MoS Model.
    - Combining data at the unit level.

  2 - Services provided by the IFATS located in the territory of country to polish residents through the commercial presence (excluding the value of goods included in the value of services provided by the IFATS to polish residents) (MoS 3).

- Data sources: Annual business survey of enterprises.
- Data at the unit level.
- Link data at the unique level, however sometimes it's impossible so there are assumptions taken to compile data.

3 - Distributive services purchased from non-residents due to the import of goods reduced by the value of distributive services purchased by IFATS from their mother company as well as affiliates (MoS 1).
- In order to estimate the margin, they use annual business survey.
- Data sources: Annual business survey of enterprises, foreign trade in goods statistics.
- Combining data at the unit level.

- New data requirements – challenges:
  - Searching for new data sources with more detailed information needed for estimating the value of services imported by the modes of supply and by enterprises characteristics.
  - Updating the methodology for compiling required datasets regarding the data available for official statistics.
  - Developing the data dissemination policy to inform the data users about the way the new information should be interpreted.
    - Looking at balance of payments and balance of MOS negative balance is estimated as Poland is large exporter.

- Summing up
  - Challenges:
    - Identifying the population engaged in import of services.
    - Explaining the asymmetries in data between countries.
    - Searching for alternative data sources.
    - Updating the methodology for compiling the datasets on import of services following the concept of international trade in services by modes of supply and by enterprises characteristics.
    - Developing the data dissemination policy to inform the data users about the way the new information should be interpreted.
  - Other issues:
    - Development of the methodology of survey on the prices in international trade in services.
    - Digital trade in import of services.

Questions
- No questions.
- Marcus states that many countries may consider this a new topic and haven't had a chance to study this yet.

- Handbook is available in English and Arabic, the French and Spanish editions will be released soon.
- Feel free to email David afterwards with any questions or comments.
- Large contributions from other countries and organizations – thanks to all.
- Efforts to define measuring digital trade have been around for a while.
- 2019 – first edition of the handbook – put forth the first definition of digital trade, established a conceptual framework, and guidance on how to compile digital trade transactions.
- Second edition – to include case studies on different countries.
- Service prices not included in the manuals yet (first or second edition)
    - Next Thursday there will be a short update about the manual updates which will include service prices.
- Handbook is for compilers of digital trade – targeted at how to compile digital trade.
- Handbook on Measuring Digital Trade – 6 chapters.

Introduction
- Digitalisation has enabled the emergence of e-commerce.
- Services are increasingly traded at a distance.
- Online platforms play a transformative role in many industries.
- More international trade in low-value goods and de minimis thresholds.
- Future work: cross-border data flows; cloud computing; nonliability crypto assets; and digitalisation, investment and intellectual property.
- Digital technology has created more international trade – many international services would not be traded internationally if they couldn't be done digitally since it just wouldn't be technically possible.
    - Access to more and cheaper products on the demand side.
    - International trade – businesses are responsible for the bulk of the transactions however we do need to keep in mind that digital trade has seen an increase in opportunities for households, governments and small enterprises.

Conceptual framework for measuring digital trade
- Nature of transaction is key (the what and the who); Handbook defines digital trade as: All international trade that is digitally ordered and/or digitally delivered.
- Framework is consistent with SNA 2008/BPM6 and next versions (SNA2025/BPM7).
- Framework covers goods and services, but only services can be digitally delivered (consistent with the first version).
- All economic actors (all sectors) can engage in digital trade – businesses, households, government, etc.
- Non-monetary digital flows, including data flows, acknowledged but not included in digital trade.

Definitions
- Digital trade
    - All international trade that is digitally ordered and/or digitally delivered.
- Digitally ordered trade
    - The international sale or purchase of a good or service, conducted over computer networks by methods specifically designed for the purpose of receiving or placing orders. – consistent with the definition used by both EUROSTAT and OECD – internationally stable in regards to delivered trade.

- Digitally delivered trade
  - All international trade transactions that are delivered remotely over computer networks.
  - In the past, this definition was longer, but has now been made simpler based on feedback from compilers.
- Digital intermediation platforms (DIPs)
  - Online interfaces that facilitate, for a fee, the direct interaction between multiple buyers and multiple sellers, without the platform taking economic ownership of the goods or rendering the services that are being sold (intermediated).
  - Online interfaces that facilitate international trade.

The conceptual framework for digital trade

Figure 2.1: The conceptual framework for digital trade
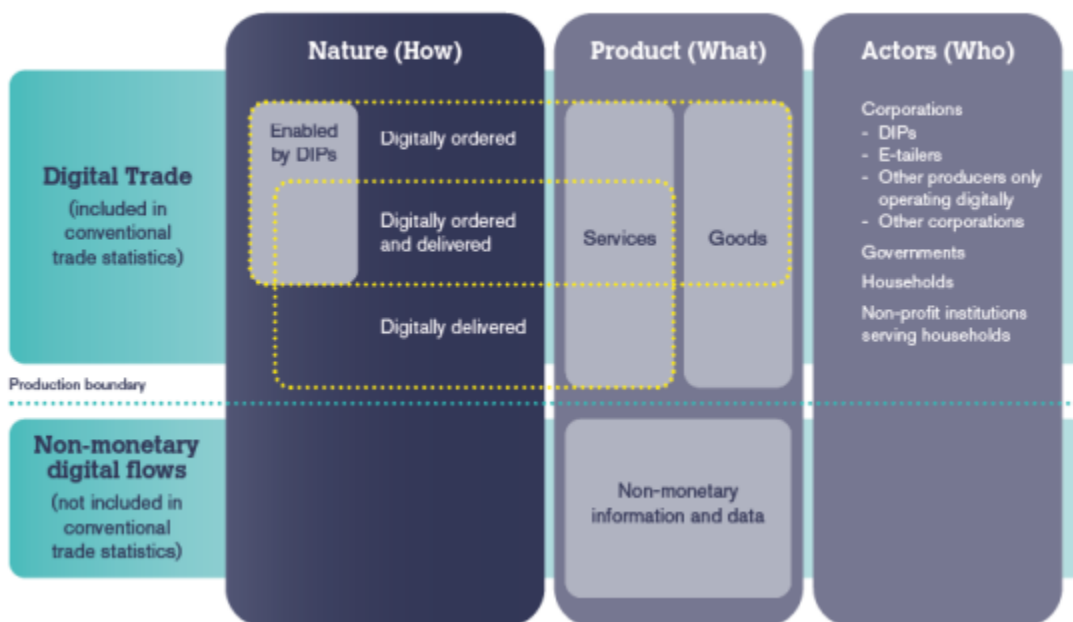
- Top 2/3^{rds} and the bottom 1/3rd are split by the production boundary.
- The nature of the transactions: The how, the what, the who.
- Split by goods and services and across you can see its digitally ordered.
- Below the production boundary
  - We need to acknowledge them but they're not measured.
- Top 2/3^{rds} – this is digital trade which is already included in all the conventional trade statistics
  - Trying to breakout the digital trade from this.

Digitally ordered trade
- Important when thinking about e-commerce.
  - Difference between digital trade and ecommerce.
    - Ecommerce is about ordering – both domestic and international.
    - Whereas digital trade is about ordering and delivery, and we're talking about the international aspect.
    - Digitally ordered trade is the equivalent of international e-commerce.
- "The international sale or purchase of a good or service, conducted over computer networks by methods specifically designed for the purpose of receiving or placing orders".
- Digital ordering = e-commerce → Digitally ordered trade = international e-commerce

- Goods and services (including digitally delivered services).
- All economic sectors can be buyers and sellers:
    - Businesses
    - Households/individuals
    - Government units
    - Non-profit (NPISH)
- Key starting points:
    - Digitally ordered transactions involving businesses.
    - Digitally ordered trade in goods.

Definitions
- This is mainly about helping compliers to better understand if they want to measure digitally ordered trade, what is included and what is not included.
    - Consultation with countries and international organisations and others involved with trying to measure digital trade – how they came up with the definitions.
- Ordering by social media apps – should these be included?
- Tried to make sure that compliers can use something to start measuring.
- Orders made by phone, fax or manually typed email – are excluded because they need to harmonize definitions with OECD and EUROSTAT.
- Additional recommendations and guidelines in the handbook.
- Supporting clarifications:
    - The payment and ultimate delivery of the goods or services do not have to also be conducted online;
    - Digitally ordered transactions cover orders made over the web, extranet or via electronic data interchange (EDI);
    - Digitally ordered trade includes purchases of applications (apps) and in-app online purchases;
    - Digitally ordered trade includes transactions via online bidding platforms;
    - Orders made by phone, fax or manually typed email are excluded from digitally ordered trade;
    - Offline transactions formalised using digital signatures are excluded from digitally ordered trade;
    - Each trade transaction should be treated separately. When a transaction is established via offline ordering processes, but subsequent transactions (or follow up orders) are made via digital ordering systems, the follow-up orders should be considered as e-commerce; and
    - Trade transactions do not necessarily coincide with contracts. For a contract spanning several statistical periods and potentially involving multiple transactions, each transaction should be classified as digitally ordered or not digitally ordered, reflecting the mode(s) of ordering initiated in the current period.

Digitally ordered trade in goods
- Example in the handbook – from China – exports growing strongly – all countries expressed that they want to start measuring this because it is something that is growing, and it's something that policy makers want too.
- In many countries, cross-border trade is mainly in goods (rather than services).
- Likely the same for digitally ordered trade.
- Several countries have modified customs reporting requirements and processes to identify merchandise shipments that are digitally ordered.

Digitally delivered trade
- Only services can be digitally delivered
    - Digitally delivered trade is a subset of balance of payments international trade in services transactions between residents and non-residents.
    - Full alignment with definition of ICT-enabled services.
    - The payment for digitally delivered services can be online or offline – it's not dependent.

Definitions
- "All international trade transactions that are delivered remotely over computer networks".
- For digitally delivered transactions, the payment for and ordering of the services do not have to be conducted online;
- Services delivered by phone, fax, video call or email are included in digitally delivered trade;
    - For digitally ordered they are not included.
- Digitally delivered trade includes services provided through apps;
- Each trade transaction should be treated separately. When a trade transaction is delivered via offline processes, but subsequent follow-up transactions are delivered digitally, the follow-up transactions should be considered as digitally delivered; and
- A trade transaction can be delivered via multiple (digital and non-digital) modes.
    - This was added because countries were asking for these things to be included in the handbook to be more realistic for these things to be measured.

Compilation
- Digitally deliverable services – gives you an upper bound.
- Identify services which can be delivered remotely through computer networks.
- Total for (most) digitally deliverable services can be aggregated from existing trade by product statistics.
- Focus on cross-border supply to yield a reasonable estimate for digitally delivered trade.
- Recommended to add questions to balance of payments trade in services surveys and ICT surveys asking about digital/remote delivery.
- Note: Only certain services can be digitally delivered! – e.g. transport can't be digitally delivered.

Align digital trade with modes of supply
- Trying to bring all other international guidelines that affect services and align them with digital trade in the handbook.
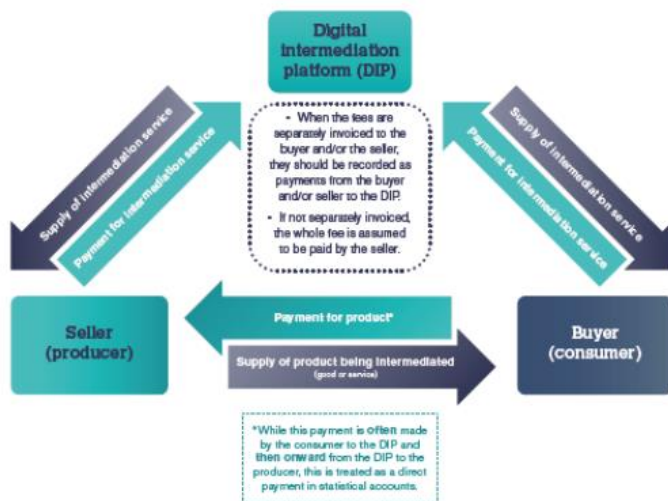
Digital intermediation platforms (DIPs)
- Policy interest around these from governments.
- This chapter outlines the counting principles for recording transactions, provides a way for compilers to get an understanding of DIPS and how to measure them.
- Marketplace platforms that bring together buyers and sellers to trade goods and services, e.g., platforms facilitating short-term accommodation;
- Platforms facilitating ride hailing, similar to taxi services;
- Platforms facilitating sharing of household assets, such as car-sharing; and
- Platforms that intermediate electronic content (without taking economic ownership of the intellectual property products they distribute), such as app stores.
- Try to provide examples in the handbook of how to go about measuring these types of things:
    - Amazon, Meta, Uber – these big DIPs are quite hard to get information out of.

Definitions

- Digital intermediation platforms: Online interfaces that facilitate, for a fee, the direct interaction between multiple buyers and multiple sellers, without the platform taking economic ownership of the goods or rendering the services that are being sold (intermediated).
- Digital intermediation services: Online intermediation services that facilitate transactions between multiple buyers and multiple sellers in exchange for a fee, without the online intermediation unit taking economic ownership of the goods or rendering the services that are being sold (intermediated).
- Key rules when dealing with DIPs
  - Has to be multiple sellers and multiple buyers
  - Has to be a fee involved
  - The platform does not take ownership of the goods or all the services that have been intermediated or sold
- Some crossover, e.g. Amazon marketplace – one corporation doing multiple things at one time
Transactions intermediated by DIPs.
- Diagram for compilers to see how a transaction actually works – the DIP at the top, the seller on one side and the buyer on other side.
  - The flow should be between the seller and buyer of the actual good and service when in reality it goes through the DIP.

Figure 5.1: A DIP transaction

- Buyer purchases from seller via DIP
- Often:
  - Buyer pays DIP
  - DIP subtracts fees
  - DIP pays remainder to seller
- Economic reality:
  - Payment from buyer to seller for good/service
  - Payment(s) from seller and/or buyer to DIP for the digital intermediation service it provided
- Buyer/seller/DIP resident in different economies = international trade transactions
- Limited country measurement experience, Handbook recommends:
  - collecting information from resident DIPs using enterprise surveys
  - collecting information on transactions made via DIPS using ICT Usage surveys

- o using other sources (e.g. card payment data) to focus on major DIPs

Key take aways

- The definitions and frameworks for measuring digital trade are international agreed upon
- Many countries contributed to the handbook and provided good ideas and advice – what works and what doesn't "on the ground".
- The Handbook on Measuring Digital Trade sets out key definitions, a measurement framework, and reporting template for Digital Trade statistics.
- The second edition is a significant development, adding important clarifications and explanations, and presenting extensive new compilation guidance reflecting the rapid progress being made by countries.
- It has been endorsed by countries through global consultation.
- Multiple sources and methods needed for complete and coherent measure of digital trade.
  - o Key priorities:
    - ▪ Measuring digitally ordered transactions involving businesses (e.g. through business ICT usage surveys).
    - ▪ Measuring digitally ordered trade in goods through adjustments to customs reporting requirements.
    - ▪ Ensuring the availability in services trade statistics of full product detail for digitally deliverable services.
    - ▪ Including questions on digital delivery in international trade in services surveys
  - o Coordinated statistical capacity building to support countries in putting Handbook into action.

Questions - none

Marcus Friden *comment* : we have talked about intermediation companies before in the Voorburg group, but it's hard to get an understanding of how exactly to price them and what they are doing – it's a difficult question and the digital intermediate platforms are complex to understand

- Background
  - Around 2016 Statistics Finland started to expand SPPI to include mobile games – began to research the industry to get a better understanding of how to classify mobile gamers, etc.
  - Rapidly growing industry
    - Started with Snake game but has grown quickly, especially with fast emergence of smart phones.
  - Drawn into SPPI sample in 2015=100 renewal
  - Industry study – beginning in 2016
    - How to classify?
    - How do they make money?
    - Who's the buyer?
    - What's the market like?
  - Included in SPPI since 2018
- Classification
- How the mobile game producers are classified in business statistics in general?
  - Many enterprises producing video games had been classified under programming activities vs. publishing.
  - Reviewed industrial classification of all enterprises related to video games and in 2019 about 10% of these enterprises were moved from programming activities to publishing.
    - Affected a lot of their statistics including national accounts and employment statistics.
  - Important to maintain coherency between our statistics and also from SPPIs point of view to ensure that our sampling frame for mobile games is representative.
  - Product How the outputs/mobile games can be classified in SPPI.
    - They used the European Classification of Products by Activity (CPA) 2015 to compile the SPPI – its product based, there is no class that is named mobile games, so they researched which one would be most suitable.
    - 3 possible 6-digit sub categories under the word "games".
      - Computer games downloads
        - Includes electronic files to games that can be downloaded and stored on a local device.
          - Contain aspects that fit both of the 2 sub categories as they are downloaded and stored on a device.
          - But computer game downloads mention words such as computer and local device, and a defining feature of mobile games is that they are played on a mobile device.
      - Online games
        - Provision of games intended to be played on the internet.
        - This is where we have placed our classification – this is what was chosen as the most suitable sub category for mobile games.
      - Computer games software originals (which is under programming, not publishing).

- o Took a closer look at this
  - ▪ The key distinction is intellectual property – refers to technology in a software or an algorithm or rights to a finished mobile game – means its for selling rights of the game to other enterprises.
- Monetization on mobile games – how they make money on the games - two main categories:
  - o Free to play
    - ▪ Player can download and play the game without any upfront payment.
    - ▪ Three models:
      - Micropayment model.
        - o Play the game for free, but make purchases within the game – speed up progress, get an item, etc.
        - o Often used when new content is regularly added to the game – to keep the player engaged.
      - Revenue from advertisement space.
      - Lite version.
        - o Limited version of full game.
        - o Less features and levels.
        - o Goal is to give player a trial before they buy the full game.
  - o Pay to play before downloading and playing the game.
    - ▪ One time purchase
      - Player pays upfront to get access to entire game.
      - Used when producers goal is to maximize total number of downloads, producing new versions of the game to get more downloads vs. making updates to the existing game.
      - Instead of new content of the game, they produce new version of the game.
    - ▪ Subscription
      - Keep adding content to the game so that people play as long as possible.
  - o 5 different models in total for these categories, but:
    - ▪ The most profitable model is the micropayment model – brings most revenue or turnover to the producer.
  - o Common to combine these models to get the most turnover.
    - ▪ Selling ad space added as an option in many cases.

Industry description
- Two platforms: Apple Store and Google Play
  - o Serve as an intermediary between mobile game producers and the consumers, which means the actual transaction is between the producer and the platform (which is another enterprise).
    - ▪ Means that the publishing of mobile games belongs to the B2B side of SPPI
  - o B-to-B.
  - o Collect commission - these platforms also collect commissions for all the purchases made.
    - ▪ the platforms take 30% for themselves.
  - o Global market
    - ▪ Most of the turnover comes from abroad in a small market like Finland.

- Low barriers for entering the market – easy and cheap market entry – the cost of having games for sale on the platform is very low so typically available on both major app stores (Google Play and Apple Store).
- Prices chosen from Apple Store's price matrix – the industry experts told the team about the price matrix that the Apple store sets.
    - Producers pick their prices from this matrix - industry experts said that mobile game producers tend to commit to having the same prices across platforms for apple and android.
    - The prices in the price matrix are Customer prices – so they include the value added tax as well as commission to get the producer price you need to take these into consideration.
    - Following changes in price matrix is the best way to measure producer price development of mobile games – according to the industry experts – so this is what they do at Statistics Finland.
        - In practice, the price matrix doesn't change very often.

Practical experience
- Price survey
    - Twice per year the survey is sent out to respondents.
    - The respondent will let us know if there are changes in price matrix, VAT rates and commission rates.
- 5 price tiers for most important market areas (most commonly used in the producer's games, so no game specific prices in our survey).
- Elementary weights by enterprise and country (price tiers do not have own specific weights, don't need game specific revenue to compile the weights).
- Month-to-month changes in producer prices from currency rates (since a lot of the games are downloaded outside of Finland).
- Response burden is low, but the method is not perfect because they follow list prices.

Points of improvement
- All connected to the use of the price matrix.
- Sales campaigns are not included in our index because we use list prices.
- List prices → discounts excluded.
    - But discounts are just as common in mobile games as they are in any other product or service.
- Quality change not observed – no way to observe this, no idea what the player receives for the money so don't know if its comparable with the previous reporting period
- No game or price tier specific weights – if it were possible, they would weight the elementary indices on a more precise level.

Example game: Index Game – 10 levels of fun with compiling price indices.
- The index game follows the one-time purchase model – buy all 10 levels with one euro.
- As the game is an instant hit a new version is published, and price is set to 1.20 euros.
- If the main idea is unchanged but have just added new industries – is it price change or quality adjustment needed?
- Micro payment model – most profitable.
- In game currency – tokens to advance in the game or get more features.
- Discounts are not observed in the price matrix – player can receive more for the same amount of money.

- Other discounts – price of skipping a level could go down – player gets more than they did yesterday for the same number of tokens – could be seen as a discount.
- Following the unit price of in game currency may not be precise enough for us to capture discounts – measuring producer prices in mobile game can be very difficult and complex.
- Tracking price development of the features that can be bought in a game – but may not be feasible.
- → Goal: prices of the most bought features?

Summary
- Mobile games are a publishing activity.
- CPA 58.21.30 On-line games.
- Global business – anyone with access to an app store can download and play the games.
- B-to-B – transaction between the mobile game producer and the app store.
- Several monetization models.
    o Micropayment model creates most turnover.
- List prices easy to follow, accurate prices more difficult (taking discounts into consideration and controlling for quality change is more complex).

Questions

Bonnie Murphy (USA): Since the experience in Finland has been done has been more complex than what was done in Voorburg Group, I think it would be good to add your experience to our paper and have a revised paper for the next time that we meet, or in general to have an updated version on our current publishing paper.

Mini-presentation – Developing SPPI for Computer programming, consultancy and related activities in Israel (addition to ISIC 62 presented in Warsaw 2012) - Michael Elizarov and Moriah Hazi (Israel)

- Developing an SPPI for computer programming, consultancy and related activities
- We refer mainly to the data of Classes 6201 and 6202. This is because we have not yet met with representatives of companies in Class 6209, which is negligible in the division in terms of its output rate.
    - Class 6201 Computer programming activities.
    - Class 6202 Computer consultancy and computer facilities management activities.
    - Class 6209 Other information technology and computer service activities.
- The data and information presented here are based on the Surveys of Industries for 2018-2022 and information received from companies' representatives with whom we met.
- Currently, we are continuing to establish the Division 62' SPPI.
- Reasons for developing an SPPI for computer programming.
    - The percentage of gross value added (GVA) of a division out of the total GVA of all trade and services for 2018. The larger the percentage, the greater the level of importance and priority for the division's development.
    - The level of complexity of the industry and difficulty in developing a price index.
        - The greater previous international experience in developing SPPIs and the richer the professional literature on the subject, the less complex developing the index.
    - The weight of sales to other businesses and exports versus sales to the final consumer.
        - Higher the sales to businesses, the more relevant to develop the index.
    - Supply use and input/output tables not usable.
- Based on these 3 criteria the first division chose to develop SPPI was Computer programming, consultancy and related activities - Division 62.
    - Meets the first and third criteria and to a lesser extent the second criteria as well.
    - The largest among the trade and service divisions in revenue and gross value added.
    - Growing size of the industry in recent years.
- Classification structure
    - In order to establish an SPPI for Computer Programming, consultancy and related activities, we used two classifications:
        - UNs ISIC Rev 4 classification, adapted to Israel.
        - The UN's Ver 2.1 CPC classification.
    - More classifications in CPC classifications compared to ISIC.
    - In order to establish a pyramid of the products and service groups in each of the classes in the division, we also used data we received from the companies' representatives we met with.
- Classification Issues
    - Classification of software R&D centers
        - In Israel, many companies are software R&D centers and should be classified in Class 6201 (according to the latest ISIC Rev.4 of the UN). Most of the time, their main activity is R&D for the benefit of their parent companies. Some of them cooperate with other sister companies located outside of Israel.
        - Main thing is doing research and development for their parent companies.

- Class 6203 - Due to the large number of companies that have high revenues and a large number of employees in R&D activity, it was decided at the ICBS that they will be classified in a new and separate class - 6203: Software R&D Centers instead of in 6201.
- Inability to measure prices - Due to the fact that their income derives from payments transferred to them by the parent companies located outside of Israel, we do not have the ability to develop an index for this class which will measure market price changes of services or products that the companies produce and sell.
- The sample
  - Survey of industries 2019.
  - Initial strategy was to include the largest companies in terms of output.
  - Waiting to receive list of medium and small companies that will be sampled probabilistically using various criteria.
- Why we chose to start with large companies
  - To start scheduling meetings with the companies.
  - Used as a kind of preliminary survey to learn from the major companies in the industry about its types of services, products, customers, technologies and characteristics, as well as ways of determining and measuring prices.
  - Companies cover a large part of output in each class.
- Number of large companies we chose for the initial sample:
  - Class 6201: 21 companies
  - Class 6202: 16 companies
  - Class 6209: 4 companies
- Example of data analysis for the purpose of determining a sample in class 6201.
  - Computer programming – 6201
  - 21 companies of Class 6201 cover 5.2% of the companies in the Survey of Trade and Services 2019 sample, but cover only 0.2% of the total companies in the population. These companies cover 56.6% of the output of the sample and 32.4% of the output in the population.
- Sample issues
  - The sample we chose also included companies that provide virtual games and companies that advertise through the Internet or the various applications.
  - Our initial analysis of the companies that provide virtual games is that they should have been classified in Software publishing (Class 5820) of the Publishing industry (Division 58).
  - Regarding the companies that advertise through the Internet or the various applications, we wondered why they are not classified in the Advertising and market research industry (73).
  - After checking with the ICBS's Business Register Sector and visiting the companies, it turned out that these companies were classified in Division 62, because most of the companies' activity is software development. Most of the employees of these companies are programmers and other software professionals.
- Market Characteristics
  - Concentration
    - The general characteristics of the industry are the concentration of the international corporations Alphabet (Google), Meta (Facebook), Amazon and Microsoft, and the commissions they derive from all the goods and services that some of the companies in this industry sell to their customers.

- o Cloud
  - ▪ These international corporations receive quite a few commissions from some of the companies that use their cloud for thousands of different purposes.
- o Digital wallet
  - ▪ Additionally, they receive commissions from the companies that pay using their digital wallet platforms and clearing, for the purchase of the goods and services that the companies in the industry provide to their various customers around the world and in Israel.
- Characteristics of Class 6201: Computer programming activities
  - o Large number of companies and employees
    - ▪ Dozens of subsidiaries in Israel and throughout the world that are considered as research and development centers but their total income is ultimately included in the tax needs of the Israeli parent groups.
  - o Over 90% of the revenues of the companies are from exports.
  - o Most of the companies in this class are parent companies of international corporations.
  - o Produce themselves all products they provide to the customers.
- Characteristics of 6202: Computer consultancy and computer facilities management activities.
  - o Second-largest number of companies and employees after Class 6201.
  - o Over 90% of revenues come from local market.
  - o As in Class 6201, these companies are the parent companies of dozens of subsidiary companies in Israel and throughout the world.
  - o Relatively concentrated because there are a few large companies that bring in most of the revenue, and all the rest are negligible in terms of revenue.
  - o Provide their customers with hardware and software from third parties and various types of professionals who manage and operate computer systems and/or data processing facilities for the customers, related support services, in the clients' offices or in the companies' offices themselves or they provide only the professionals.
  - o Most of the employees are in Israel.
  - o The income of these companies is determined by Cost-Plus contracts, in which the costs of the projects are priced, which combine the 3 elements mentioned above.
- Company and Employee Statistics
  - o Fairly stable employment in division 62.
  - o Number of companies did not increase, but size of workforce did – share of workers employed in Division 62 out of the total number of employed workers increased.
- SPPI Types of Services
  - o Class 6201 – Computer programming activities
    - ▪ Virtual game applications.
    - ▪ Online advertising platforms services.
    - ▪ Information security and cyber services.
    - ▪ Financial fraud detection services.
    - ▪ Platform services for creating web pages for businesses and a platform for managing online businesses.
    - ▪ CRM services.
    - ▪ Software providing billing, financial, payroll & GIS services.
  - o Class 6202 – Computer consultancy and computer facilities management activities.
    - ▪ Project management services - various projects that supply third-party hardware & software and provision of various types of professionals who

manage and operate computer systems and/or data processing facilities for the customers as well as providing related support services.

- Provision of various types of professionals who manage and operate computer systems and/or data processing facilities for the customers as well as providing related support services.

- SPPI Pricing Methods
  - Class 6201 – Computer programming activities
    - The price measurement methods are the same as in manufacturing PPI, namely, the direct use of prices of the repeated services or the contract pricing method.
    - Companies in this class produce vital products and services that are sold to the various customers.
    - Products are primarily virtual and not physical products.
  - Class 6202 – Computer consultancy and computer facilities management activities
    - The prices are measured using the time-based method.
- SPPI Issues
  - Information security and cyber services
    - Some companies provide licenses for intrusive cyber software, which is used by intelligence and security agencies of various countries in order to capture terrorists, hostile elements, pedophiles, etc.
    - All the customers pay in full for using the company's license for an entire year from the date of first payment.
    - Therefore, the price will not change for that customer during the three quarters following the quarter of the purchase. Accordingly, we made an agreement with these companies that they would report the price of the quarter that the product was purchased for each customer, and afterward they would not need to report on a price change for three consecutive quarters for each specific customer.
  - Project management services
    - Companies that manage projects for other companies and do not provide fixed services. They offer solutions for the clients' requests and when they carry out projects supply the cost according to the scope of their expenses plus a profit margin.
    - Our goal is to obtain an hourly rate charged for the project that includes costs for professional role as well as for software and hardware costs from the companies we visit in the future.
    - Service description: Some companies manage projects for other companies and offer solutions for the client's requests. They price the costs of the projects according to the extent of the expenses that includes manpower and third-party products & services.
    - Issue: The projects are all different in pricing; they involve different professional roles and vary greatly in the services provided. It was inherently difficult to measure according to projects; therefore, we asked to receive an hourly rate charged for the project that includes costs for professional role as well as for software and hardware costs.
    - Solution: The companies' representatives we met with so far said they would not be able to give us such data, because they do not have such resolutions. They stated that they are able to provide us with the average monthly expenses

of the companies for the professionals in various roles that they provide to their customers.

- Summary and main conclusion
    - The global internet revolution in recent decades has accelerated the development of the programming services industry all over the world, providing it with an opportunity to reach anywhere in the world that has internet.
    - In Israel over the past few years, there has been a steady increase in the number of companies and employees engaged in the industry.
    - This industry is indeed a complex industry to measure, but it has a great impact on the Israeli economy in terms of its GVA, GDP and total revenues, especially in exports.
    - The ICBS's National Accounting Sector will be able to use it for the purpose of calculating its GVA in real terms and for other uses, and it will improve their statistical series.
    - Due to all these factors, we decided to develop an SPPI for Division 62 first.
    - We hope to create an accurate index that optimally represents the price changes of the products and services in Division 62, which will be published in the middle of 2024.

Bonnie Murphy and Marcus Fridén: Suggestion to add Israel's contributions on the Voorburg paper on computer programming. Also to contribute to the classification issues about publishers, developers. Bonnie will put an additional paper on Yammer. We may be asking Israel to add to and revise the current paper.

Update on Improvements to National Accounts and UK Deflator Gateway
- UK National Accounts improvements 2023:
  - Deflators in the National Accounts
  - Deflator Gateway
  - Improved aggregation of output deflators
  - Improved trade in services travel deflator
  - Improved deflator for computer hardware
  - Improved service sector deflators
- Deflators in the National Accounts
  - Deflators remove effects of price change from current price estimates of key National Accounts estimates, enabling 'real term' comparisons.
  - Differentiate between price changes and actual economic expansion.
  - Nominal GDP: Includes inflation impacts
    - Hard to tell how much growth stems from price increases and how much from actual economic expansion.
  - Real GDP: strips away inflation impacts offering a clearer picture of true economic growth.
- GDP Headline Volume Measure
  - Each needs specific inputs to remove inflation.
  - GDP(E) The expenditure approach.
    - Deflated with consumption deflators (ex. CPI).
  - GDP(I) The income approach.
    - Not deflated; The GDP (I) components are only published in current prices.
  - GDP production approach GDP(O).
    - Remove inflation using GDP(O) deflators e.g PPI.
- Supply and Use tables (SUTs)
  - SUTs show the whole economy by industry.
    - They show the links between components of Gross Value Added, industry inputs and outputs, product supply and demand .
  - The SUTs link different sectors of the economy (for example, public corporations) together with detail of imports and exports of goods and services, government expenditure, household expenditure and capital expenditure.
  - IPI + PPI = CPI + EPI
- National Accounts systems
  - Output framework is a comprehensive economic tool that integrates data on gross value added, industry inputs and outputs products, supply and demand, and resource allocation across various sectors of the economy.
  - Data presented in two main components to ensure that total supply equals total use.
  - Different deflators are applied to adjust the data to account for the diverse characteristics on both sides of the framework.
    - Example: products like computers
      - Producer price indices and import price indices are used to adjust data on the supply side.

- Consumer price indices and export price indices are used to adjust data on the use side.
  - Main aim is to maintain a balance where total supply aligns with total use within the framework.
  - Many of these compiler systems are also feeding data to the "Supply and use" framework. The idea being that total supply=total use.
- Deflator Gateway
  - Historically, deflator processing has happened in various parts of the National Accounts and there wasn't a clear ownership of deflators.
    - Inconsistencies in types and vintages in price series used.
  - The GDPO(O) system was acting as a form of Deflator Gateway.
    - Was not fully comprehensive solution, creating many pathways for obtaining deflators.
    - Challenges regarding data, quality, transparency, and accuracy.
  - The approach made it difficult to investigate the use of deflators across the systems and to implement improvements.
    - Processed through multiple systems, raising concerns about using different weighting methods like converting product deflators into industry deflators.
  - System lacked transparency and faced difficulties in implementing.
- Deflator Gateway Goals:
  - Streamline the processing of deflators across the National Accounts.
  - Create more consistency and transparency around the use of deflators in the various processing systems.
  - Make quality assurance of deflators easer.
  - Improve the narrative around deflators.
  - Reduce the burden on compiler areas.
  - Improve vintage control.
- Deflator Gateway
  - Main hub for deflator processing, handling most tasks that were previously spread across different systems in the central platform for deflator production.
  - Certain deflators using external sources not made by prices division – created outside the gateway system.
- Deflator Gateway 4 Main Roles and Responsibilities
  - Data ownership.
  - Production ownership
    - Team that runs the deflator gateway to create deflators for the national accounts.
  - Analytical and support ownership
    - Team that addresses compiler area inquiries about deflators and conducts sessions to explain trends.
  - Business area ownership
    - Team that manages compiler systems and deflator processing within the systems.
  - Collaboration necessary from the four teams to ensure that the gateway functions effectively and efficiently.
- Improved aggregation of output deflators (BB23)

- In the national accounts, various product deflators are constructed by aggregating Producer Price Indices (PPI) and Export Price Indices (EPI).
- Previously, these deflators relied on Monthly Business Survey data at the industry level, resulting in deviant trends and variability in index calculations due to monthly weights at an unsuitable level.
- The new approach uses more suitable data sources, specifically HM Revenue and Customs and Prodcom data, at the product level (desired level).
- This new method, with annual chain-linking, successfully addresses these issues and provides a more accurate representation of price trends.
- Improved trade in services travel deflator (BB23)
  - The data source for the imports deflator ended in 2016 Q3, prompting an opportunity to develop improved methods and sources for both imports and exports deflators.
  - For exports, two new deflators developed:
    - Travel services (excluding education).
    - Education travel services, given their significant contribution to the travel services exports account.
      - This is created using the CPI for International Student Tuition fees.
  - For imports, a single deflator has been developed, constructed using a weighted average of travel-related CPIs, adjusted for exchange rates.
  - These improvements ensure deflators are more representative, with source data available on a regular basis.
- Improved deflator for computer hardware (BB23)
  - Part 1
    - To address the lack of quality adjustment in deflators other than CPI, we are using Implicit Quality Indices (IQIs) derived from hedonic adjustment in CPI.
    - We propose applying these adjustments proportionally to the weight of PCs, laptops and tablets in each transaction.
  - Part 2
    - To address the current poor coverage of IPIs for CPA 26.2, we are:
      - In the short term, imputing the PPIs for CPA 26.2 or equivalent from countries from which we import computer hardware products as a proxy for our IPI.
      - In the long term, we will improve the coverage of our own IPIs.
- Improved service sector deflators (BB23)
  - Nine services are currently deflated using generic bespoke deflators - 50:50 combination of the headline CPIY and average weekly earnings (AWE) for the relevant Section.
    - SPPIs will replace these generic deflators in the 2023 UK National Accounts.
  - SPPIs are theoretically most appropriate price index to use for the deflation of services and recent methodological improvements to UK SPPI include:
    - Introducing annual chain-linking.
    - A new source for index weights – Annual Survey of Goods and Services.
    - A change to classification framework – CPA08 to CPA2.1.
    - Coverage increased to not just cover transactions to businesses but also to consumers, moving from business-to business transactions to business-to-all.

Questions:

Marcus Fridén: The gateway that you are working on is something that we are interested in Sweden. So we are doing our deflation in many different places and no one really has any control over it. And we

have no expert on it. So we are going to have a project on this this year. Some of them those things that you have been working on definitely needs to be done.

Robert Bucknall*: I can share any information with you, if you want.

Day 3 – Tuesday March 19, 2024

Meeting started by Bonnie Murphy: Thank you for joining us for the third day of the conference.

Ruth Vizner (Israel CBS): Welcome to the second part of the conference. First two days were good and we are looking forward to today. Recording of the conference has been uploaded to the website and the rest will continue to be uploaded. The photo taken on Zoom will also be uploaded onto the website. Thank you to Denise and staff for handling this. As well, if you would like to be tagged in the LinkedIn post, please put a link to you or your organization in the chat and we will do that.

Cross cutting topic (8) – Innovative methods for capturing quality change Session leader: Sahoko Furuta (Japan)

Opening remarks from Sahoko Furuta:
- When the sample changes, it is divided into
  - Price change due to quality change.
  - Price difference due to pure price fluctuation.
- Quality adjustment to services is difficult compared to goods
  - More characteristics that can be quantified.
- Two presenters will share their challenges on these difficult issues.
- UK will share Case studies of quality adjustment on Information Services and Architecture and Engineering Service.
- US will share case studies on Broadband Internet Services
  - Changed data source and model based on transmission type.

Measuring quality change in services: Case studies on Information Services and Architecture and Engineering Services - Katherine Chant (UK)
- Context
  - Extremely important that we account for quality change when creating deflators.
  - It is essential for deflators to be comparing like-with-like products and services.
  - Accounting for quality change in services is particularly difficult.
    - Services are often intangible, perishable and unique.
    - Rapid technological advancements have led to brand-new services not yet adequately captured by current classification systems.
- Introduction to case studies
  - We have investigated quality change in two services that have experienced significant quality improvements:
    - CPA J63 (Information Services)
      - Rise of cloud computing.
    - CPA M71.1 (Architecture and Engineering Services)
      - Use of technologies such as Business Information Modeling (BIM), drones and digital twins.
- Case study 1: CPA J63 – Information Services
  - Information services
    - In 2022, CPA J63 accounted for 0.4% of GDP(O).
    - Our SPPI only includes items classified under J63.11 (Data Processing, hosting, and related activities).

- We believe cloud computing services should mostly be captured within J63.11. We're going to look at more detail about how we're viewing classification of cloud services.
- Also captured within J63 are things like web portals and other information service activities which we currently don't capture any prices for in our SPPI.
  - o Quality change in Information Services
    - Cloud computing: on demand availability of computer system resources, such as data storage and computing power without the direct active management by the user.
    - Rise of cloud computing services over the last few decades in the UK.
    - Cloud market in the UK was estimated to be worth over £35 billion by 2023 – a 73% rise from 2019.
    - Challenge in understanding exactly where this should be classified in CPA 2.1.
    - Steady increase of use of cloud computing services since 2013.
  - o International comparison
    - Undertook an in-depth international comparison across six countries: Canada, Germany, Ireland, Japan, Norway and USA.
    - There does not appear to be an internationally standard method or trend when it comes to measuring prices for J63 and quality adjustments.
    - Interesting to us to illustrate that this is potentially an area that's becoming more important. And one that we'll probably need to continue some research to be able to keep up to date with changes over time.
    - What quality adjustment is used?
      - Canada - Does not at the moment, planning to quality adjust the cloud computing component of the Information Services index using hedonic methods.
      - Germany - Price change taken as quality change for a new product, Overlap or Direct Price comparison depending on available information.
      - Ireland - Bridged overlap.
      - Japan - Does not at the moment, possibility of using some indicators like the number of unique users, page views, and viewing times.
      - Norway - Firms have the option to replace services that have changed quality and missing prices will be imputed.
      - USA - Respondents will be asked to provide cost data for quality adjustment.
    - UK at the moment does not use any quality adjustments either.
  - o Classification Challenges
    - Consensus is that cloud services and computing should be in J63 but hard to determine where they fall when it comes to 6-digit coding.
    - In UK at the moment, not currently capturing cloud computing component in SPPI.
    - Cloud computing components
      - Infrastructure as a service (Iaas) – 28% of UK market.
      - Platform as a service (PaaS) – 9% of UK market.
      - Software as a service (Saas) – 63% of UK market.
  - o Using an index of cloud computing prices
    - ONS's deflators team met with a couple of experts in the area, who:

- Were surprised by the upward trend in our SPPI.
- Suggested that the period from 2007 onwards would be the most. important period to account for cloud computing.
- Felt that the issues with the sample were the biggest problem.
    - Professor Diane Coyle (ONS fellow) suggested using data from her work constructing a price index for cloud computing services to deflate the cloud computing component of J63.
        - Using an index of cloud computing prices.
        - Price indices for cloud computing prices starting in 2010-2023 – comparison of quality adjustments for performance adjustments.
            o Data are based on Amazon web services, list prices and their own press releases on performance improvements.
    o Challenges
        - Big differences in series produced internationally – different approach.
        - Complicated to measure cloud computing services given the international operations – servers could be based both in the UK and Continental Europe – hard to measure where service is actually being provided and where specific information is being stored.
- Case study 2 - CPA M71.1 – Architecture and Engineering services
    - Topic explored in previous Voorburg meeting – follow up presentation.
    - CPA M71 accounts for 1.16% of GDP and 4.83% of the service sector.
    - Current pricing method is time-based.
    - Exact contracts are unknown.
    - Quality change is not accounted for.
    - Increasing trend in SPPI since 2008.
    o Quality change in Architecture and Engineering Services
        - Recent technological advancements like drones, Business Information Modeling (BIM) and digital twins have increased productivity and decreased costs.
            - Drones – used in surveying improve accuracy.
            - Digital twins – enables real time monitoring.
            - BIM – allows collaboration between businesses and clients.
    o International comparison
        - Undertook an in-depth international comparison across six countries; Germany, The Netherlands, USA, Canada, Japan, Australia, and New Zealand.
        - All countries (except Canada) experienced significant increase in their SPPI compared to the UK.
        - Majority use model pricing.
        - None explicitly account for quality change in their pricing method.
    o Options to account for quality change
        - Change of pricing method.
            - Model pricing implicitly accounts for quality change.
            - Used by majority of the countries we researched.
        - Make explicit quality adjustment (based on discussion in last Voorburg meeting)
            - Have decided against this for now.
        - Implications for construction services and construction industries – where should quality change be captured?

- - - Increased efficiencies as a whole – how to account for these and in what sector?
- Findings and conclusions
    - Common challenges and options
        - Sample size
            - CPA J63
                - 23 specific services.
                - Only J63.11 (Data processing, hosting and related services) currently included in the SPPI for J63.
            - CPA M71.1
                - 107 observations.
                - Low coverage – 19.5% for M71.11 and 52.8% for M71.12.
        - Change in services being provided over time and how to account for this in classification
            - CPA J63 Cloud computing services.
            - CPA M71.1 Development of technology such as BIM.
    - Next steps
        - Improving sample and coverage of SPPIs.
        - Explore changes to pricing method for Architecture and Engineering.
        - Build understanding of cloud computing use and prices.
        - Investigate possibility of deflating components of these services (e.g. cloud computing services) at a lower level.
        - Acting in response to classification updates e.g. ISIC revisions which will classify J63 differently.

PPI Hedonic Model for Broadband Internet Melanie Santiago (US BLS)
- Background
    - Uses the North American Industrial Classification System (NAICS)
        - Broadband Internet access services are in the wired telecommunications industry which includes establishments that provide access to transmission facilities and infrastructure for the transmission of voice data, text, sound and video using wired networks.
        - NAICS corresponds to ISIC 6110 Wired Telecommunications Activities.
    - Pricing methodology for producer prices for broadband services
        - Average revenue per subscriber for a specific plan
            - Average revenue per month per subscriber for a specific Internet service plan not bundled with any other plans.
            - This type of price permits the inclusion of both new and existing plan customers.
        - Actual transaction price for a specific plan
- Capturing quality change
    - Item Substitution
        - Technological change
        - Increasing download and upload speeds
            - Constant changing and bettering of service

- o To account for changes in speed and hold to matched model methodology, we have to determine the dollar value of that change in download or upload speed that we refer to it as the value of quality adjustment (VQA).
  - o Need for Hedonic Quality Adjustment
    - ▪ Value of quality adjustment (VQA) - Dollar value of change in download or upload speed.
    - ▪ Ability of respondent to provide information.
      - • Not often possible for respondent.
- Original Model
  - o Introduced in December 2016
  - o Ordinary Least Squares regression
  - o Used BLS PPI broadband data for estimating the model
- Original Model Variables
  - o Service Characteristic Variables
    - ▪ Selected company (dummy)
    - ▪ Residential or business service (dummy)
    - ▪ 2 interaction variables
  - o Independent Variable
    - ▪ Log(download speed)
  - o Dependent Variable
    - ▪ Log(price)
  - o Upload speed not included in the model – in USA it is typically the same or a fixed ratio of the download speed so it was only necessary to collect the download speed.
- While we re-estimated the model each year from an updated data set, the methodology remained the same until 2022. And the VQA Coefficient changed over those years.
  - o Example 2016 VQA Coefficient of 0.3075 meaning a 1% increase in the download speed was associated with a 0.3075% increase in price.
- Changes to Model – June 2022
  - o Need for Change
    - ▪ Introduced new PPI sample for Wired Telecommunications Industry
      - • Selection of new Internet providers and Internet access service items
    - ▪ Preference for average price collected
      - • Transaction prices as fallback option.
      - • We switched to collecting average prices per subscriber for a specific plan in order to more accurately capture the prices received by producers.
      - • Average price includes both new and old customers – inclusion of discount pricing for first 12-24 months of new customers before the price reverts to a higher level for the duration.
    - ▪ Average prices unusable in model
      - • Fewer transaction prices in the dataset to calculate the model.
      - • Cannot be used to generate hedonic model like done previously.
  - o Solution
    - ▪ Third-party data provider
      - • Collects telecommunications, list prices typically scraped from online and including prices for cable TV, wireless telephone, and residential Internet services.

- - - Telecom list prices for residential internet service.
    - Thousands of data points available.
    - Main drawback.
        - Only includes residential services, not businesses.
        - Though price levels can be different, the relationship between price and download speed is very similar.
    - In 2022, due to lack of transaction price quotes in new wired telecommunications sample, switched to the third party data source rather than continuing to use the data collected from PPI respondents.
    - Data source used only to calculate the model, the data is still collected from respondents to calculate the index.
- Changes to Model – 2023
    - Further improvement of the model by using subgroup analysis based on transmission type (5 types of transmission).
    - Cable/Fiber Optic
        - Speed affects price
        - Remain in database
        - Items adjusted by new model
        - 70% of US market share
    - DSL/Satellite/Wireless
        - Speed does not affect price
        - Removed from database
        - Not adjusted by new model
        - Rarely adjusted since 2016
    - For the lower speed DSL/Satellite/Wireless types there was no significant relationship to price so it was removed from the database, using only cable/fiber optic services to calculate the model.
    - DSL/Satellite/Wireless – do not really experience speed changes so the quality adjustment was rarely quality adjusted for under the old model.
    - Did consider controlling for geographic region and metropolitan area because those pieces available in the data set, but any differences due to geography were typically due to the company providing the service, and we already have that dummy variable controlling for the company. So, we did not include a specific variable for geographic region in the 2023 model.
- Current Model
    - Look at how the coefficient has changed over time.
- Ongoing Research
    - Time-Dummy Model
        - Using the third-party dataset to calculate hedonic model.
        - Would replace the collected items and match model entirely.
        - However, the methodology changes that we implemented with our new sample resulted in better participation and mitigated some of the response rate issues that we had been facing.
        - Time-dummy model has not currently been implemented but kept as research project in case change required in the future.
    - More frequent Updates
        - Previously run on annual basis when only using collected data.

- Third party dataset is updated monthly so the model can be run on a more frequent basis.
- Monthly model change implemented in November 2023.
- Building the model and selecting variables will continue to be an annual process.

Q&A Session

Steven Sawyer – *US BLS*: Comment for Katherine on Cloud Computing. Interesting that the price trends and prices were fairly static. This seems to be a common thing with technology products that they seem to match a price point and as the quality improves, they maintain that price point. So, we had run into the same thing you did and we found that it remains relatively stable using the time-dummy hedonic model to address the static prices with increasing quality over time. And we also looked at Diane Coyle's papers and we had cited that as well, so I think we have similar conclusions.

Sahoko Furuta: To Melanie – I think that it is difficult to get useful and large data set. And it is a serious problem in hedonic estimation. So, I think it is great that you have solved the problem by using third party alternative data. And I have one question, are you running estimation using this dataset, including both cable and fiber? I was wondering if the parameters of download speed for cable and fiber could be different.

Melanie Santiago (US BLS): I know our model includes both the fiber and cable items in developing it. But I don't know if we control for the different pieces of it.

Kyle Vachris (US BLS): No control because they usually trend in the same direction and are usually offered by the same company.

Melanie Santiago (US BLS): Something we will continue to evaluate if they should be separated or can continue to remain combined.

Ariel Juárez (INEGI-México)
This is a question for Melanie. Have you thought about doing the measurement or any exercise at the subnational level? What challenges do you have in doing it?

Melanie Santiago (US BLS): For the US we do not create our indexes at the subnational level unless there is a noticeable difference in prices at the regional level. But this is not an area where we have found the price trends to be different by region. There are also challenges with sample sizes to do it at a subnational level. To do it at a more detailed regional level would require more resources. And that's part of why we don't do that as the norm, we only do it in cases where it really would be affecting, how the price indexes move whether the trends vary by region. I know Kyle did investigate including region in the hedonic model itself but found that it did not have an effect. And so it wasn't a useful, variable to include. But we will continue to evaluate that each year when we are looking at our model.

Trym Langballe - Norway
For Katherine: What method did you use for the quality adjustment?

Katherine Chant (UK): For the cloud comping components, it is including the change in the service being provided – the quality adjustment applied by Diane Coyle's team, it is further detailed in her papers. For the architecture engineering component, as I said, most of the quality adjustment, is explicit quality, a method we explored was in our paper for the last conference. But that was looking at kind of creating a proxy or quality change based on satisfaction, and we haven't decided to use that.

Dorothee Blang, Germany
Melanie, what was the third party data source you used for the hedonic model?

Melanie Santiago (US BLS): Unfortunately, we do not share our data sources publicly. We have a confidentiality agreement that we provide to both our respondents that provide data to us and to the third party sources where we purchase the data. So, I can't share the data source, unfortunately.

Olivier in your formula for quality adjustment your have a power coefficient b1. What is the value and how you determine it?

Melanie Santiago (US BLS): the beta one value comes out of the hedonic model. It's the coefficient determined by the model and then that value is used into our quality adjustment formula. I'm not sure of a better answer to that question, but that coefficient is determined by the model.

Mikael Nordin - Statistics Sweden Melanie: Could you elaborate on the motivation to update the hedonic model every year?

Melanie Santiago (US BLS): We update all of our models on a regular and ongoing basis. It depends on the data source how frequently we do it, but annually is the minimum that we re-evaluate and update our models. We refresh the data and do a fresh look at what variables should be included, how to specify the model itself, to make sure that we're still adjusting for the right things, and we have had variables change over time. Not so much necessarily in this model. I know in some of our other models, like semiconductors, and in the computer area, we have changed the variables that are included, based on the outcomes of those models when updating the model each year.

Msaavedra The US BLS: when hedonic method for laptops present multicollinearity and heteroscedasticity what do you recommend to do?

Melanie Santiago (US BLS): I will defer this question to Steve Sawyer.

Steven Sawyer (US BLS): So, heteroscedasticity you just assume the model, has it, and you use heteroscedastic, corrected standard errors. Any statistical software will have that option. multicollinearity is much more difficult. So, laptops, for instance, if you look at weight and screen size, those typically will be fairly, closely correlated. Typically, you would just pick which one is more important and exclude the other variables. For us, screen size would be the more relevant variable. We would include screen size in the model and exclude other things like say, memory or storage. So, you need to use discretion and select the variables that are most relevant for quality adjustment and make sure that you don't exclude too many so you don't get omitted variable bias.

Cross cutting topic (9) – Machine Learning / AI driven processes - Ambuj Dewan (Canada)

- Coming forward as an applied user, not as a researcher in the field itself, not a machine learning expert.
- Business continuity one of the main themes of the presentation – important for implementation
- Overview of Machine learning at StatCan.
    - With advances in computing power and availability of big data, more complex machine learning algorithms have gained prominence.
    - Statistics Canada has been incorporating some of these techniques into production and analysis.
        - Classifier algorithms (for categorizing products).
        - Optical character recognition (for digitizing grocery receipts).
        - Natural language processing (for identifying economic events from news articles).
        - Predictive modelling (for predicting price movements).
    - From a statistical agency point of view, two questions arise:
        - What advantages, if any, do more modern predictive methods provide over more traditional ones?
        - How easy is it to incorporate these methods into a production process that faces tight deadlines?
    - Today's talk: answering these questions in the context of Statistics Canada's Wholesale Services and Retail Services prices programs.
- Motivation
    - Why do we need to model price movements – don't we have price data?
    - At Statistics Canada, monthly GDP section requires wholesale services and retail services price deflators approximately 6 weeks after reference period.
        - Wholesale Services and Retail Services price programs are quarterly: not timely enough to meet this requirement.
    - Thus, wholesale and retail price deflators need to be modelled until actual data are received, at which time monthly GDP is revised.
- Context
    - Timeliness
        - Not much time between receipt of data (from retail/wholesale programs and auxiliary sources) and deadline for results.
    - Computing resources
        - Do not have access to unlimited computing power.
    - Limited input data
        - Microdata often unavailable for "nowcasting"
            - No retail/wholesale prices available.
        - Must rely on contemporaneously published series.
        - Proxies must be published at same or greater frequency than series being predicted.
        - Much of what statistical agencies publish is produced on an annual or quarterly basis.
    - Business continuity
        - Process should be understood by anyone who uses it (both math and code).
        - Interpretability is valued.

- Internal use and public trust are important.
- General users should know how numbers are produced to maintain interpretability and public trust of the agency.
- Description of Indices and Data Sources
  - Indices trying to predict: Wholesale and Retail Services Price Indices (WSPI/RSPI).
  - Monthly indices produced quarterly (with a three-month revision).
  - Actually, three indices in one: margin; selling price; purchase price.
  - Coverage
    - WSPI – wholesale trade services under NAICS 41, excluding 419 (Business to business brokers).
    - RSPI – retail trade services under NAICS 44 & 45, excluding 44112 (used cars) 454 (non-store retailers), and 453993 (cannabis retailers).
  - Most price data from quarterly Wholesale/Retail Price Report
    - Randomly selected sample of wholesalers and retailers.
  - WSPI also uses some administrative data on cannabis sales from Health Canada. RSPI also uses some scanner data from major retailers and auto data from J.D. Power (administrative data).
- Production and Dissemination of Indices
  - Produced in an R-based pipeline.
  - Margin indices disseminated publicly; selling and purchase price indices available internally.
    - Selling prices needed for deflators.
  - Disseminated 2.5 months after end of reference quarter.
    - Not timely enough for monthly GDP deflators, thus the need for predicting price models every month.
- Methods Reviewed
  - Wholesale
    - Basic linear model
    - ARIMA with stepwise selection
    - Simplified ARIMA
  - Retail
    - Basic linear model
    - Neural network model
    - Linear time-trend model
  - Other methods tested but only going to discuss the methods actually put into production.
- Wholesale: Basic Linear Model
  - Description
    - Old model; used pre-2020 – not machine learning.
    - Predictions are convex combinations of Consumer Price Index (CPI), Industrial Product Price Index (IPPI), and Raw Materials Price Index (RMPI) series.
    - Weights for convex combination come from NAPCS commodity shares in Annual Wholesale Trade Survey.
    - Implemented in SAS (computation) and Power BI (reports).
  - Upsides
    - Very simple model: prediction just a linear combination of contemporaneous values.

- - Quick and easy to calculate the models.
    - o Downsides
      - Did not incorporate trends, just contemporaneous values of other series.
      - No dynamic information.
      - Annual weights.
        - Do not vary by reference month.
        - Not available contemporaneously with price data.
      - Model parameters not obtained by training on our data set, but by estimation from a completely different data set.
      - Operational concern: SAS programming knowledge not widespread throughout the organization, dwindling usage of this program – needed to revise.
- Wholesale: ARIMA Model with Stepwise Selection
  - o Description
    - Used from early 2020 to early 2022.
    - Retrained every month on an expanding window.
    - ARIMA model with at most 5 autoregressive and moving average lags and up to 70 covariates.
    - Lags and covariates selected by BIC.
    - Instead of estimating all possible models for each series, stepwise selection was used – not possible to estimate that many models.
    - Implemented in R.
  - o Upsides
    - Flexible; could incorporate both contemporaneous information and trends.
    - Let the data "do the talking": data will tell us which covariates matter and to what extent.
  - o Downsides
    - Large number of potential covariates could lead to spurious correlation, high variance in predictions, numerical instability – easy to overfit.
    - Different predictors could be used every month: compromises interpretability
    - Long runtime – several hours.
- Wholesale: Simplified ARIMA Model
  - o Description
    - Currently in use.
    - Retrained every month on a rolling window of 5 years.
    - ARIMA model with at most 5 autoregressive and moving average lags.
    - Each WSPI-SP series uses pre-defined set of covariates (typically around 5 but up to 8), plus possible seasonality adjustment in both AR and MA.
      - Covariates selected from subject-matter knowledge (stable).
      - Include CPI, IPPI, and RMPI series.
    - Use of administrative data
      - Scanner data used for predicting movements in NAICS 413 (food, beverage, & tobacco).
      - J.D. Power sales data for 4151 (motor vehicles).
      - Kalibrate data for 4121 (petroleum).
    - Models selected by AICc
      - Model selection only on lags and seasonality dummies; stepwise selection used.

- Set of possible models much smaller than earlier ARIMA model (2^18 vs 2^80).
        - Implemented in R.
    - Upsides
        - Flexible; could incorporate both contemporaneous information and trends
        - Manageable number of covariates.
        - Stable models: same covariates used every month – enhances interpretability.
        - Simple, single-environment implementation.
        - Runs in about two minutes.
    - Downsides
        - If there are relationships that the analyst did not account for in the model
            - Does not fully let the data "do the talking" for things not considered in relationships.
        - Using a rolling window result in only T = 60 data points per series – 60 months per data per series.
- Wholesale: Basic Model vs ARIMA
    - ARIMA performs similarly to simple linear model in terms of mean absolute forecast error.
    - ARIMA outperforms linear model for some series but not others.
    - Averaging across series, ARIMA reduces mean absolute forecast error 0.17% relative to basic linear model.
        - Pretty modest improvement overall, but large improvement in specific sectors (e.g. 4181, recyclable materials).
- Wholesale: ARIMA vs Simplified ARIMA
    - Simpler ARIMA model outperforms more complex one for some 4-digit NAICS; vice versa for others.
    - Averaging across series, using the simpler ARIMA model leads to an improvement in Mean Absolute Error of 0.04%.
    - Mean Absolute Error improvement modest, but runtime improvement large (minutes vs. hours).
        - Runtime improvements make it worthwhile to be in production today.
- Wholesale: Key Takeaways
    - Good predictions incorporate both trends and contemporaneous data.
    - Letting the data "do the talking" is a good idea… to a point.
        - Cannot fully substitute for specialist knowledge.
        - "Kitchen sinking" can lead to longer run times and less clear results.
    - Having stable models makes interpretation and diagnostics easier.
    - Implementation trade-off: increased complexity and flexibility come at the expense of runtime, convenience, business continuity.
        - Worth switching to a faster method even when improvements to accuracy of prediction are modest.
- Retail: Basic Linear Model
    - Description
        - Used up to December 2020.
        - Predictions are convex combinations of CPI and other series.
        - Weights for convex combination come from NAPCS commodity shares in Retail Commodity Survey.

- Projected to reference month based on historical data.
    - Later revised to take weights from Annual Retail Trade Survey to match wholesale methodology.
    - Implemented in SAS and Microsoft Excel.
  - Upsides
    - Very simple model: prediction just a linear combination of contemporaneous values.
    - Easy to generate the predictions.
  - Downsides
    - Did not incorporate trends in price movements, just contemporaneous values of other series.
    - Monthly weights not available contemporaneously, while annual weights do not vary by reference month.
    - Model parameters not obtained by training on our data set, but by estimation from a completely different dataset.
    - SAS knowledge declining throughout the organization.
- Retail: Neural Network Model
  - Description
    - Used from January 2021 to April 2022.
    - Neural network with two hidden layers.
      - Rectified linear unit activation function (avoids vanishing gradient problem on high input values).
      - Loss function is asymmetric squared loss (penalizes predicting incorrect movement direction 50% more).
        - Non-standard method.
      - Uses L1 and L2 regularization (both parameters set to 0.001) to guard against overfitting.
        - Selection and shrinkage.
      - Learning rate is adaptive (uses adaptive moment estimation to accommodate sparsity).
      - Input variables for training pre-selected by QR decomposition.
    - Incorporated contemporaneous scanner data into the model.
    - Multi-environment implementation.
      - R → Python → R → SAS
      - R: data cleaning; preparation of inputs; prediction
      - Python: model training (using TensorFlow and Keras)
      - SAS: preparation of outputs
  - Upsides
    - Flexible model that could potentially capture some nonlinearities.
  - Downsides
    - Large number of potential covariates could lead to spurious correlation, high variance in predictions, numerical instability.
    - Model needed to be retrained quarterly, but retraining could take 2-3 weeks.
    - Estimation not fast either.
    - Laborious to update model when data sources changed or basket updated.
    - Multi-environment implementation complicates production process.
    - Opaque for end users.

- Retail: Linear Time-Trend Model – currently used in production
  - Description
    - Retrained every month on a three-month rolling window.
    - Regress each series on a time trend and a single, series-specific controlling parameter.
      - Parameter is a convex combination of relevant CPI, IPPI, and Kalibrate series, with weights corresponding to North American Product Classification System (NAPCS) shares from the Quarterly Retail Commodity Survey (QRCS).
      - Use of a single controlling parameter cuts down on degrees of freedom.
    - Essentially extends the old basic linear model by adding trend data.
    - Scanner and administrative data from some retailers used instead of model prediction for some series, because those data are available monthly.
      - In certain sectors, namely, the auto sector, we're not actually generating predictions. We're using contemporaneous data to produce a price index estimate.
    - Implemented in R with some reports also produced in Power BI.
  - Upsides
    - Extremely simple.
    - Stable models; same covariates used every month.
    - Runs in about an hour, most of which is processing scanner data transactions.
    - Model is easily interpretable.
  - Downsides
    - Somewhat non-standard model.
    - Rigid functional form: does not fully let the data "do the talking," and assumes a linear time trend.
- Retail: Basic Model vs Neural Network
  - Neural network generally tracks the model better than the old basic model.
  - Electronics: linear model deviates from RSPI in late 2018; neural network model continues tracking relatively closely
  - Gas Stations: both models track trend, but linear model exhibits larger forecast errors
- Retail: Neural Network vs Time-Trend Model
  - Time-trend model tracks RSPI series better for both NAICS 443 (electronics and appliance stores) and NAICS 447 (gasoline stations)
  - NAICS 447 (gasoline stations).
    - Neural Network has higher average percentage prediction error, and more months where percentage error exceeds 5%.
    - Direction of prediction error in Neural Network model upward biased.
      - Indicates overfitting on training data and lack of retraining.
    - Direction of prediction error in Linear Time-Trend model not biased.
      - Rolling window allows model to adapt.
- Retail: Key Takeaways
  - Neural network models often not suitable for limited input data.
  - Overly complex models on limited data can overfit in sample and perform poorly out of sample, even with regularization.
  - Subject matter knowledge should guide model construction.
  - Simplicity of implementation can be just as important as simplicity of computation.

- For one-off analysis, may be better to train in one environment (e.g. Python) and estimate in another (e.g. R).
- But this is messy for production purposes; mixing environments complicates production and difficult for analysts.
- Implementation at a Statistical Agency
  - Model performance (i.e., goodness of fit) not the sole criterion by which we judge models.
  - Operational concerns (e.g., business continuity, compatibility with other processes, software/package management) matter.
  - Personnel and computing power are scarce resources.
  - Statistical agencies must be able to explain what they do to a broad audience.
  - Continuity in methods is valued.
    - Don't want to change how model is interpreted.
  - A complicated model that takes a week to run, is understood by few people, and differs immensely from previous models is unlikely to be used, regardless of how well it performs.
    - When looking around, a simpler model of the same family was chosen in order to maintain continuity.
- Conclusion
  - Vast array of powerful and innovative machine learning techniques available for prediction.
  - With limited training and input data, gains from using more complex methods are modest or even negative.
    - Little advantage to allowing for nonlinearity and complexity on small data sets.
  - Regular statistical production subject to constraints on data, time, computation, and personnel.
    - Complex methods sometimes unable to meet deadlines.
  - Success can often be found where the machine learning toolkit and the standard econometric toolkit intersect.

Questions:

Frances Krsinic - New Zealand

Hi Ambuj, excellent presentation thank you. Are these predictions overwritten once the quarterly series available and if so, does this lower the bar for how explainable they need to be?

Ambuj Dewan: Yes, they're revised quarterly once the actual index series come in, and then they're revised again the next quarter once we get revision data because these series are produced with a 6 month revision. No, the bar is not lowered because we are very concerned with the magnitude of revisions every quarter. Monthly GDP prefers to not see large revisions, which is why we want to predict as accurately as possible. Whenever there are large revisions, we do need an explanation – which series is it coming from, what's causing it, and whether this needs to be rectified. So unfortunately, we can't throw any kind of interpretability out the window. We do need to worry about explanations eery time.

Melanie Santiago | US BLS

Are these models solely used for deflating GDP or are they used at all in the calculation of the price indexes themselves?

Ambuj Dewan *Answer*: The calculations are only used for generating the deflators.

Bonnie Murphy *(US BLS):* Your input data – scanner data, JD power data – does it match your margin price data and your indexes? And if they don't match, did you make some assumptions?

Ambuj Dewan *Answer*: Because scanner and auto data are available monthly, they aren't fed into the model. We're just constructing price indices for those monthly now. Of the 3 indices produced (margin, selling, purchase), margin price is the one disseminated but the selling price is what is used in the GDP calculations in industrial accounts. What we are predicting is the selling price and that is what we are feeding into our monthly deflator calculations.

Because scanner and auto data are available monthly, they aren't fed into the model. We're just constructing price indices for those monthly now. Of the 3 indices produced (margin, selling, purchase) – margin price is the one disseminated but the selling price is what is used in the GDP calculations in industrial accounts. What we are predicting is the selling price and that is what we are feeding in our selling price data.

Cross cutting topic (10) – Production of a deflated index of turnover. Session leader: Dorothee Blang (Germany)

Production of a deflated index of turnover (ISP) in Croatia Josipa Kalčić Ivanić (Croatia)

- The service sector has great economic importance in Croatia, and it is a fast-growing economic sector. Over 60% of business entities have registered service activities.
    - Almost 50% of value-added coming from the service sector.
- The graph shows the actual distribution of turnover and value added for the service sector in business economy by activity. The highest share of turnover and value added was recorded in section G, wholesale and retail trade, repair of motor vehicles and motorcycles.
- Main purpose of ISP is to measure short term changes in service production.
    - Also required by EU regulations (production variable for services sector).
- ISP could be combined with volume indicators (industry, construction, and trade) to generate an overall production volume indicator (total market production index).
- Starting in 2019, ISP was gradually developed through EU grants. CBS started with developing section H transportation and storage.
    - All activities are covered, and CBS is completely in line with the new EBS regulation for small countries.
- The periodicity is monthly, and the indices are unadjusted, calendar adjusted and seasonally adjusted. The first reference period was January 2020.

- Calculation of ISP is done through 7-steps.
    - Gather all sources for ISP.
    - Disaggregation and estimation of monthly indices for the groups for which the quarterly indices are determined as deflator.
    - Deflation of the nominal turnover in order to get the deflated turnover.
    - Calculation of the annual "real indices" (indices calculated from deflated turnover) on the level of 4- or 3- digit NACE groups.
    - Aggregation of higher-level annual indices.
    - Calculation of base-year indices.
    - Calculation of all other indices from the base-year time series indices.
- Sources for the calculation of ISP are nominal turnover from regular monthly survey on service activities combined with the data from administrative sources (VAT).
    - The deflators are price indices with a fixed base year.
    - SPPIs are the best deflators for ISP for service activities.
    - If SPPIs are not available, other sources are used as deflators (CPI, PPI, Agricultural Price Indices (API), Index of Average Gross Salary (IAS) and Physical Indicators (PHI).
- Other sources include weights for all the deflators and structural weights. The added value from the SBS data were used for the calculation of the structural weights, and it's updated annually.
    - The basic level of weighting is 3 or 4-digit NACE level.
- Procedure for the calculation of monthly deflators is based on quarterly indices, disaggregation and estimation methods.
- Quarterly indices are on disposal:
    - Quarterly indices need to be disaggregated on 3 monthly indices.

- o 2 methods are used for this aggregation (auxiliary index method and linear interpolation method).
  - o In auxiliary index method CPI are mostly used as auxiliary source and the disaggregation is made using this formula.
  - o In the linear interpolation method, there is the assumption that the monthly movement of prices inside one quarter is similar. It means that there are 3 identical indices "month on previous month" which are aggregated in quarterly Index.
- When the quarterly index is not yet available, forecasting is made. It also uses 2 methods: linear interpolation methods and auxiliary index methods.
- In cases when monthly indices are used as deflators, there is no quarterly indices, and there is no need for disaggregation (monthly Index is directly used as deflator).
  - o In case when there is more than one monthly index, they should be reduced to one index using the weights.
- After estimation and disaggregation, there is deflation. CBS uses deflation on micro level for the calculation of ISP. In order to perform a deflation two main inputs are used: nominal turnover on micro level and the set of deflators.
- Deflation is performed in a few steps: for every reporting unit **i**, for which nominal turnover is available, appropriate **g** is added (according to its activity code).
  - o Formula for deflated turnover.
- Index calculation. First, the index "month-on-the-same-month-of-previous-year" is calculated for elementary level (NACE 3 or 4-digit level) and most of the indexes are calculated using the deflated turnover formula.
  - o Use deflated turnover in current month and divide it with deflated turnover in same month of previous year.
  - o Only units for which turnover in both periods are available, are taken into index calculation.
- When physical indicators are used instead of price indices (groups 49.2 49.5, and 50.2) deflation is not performed but these indices are used directly instead.
- Indices of physical production – quarterly indices on the base year. Disaggregation on monthly level using the linear interpolation method.
- For aggregation at a higher NACE level (group, division and section) the Laspeyres-type index is calculated using weighs (value added variable) from structural business statistics and the weights are updated every year and refer to the period T minus 2.
- The data is seasonally adjusted using software package JDemetra+ 2.2.4 using the X13 ARIMA method.
  - o Seasonal adjustment is done for 36 series. The Seasonal adjusted time series are revised every month (all value backwards), due to revision of original series.
  - o Direct seasonal adjustment approach is used.
  - o For the length of seasonal filters, automatic procedure ARIMA X13.
- Some outliers are detected (level shifts, additive outliers, and transitory changes).
  - o Outliers for which clear interpretation exists are included as regressors in the model. For example, COVID-19 crisis is modeled as LS, AO, or TS.
- ISP calculation done through the web-based application, and the application performs index calculation for a chosen year and month. Possible results in the application are ISP series,

deflated turnovers, all indices for all periods, comparison preliminary data and final data and comparison value indexes and volume indices.
- The main challenges in the calculation process of ISP lies on combining multiple sources derived from various service with a specific methodology for each for each of them.
- Knowledge of all these methodologies is necessary for good analysis of the ISP results.
- Future plans: automatization of deflators updating, improving data quality, and further good cooperation with the National Account.

Price Adjusted Economic Indicator Data Wholesale Sales - Scott Scheleur (US Census Bureau)

- Price impacts evident in the economy. Changes in the PPI for both foods and energy show this volatility. The volatility makes it difficult to interpret survey results. Important to account for this and provide insight to data users.
- The Census Bureau produces 13 economic indicators, most of which publish data on a nominal basis. Historically, have left the price adjustment to sister agency (the Bureau of Economic Analysis – BEA) who do a lot of real dollar estimation as part of the national accounts of the GDP.
- Push to add value to own products, by providing real dollar estimates, as nominal estimates are not telling the full story.
  - Price changes can skew the underlying trends in the data.
    - Emphasize the need to do this.
  - Goal to supplement existing indicator releases.
- Experimental product (real dollar estimate of wholesale sales series)
  - First released in September 2022.
  - Follows the lead of kind of established processes that have been done both in national trade program, which does extensive price adjustment on imports and exports, as well as the BEA.
  - Data from published census estimates, published price indices.
  - Times series was carried back to 2012.
- Census Nominal Wholesale Sales
  - Impacts in wholesale were very notable from beginning of pandemic.
  - How much of the trend is price change and how much is actually trends in the data and purchases?
- Chose wholesale as it is very commodity driven and notable impacts were being observed (abnormal trends throughout the pandemic).
  - Monthly wholesale trade survey used to level set.
  - Distributors, importers and exporters were included, while manufacturer sales branches and offices were excluded (exclusions covered only on the annual programs).
  - Used wholesale and manufacturing product data from the 2012 economic census along with import data from international trade program.
- From Nominal to Real
  - 2012 – sample designed at the time is based on 2012 – later years have been delayed but are being implemented.
  - 2012 Manufacturing Shipments
  - 2012 Econ Census Wholesale Products

- o 2012 Imports
- o Product Weights (with domestic/import breakouts)
- o Product Weights
- o Producer Price Indexes (PPI)
- o Import Price Indexes (MXP)
- o Price Deflators for each 4-digit NAICS to be adjusted
- Product Weighting Example – NAICS 4243
  - o Created the product weight and matched to the categories from BLS and created price deflators.
  - o Did not try to map each of the products to the 40 NAICS codes. Accounted for most of the products and extrapolated to get the rest. E.g., apparel and footwear product.
  - o BLS' Import Price Indexes (MXP) & Producer Price Indexes (PPI) were applied at the apparel and footwear product category levels for purposes of calculating real dollar estimates.
- Product is experimental, trying out different methodologies. Some limitations to the approach.
  - o Product weights based on annual product data, does not account for seasonal variation
    - ▪ In some industries that can be very impactful.
    - ▪ Other sources have been attempted but not many options worked well.
  - o MWTS sample is not controlled for products
    - ▪ Sample controlled at industry level to produce best nominal national level of wholesale.
    - ▪ Minor concern based on research.
  - o MWTS subject to sampling and non sampling error, currently no estimate of the non sampling error associated with BLS prices.
  - o Price indexes not always available on a seasonally adjusted basis.
    - ▪ Discussion on if seasonally adjusted deflators could be used.
- Census Real vs Nominal Wholesale Sales
  - o Can see the growth based on price changes by looking at the price adjusted sales data.
- Census Real vs Nominal Month-to-Month Percent Changes
  - o Can change month to month.
  - o Individual months can show differences between nominal and real dollar change.
- Census Real vs Nominal Wholesale Sales
  - o 4-digit NAICS codes explored.
  - o Historically, the nominal and the real trends have been consistent. But in the past couple of years there's been a little bit of a departure, and this new product can show the impact.
  - o Lumber and construction materials—supply change greatly impacted by the pandemic. Nominal estimates continue to show a higher trend. Provides a better picture of what was going on behind the scenes in terms of actual real spending.
  - o Petroleum— poster child for price changes, lots of variability even in normal times.
    - ▪ All over the place in normal times.
    - ▪ Real dollars compared to nominally adjusted shows large difference.
- In Progress
  - o Exports 2024: deferred exports until later, going to be incorporated, and inventories added as well.
    - ▪ Could do some relationships such as inventory to sales ratios.
  - o Working on other sectors, such as retail services and manufacturing.

- Some work has been done using primarily industry CPI/PPI for internal clearances and Departmental briefings.
- Research ongoing to develop similar experimental products.
  - Goal is to try and produce some result that accompany as many of the indicator on a more real-time basis (monthly).

Deflation of services turnover indexes – The Deflation of Wholesale Trade Mariagrazia Moschetta (Italy)

- Italian survey of the index of turnover on services collects information on turnover in euro, excluding vat and other taxes. Another survey which collects turnover is done by Structural Business statistics.
  - The turnover is collected at the enterprise level.
- The index of services turnover implicitly contains price movements so in order to obtain a measure of the change in the volume of services it is necessary to introduce a deflation technique.
  - Possible to deflate the data by dividing the turnover by a deflator. The deflated turnover index is the most reliable proxy for the production index.
- The result of this work refers to quarterly data, but by the end of this month can disseminate a new monthly, index of turnover in services.
- According to the regulation of the European Parliament and Council on European business statistics (November 2019), the National Institutes, starting from 2024, will have to disseminate turnover indicators for the services sector (with a reference period starting in January 2021).
- Required to deflate the turnover of a wholesale and retail trade and the repair of motor vehicles and motorcycles and wholesale trade, except motor vehicle, motorcycles.
- The section G of NACE classification and, separately the turnover of all other services excluding G (sections H, I, J and M excluding 701, 72 and 75).
- A deflation technique can be based on 3 different approaches.
  - Input indicators. For example, hours worked or deflated wages and salaries can be used to measure the value of output. Often this kind of proxy is used for output of non-market sectors, such as library, education and health.
  - Output indicators. For example, for the deflation of the postal services sector could use a weighted average of letters, parcels, and in general of all deliveries can be used. This kind of approach is also suitable for transport of passengers and goods.
  - Price indexes. Here each service is deflated by dividing the turnover by the corresponding output price index. If this is not available an alternative price index can be used (for example the consumer price indexes (HICP)). The latter method assumes that the producer price grows as the same rate as the sale price. Proxy is more robust for services aimed at consumers rather than a business.
  - Among the possible methods to produce volume indexes, the deflation by an appropriate output price index is considered to be the first feasible choice.
  - The alternative choice of using a consumer price index is used as a secondary option. This method is based on the assumption that the prices of manufacturing companies grow at the same rate as sales prices. Clearly this proxy is more robust for services aimed at consumers (Business to Consumer) rather than businesses (Business to Business).
- Main steps
  - The building of the matrix of the deflators.
  - The definition of the weighting system.

- o The calculation of the volume indexes.
  - o The presentation of the results.
- The Index of Production Services
  - o The compilation of the Index of Production Services is achieved according to the Italian classification of economic activities (ATECO 2007). The covered sectors are the 2-digit activities.
- Deflators
  - o Among the possible methods to produce volume indexes, the deflation by an appropriate output price index, is considered to be the first feasible choice.
  - o The alternative choice of using a consumer price index is used as a secondary option. This method is based on the assumption that the prices of manufacturing companies grow at the same rate as sales prices. Clearly this proxy is more robust for services aimed at consumers (Business to Consumer) rather than businesses (Business to Business).
- The matrix of deflators
  - o The construction of the deflators for section G and for all the others service sectors except G (TOTXG) is carried out separately.
  - o TOTXG
    - ▪ The price indexes used to construct the matrix of deflators are the production price indexes of services (SPP)for the BTB component and the harmonized consumer price indexes (HICP) for the BTC component.
    - ▪ The aggregation of price indexes is based on data from the matrix of USE (2015), produced by the National Accounts.
    - ▪ Values of final household consumptions and intermediate consumptions, are used to assign weights to the HICP and SPP.
  - o Section G - divisions 45 and 46
    - ▪ For section G and divisions 45 and 46, a different approach is used as there are no series of output price indexes available. Starting from the most detailed breakdown, each service is then associated with the price of the corresponding products sold or if that is missing then the most representative service of the sector.
    - ▪ Starting from the most detailed break-down, each service has been associated with the corresponding price or, in the absence of this, the most representative of the sector.
    - ▪ There are two different situations.
      - One-to-one correspondence, which is the simplest, where the deflator coincides with the identified price.
      - One-to-many correspondence, which means that the deflator is a synthesis of two or more different prices and synthesis is a weighted arithmetic mean.
- The weighting coefficient are based on estimates of the annual net turnover referring to the base year 2015.
- In order to aggregate the turnover indexes at a higher level of NACE, the indexes at the lowest level are aggregated by using weights, which are based on information on turnover regarding Section G, and the value added for all the other service sectors. These data are provided by Structural Business statistics and are available for each activity referring to the base year 2015.

- Technically: list of services classified according to the NACE codes, the corresponding turnover and value added, and the aggregation rules.
- List of codes that can aggregated at the division level.
- At this point having available: the raw indexes of turnover for the 3-digit levels and their aggregates, the matrix of the deflators and the weights.
  - Ready to calculate the deflated indexes by dividing the row indexes by the deflators.
  - In order to obtain the 2-digit indexes and the totals, use the weights to get to the upper aggregation.
  - All the indexes are then adjusted for seasonality and calendar effects.
- For the 2 divisions 45 and 46
  - The red line is the value (the index of production services).
  - The blue line is the deflated the index of production services (volume).
- The results of this work refer to quarterly data (until last February the Service Services turnover Index was calculated and released on a quarterly basis).
  - By end of this month, monthly indexes with data for the reference period will be disseminated (starting from January 2021).
  - The full process of the definition is being set up for monthly indicators.
- Automation of the entire process through an R processor which allows direct access to all the databases involved in the estimation of the weighting system (calculation of the deflators, and finally the deflator, the turnover).
- The seasonal adjustment procedure is not completed yet, as the time series are not long enough. The direct approach will be used to calculate seasonally adjusted indexes for all the aggregation levels.
- Room for improvement by considering additional quantitative information. This is especially true for some sectors like accommodation, and food and beverage services activities where the deflated index could be supported by information based on number of nights in hotel or other accommodation facilities. Similar for transport activities, in addition to the deflated indexes, could use the number of plane or train tickets. Could use additional pricing sources like import prices. This especially true for the wholesale sector, which is not covered enough.

The Product of Industries in Israel: Sources, Methods and Transition to Constant Prices - Yair Ben Netanel and Lior Zisman (Israel)
- The Israeli GDP and Gross Value Added are compiled using two different methods: the expenditure method which gives the official GDP and the production approach. The expenditure approach is more developed than the production approach and is based on more up-to date sources.
- The impressive recovery of the main aggregates in the national accounts after the Coronavirus crisis in 2020.
  - Driven by consumption alongside global trends in 2022 also led to deviation from the inflation target.
- Historically, average growth rate in Israel higher than other countries, Israel still growing.
- Distribution of the gross value added in the economy in 2022. The information and communication industry consists of the largest share of the business products probably for the first time since the beginning of the official measurement.
- This section is important in Israel and attracting great interest from researchers and policymakers.
- Our main data source for gross value added by industries is the yearly Survey of Industries.

- o Most recently published data for the year 2020.
  - o Unfortunately, there is a gap of about 3 years between the survey data and the publication period mainly because of the reporting time given to businesses by the tax authority.
  - o The survey is based on a large sample of over 20,000 businesses whose financial statements are analyzed by the CBS.
- The survey consists of the output and gross value added of most of the business sector industries in Israel, except for Agriculture and Construction. Different sources were used for measurement of gross value due to the unique structure of those industries, or the availability of more reliable resources.
- To complete the full picture of the value added created by the industries, add the value of production of the general government sector and the nonprofit institution. The Government and the nonprofit institution are responsible for about 15% of the total GDP.
  - o The government accounts are considered to be developed and comprehensive.
- A unique characteristic is the methodological adjustment to the national accounts. The purpose is to allow uniform coverage of all production activity defined by the production boundaries.
- Coverage adjustment with the addition of the government sector and the nonprofit institutions.
- Adjustment of the unobserved economy. Such as unreported wages, workers without visa, etc.
- Methodological adjustment made to be consistent with the input-output table, supply tables, and GDP compiled by the expenditure method and using price indices to calculate GVA at constant prices and more.
- Two main adjustments made to the National Accounts in Israel.
  - o The weight of all adjustment is about 10% of the total gross value added.
- Prior to the implementation of SNA2008 guidelines for National Accounts in Israel, most R&D investment was recorded as current expenditures (inputs) of enterprises or other organizations engaged in R&D.
- R&D output includes the value of the economy's R&D production (including international development centers operating in Israel), as well as R&D production for own-use of other industries.
- The estimated aggregates are deflated according to the wage indices of the R&D industry (Division 72)
- The total addition to the output of the business sector industries was about NIS 33 billion in 2022, about 2.1% of the total economy's gross value added.
- Imputation for the output and gross value added of start-up companies (which can attract a large amount of capital and contribute to R&D before being fully functional, and thus underrepresented in statistics).
  - o The unique nature of the start-up companies is a challenge for the national accounts in measuring and recording the economic activity.
- Survey and the standard of accounting measurement may produce missing or incomplete data in case of company not being sampled in the CBS survey.
- If the output at market price cannot be estimated the value of the output must be valued as the sum of the production costs depreciation, expense, net taxes on production and estimate of the operating surplus.
- The measurement model, which is also present in international forms, estimate the output of the start-up companies based on the companies rising capital every quarter.
  - o Include inventory and process accumulated over 2 years with an estimate of operating profit.

- o The data is translated into constant prices using the wages data.
- o Witnessed significant growth in capital rising since the beginning of the previous decades in a way that significantly increased the output of the start-up companies.
- o The investment growth was initially attributed to the 0% interest policy. According to professionals, the Coronavirus crisis directed a lot of money to the stock of companies in a way that broke records since the beginning of the measurement.
- o The gross value added of start-up companies has a grown about one 150% over the last 5 years.
- Methods of compliance estimates
  - o Constant prices for the main industries of the business sector.
  - o The transition to constant prices is by aggregate deflation of the current prices by the appropriate price indexes.
  - o Sometimes it is necessary to use quantitative extrapolation when indices are not available.
  - o In some cases, consult with industry experts before to choose an alternative price index to the PPI.
- Section B mining, quarrying and section C, manufacturing:
  - o The gross value added at the level of industry groups, at constant prices, is obtained as the difference between the output and the value of the inputs at constant prices (using the double deflation method).
- The output prices are calculated using the weighted indexes of the domestic sales price and The Index of Manufacturing Output for Exports.
- The input prices are calculated as the weighted index of the input from imports and input from local production. All weighs are based on 2014, input-output table.
- Section G, no not have producer price indices for wholesale and retail trade.
- The CBS Business, Economic Statistics Department has developed substitute price indices for deflating the revenue and the output values for constructing the indices in Division 45, 46.
  - o Composition of the inputs of the industries was examined according to the 2014 input-output table and a different weight was given to the construction of indices to inputs or originated from imports and inputs from the domestic market.
- Table represents the weight of the cost value added from the table, from the total value added of the economy. Importance of developing a producer index is usually done by the size of the industry. A lot of effort is invested in the development of the PPI. Hope to adopt it in the national account as well.

Q&A Session
Dorothee Blang – thanks to all for sharing methods and solutions.

Sahoko (Bank of Japan) To all presenters: We consider that consistent use of deflators across statistics is important. In order to deflate nominal values properly, do you adjust between statistics (all statistics follow the same classification)?

Moschetta Mariagrazia (Italy): All of the same classifications, for instance, on the turnover on services is the same classification as NACE SPPI but, for example, price indexes follow a different classification. So, we have to go deep in the classification and do the match.
Josipa Kalčić Ivanić (Croatia): Yes, it's the same as in Italy in the most cases the classification is the same. But in some cases, we have to use proxies.

Yair ben Netanel (Israel): Yeah, we inflate the output in the appropriate pricing decision and the input in the appropriate pricing. This is at constant prices, and to calculate the gross value added. We deducted the intermediate consumption from the output.

Scott Scheleur (United States): Yes, so, and in the US. We generally use the same classification for all our sources. There are some directly collected price information that we will use in our international trade program, which is more based on, like the harmonized system rather than our North American history classification. But generally, it would be the same.

Olivier D To Yair Ben Netanel - Can you explain Double inflation method?
Yair ben Netanel (Israel): We deflated the output constant process and the intermediate consumption and constant process. And because, while you added the deduction between the output and the intermediate conception.

Dorothee Blang (Germany): I've got a question to Josipa. The European Index of service production has to deal with the problem that the periodicity of the SPPIs and the timeliness and periodicity with which the ISP has to be calculated do not match. Therefore, I found it a very interesting approach to assign an auxiliary indicator to the actual deflator which, just used for estimation at the most recent periods. Do you revise the deflated turnover when the actual deflator is available?

Josipa Kalčić Ivanić (Croatia): Yes, the data are revised when the data become available.

Dorothee Blang (Germany): If I had read correctly the consumer price indices used for this are not adjusted for get.

Josipa Kalčić Ivanić (Croatia): Not necessarily. They are not changing, it is constant. We are thinking of it, but for now, we didn't adjust.

Setting priorities and defining criteria for developing new SPPIs in Israel - Zoya Nissanov (Israel)

- In recent years, the Israeli economy has been evolving from one with a production bias to one that is based on service industries while the industrial, agricultural, and commercial sectors have been shrinking. This is a deep structural change which occurs mostly in modern economies that uses technology and innovation to improve the standard of living.
- In the figure, revenue in the trade and service industries constitutes about 64% of the total revenue in the economy. This, as compared to manufacturing which accounts for less than 20%, and construction, agriculture, electricity, and water supply which together account for about 17% of the income of all economic sectors in the Israeli economy.
  - Most recently published is 2021, but data for 2022 is not significantly different.
- The next figure is more detailed and it also illustrates the changes over the decade. In addition, since some industries were affected by the Coronavirus crisis, the chart also includes the data for 2019, a year before the pandemic.
  - The figure reveals an increase in shares of service industries and a decrease in revenue shares of agriculture, manufacturing, wholesale and retail trade.
- More than 40 industries are defined as service industries. Most of them are not presently measured in Israel.
- In view of the lack of appropriate indices, the calculation of the output at constant prices in trade and service sectors is a problematic task, but due to resource constraints it is not possible to develop all of them concurrently. There is a need to set priorities and define criteria for ranking the importance of the industries.
- A work plan has been prepared and it is divided into two parallel parts: updating existing indices and developing indices for new industries.
- SPPIs cover several industries. There is a disagreement concerning the precise number, 7 or 8, because of the different definitions. On the one hand, legal and accounting activities are included in one division. On the other hand, these are 2 separate and distinct industries. This issue is discussed more in a separate paper.
- 3 Main Criteria for ranking the importance of developing SPPIs
  - 1. Contribution to GDP
    - The greater the relative weight of the industry, the higher the priority.
  - 2. The level of complexity of the industry according to the difficulty in developing price indices
    - The greater the experience in developing the price index and the richer the professional literature on the subject, the less complex the development of the index will be.
      -
    - Some industries are complicated to measure, despite the existing methodology, such as research and development and computer programming.
  - 3. Necessity to have accurate deflators for National Accounts
    - The level of necessity for National Accounts is determined by two factors:
      - Factor 1: The deflator that is presently used in National Accounts.
        - A high level of necessity is given to industries that use a general consumer price index since no suitable index has been found for that industry.

- - - The rate of private consumption within the industry is not high - the consumer price index does not reflect the change.
  - Factor 2: The rate of intermediate uses/gross fixed capital formation/exports versus private consumption
    - The rate of private consumption within the industry is high - the consumer price index can be used as a deflator index.
- The order of priorities of the service industries which are not yet measured in Israel was determined, based on the following data.
  - The weight of the industry in the total trade and services sector, according to the gross value added and based on the survey of industries.
  - The level of necessity, according to the rates of use in the input-output and supply use tables.
  - The index that is presently used in national accounts.
  - The list of countries that have already developed an index for the industry. The assumption is that the greater the number of countries, the less complex the process of developing the index.
    - It should be noted, however, that not only the number of countries is important but also the quality of the methodology published by those countries.
- GVA by Trade and Service Industries in 2020.
  - Figure shows data for the 20 largest service industries. Only three of them are currently measured in Israel– Legal and Accounting, Head Offices, Services to Buildings and Landscaping.. Plan was prepared in 2022, the most up to date data at that time was 2018. The figure presents 2020 data.
  -
  - The top 5 industries that have been selected for developing are in purple – computer programming, financial service, real estate, transport, architectural services.
- (62) Computer programming, consultancy and related activities- Reasons for selection:
  - Given highest priority. The largest industry in trade and services.
  - Previous attempts to develop an index put on pause due to the COVID crisis.
  - A high level of necessity due to the high rates of export, investment, and intermediate uses.
  - It has been developed and measured by many countries despite high level of complexity.
- (68) Real estate activities – Reasons for selection:
  - The sixth largest industry in trade and services (the fifth in 2018)
  - A high level of necessity due to the high rate of intermediate uses.
  - A need raised by the Bank of Israel.
- (71) Architectural and engineering activities; technical testing and analysis – Reasons for Selection:
  - Attempts to develop an index in the past – were curtailed due to resource constraints.
  - A high level of necessity, due to the high rates of export investment and intermediate uses.
- (49) Land transport and transport via pipelines – Reasons for selection:
  - The eighth industry in trade and services (the seventh in 2018).
  - There is a high level of necessity.
  - A need raised by national accounts.

- o It's been developed and measured in many countries.
- (64) Financial service activities, except insurance and pension funding - Reasons for selection:
  - o The fourth industry in trade and services.
  - o Medium level of complexity.
  - o A need raised by National Accounts.
- Conclusions
  - o Structural changes in the Israeli economy require adaptation of the PPIs and an increase in the share of services in the GDP raises the need for developing new SPPIs.
  - o However, resource constraints do not allow concurrent developing of indices for all relevant industries. Therefore, there is a necessity to define criteria for setting priorities.
  - o The main criterion for setting priorities was the necessity for National Accounts.
    - Some industries that despite the need from National Accounts, are not included due to their complexity – such as research and development.
  - o Computer programming industry was given first priority due to its contribution to the GDP despite the measurement difficulties.

Q&A

Bonnie Murphy (United States)*:* Are there any differences in in your national statistical organizations? Difference in the priorities for development other than what Zoya has presented? I have another characteristic. That's why I had a question, so due to the increase in the non-response for surveys. We have noticed that respondents, reporters don't want to give us prices as much as they used to in the past. One of our criteria would be the presence of an alternative or a secondary source for pricing, so we wouldn't have to send our survey out. We could just develop it in house. We have just released in late 2022. We used a secondary source for the transportation of natural gas through pipelines, and that was we were able to do that and expand our coverage because there was a source other than a survey. So know you didn't really mention that, but I know that the Voorburg group has been collecting data on secondary source use. And I just thought maybe that would be something that the group as a whole would add, as a priority in in development of SPPIs. Zoya, what do you think?

Zoya Nissanov (Israel)*:* I'm no longer involved in developing process, since once I finished preparing the work plan, I moved to another position. So, I'm not sure.

Bonnie Murphy (United States)*:* I think it will depend on whether your surveys in certain countries are required or not. If they're mandatory surveys, you might have better luck with the survey but in our case, in the US our survey, the SPPI survey is not mandatory, it is a voluntary survey, and so we are looking for alternative sources.

Ruth VIZNER (Israel)*:* Not like in the European country that have the EU regulation too. You have the EU regulation to develop an index. For example, like the presentation from Italy that you must have the index, we don't have. This is what we have chosen to develop, to, to advise the national account. The other organization, maybe Bank of Israel mentioned the real estate and to have the resources to do this. But maybe we can use another way because the doing service needs many resources. So maybe we can find the alternative.

Olivier D
how do you want to develop Computer programming deflators?

Michael Elizarov (Israel)*:* We define it by groups. The companies to the customers all over the world. Okay, so we use the two classifications. Also we have a lot of exports. So this is a very unique for other

industries that we didn't say before. We also measure the export so that will reflect the local market and also the export.

Bonnie Murphy & Marcus Fridén

We have received many topic proposals but we need more. Please send the topics today so that we can discuss at the meeting on Thursday.
Nominations for open Voorburg Bureau positions have also been received.

Day 4 – Thursday March 21, 2024

Opening remarks – Marcus Fridén - Welcome to the final day of the conference

Cross cutting topic (11) – Reoptimizing/updating samples for PPI including initial recruitment of reporting companies - Session leader: Mariagrazia Moschetta (Italy)

Croatian Experience in Updating Samples for SPPI, Including Initial Recruitment of Reporting Companies - Maja Dozet (Croatia)
- General aspects
    - SPPI- Started in 2008
    - Focus on the sectors required by STS Regulation
    - Gradually introducing surveys for different services activities
    - SPPI developed in 2022: H491, H492, H493, H495, H5221, H5222, H5223, H5229, I55, I56, J60, L68, M6910, N77 (NACE Rev. 2)
    - SPPI developed in 2023: M74, N811, N813 (NACE Rev. 2)
    - 30 service activities collected via web questionnaire
    - Collect prices for 4.200 items from 2 000 respondents
- Selection of companies (reporting units)
    - First step is to meet with companies and professional associations
    - Information on companies - Statistical Business Register (SBR)
        - Administrative Business Register
        - Tax Administration
        - Central Register of Crafts
        - Commercial Court
        - Financial Agency
        - Statistical sources
    - Uses administrative concepts to transform to statistical concepts
- Sampling frame
    - Information available on businesses: Main activity, secondary activities, turnover, number of employees, active status (only active included)
    - Sampling frame also updated from other sources
- Sampling methods
    - A cut-off method according to the turnover and employees in NACE classes within industry
        - Not homogeneous – large number of small units showing different price behaviour from large and medium-sized enterprises
    - Cut-off
        - Used when there are large significant enterprises
    - Probability
        - For industries with a large number of small enterprises
    - If the dominance of small enterprises in service activity is significant, sample design is conceived as combination of probability sampling (for small enterprises) with census (for medium-sized and large enterprises)
    - Separate sample developed for every SPPI service activity
        - 24 service activities – Cut-off method
        - 6 service activities – Probability sampling with census
    - Cut-off method

- - Some industries with large sample size
- Updating cut-off samples
  - 60% – 70% coverage on average in terms of turnover in combination with the number of employees (usually 20 and more)
  - All classes within the industry are included (except classes that comprise less than 0.5 percent of total output in the observed service industry)
  - CBS updates cut-off samples every year (SBR (y-2))
    - Main reasons: The universe from which the samples are taken is changing over time - Samples becomes depleted as the company stops producing or change observed activity. Some companies may resent the burden of responding and leave the panel or provide poor quality data if they are selected for multiple surveys. For this reason, the CBS updates the sample every year.
  - Updating the list of reporting units
    - Units that are non-active, misclassified, in dormant or bankruptcy are excluded from the sample information is sent to Statistical Business Register to be re-classified as needed
    - Units that did not cooperate inviting them again to cooperate
    - Inclusion of the newly created reporting units above the threshold
    - Inclusion of additional substitute reporting units to maintain the same sample size
- Updating Probabilistic sampling with census
  - Due to the significance of small enterprises in some service activities, sample design set-up as a combination of probability sampling for small enterprises and census (take-all approach) for large enterprises (20 and more employees)
  - The random sample of small units - selected by using the stratified one stage sampling stratified according to the NACE class (4-digit code)
  - Random Sample elected by using systematic probability proportional to size (PPS) sampling
    - Number of employed persons - used for implicit stratification
    - Turnover - used as a size variable in PPS approach
  - Two types of weights in SPPI compilation for small units:
    - 1. basic weights - weights based on turnover data from every reporting unit fulfilled in the questionnaire form (first quarter of the year)
    - 2. modified weights - obtained by combining basic weights and the random sample grossing-up factors calculated by strata (increase relative importance of smaller, randomly selected units). Used when random sampling is used.
  - Random sample
    - To reduce the bias seen in the cut-off method
  - Selection of the sample- largely dependent on the sample from the previous year
  - The rules applied in renewal procedure:
    - 1. Large units from the last year's sample that were designated as eligible units (also non-responding units) remained in the sample
    - 2. New large units that appeared in the new frame - included in the sample
    - 3. Small units from the last year's sample that responded in the survey were retained in the sample (3 years)
    - 4. Additional part of new small units was randomly selected in order to get the same sample size as we had last year
      - Units who did not respond or are ineligible units removed

- 5. Every three years, a complete sample rotation of small units is done
- Recruiting establishments
  - Recruiting establishments - done mostly via e-mailed official notification
  - Launching of a regular survey introduced by an invitation letter submitted to all units that are included in the survey
  - Purpose of an invitation letter
    - To inform the respondents on the purpose of the SPPI survey, data confidentiality and their role in its implementation
    - To ask the selected units for contact details of persons who will be in charge of completing the web questionnaire
  - After receiving the required information by email
    - An automated message (directly from the application) is sent containing the user account data (username and password)
    - Alert messages are sent every quarter to respondents with information on the beginning of data collection for the respective quarter and on deadlines
- Challenges
  - Difficulty to establish contacts with associations and large companies - lack of understanding of the topic
  - Companies perceive statistics as a big burden and are reluctant to deal with statistical questionnaires, especially small units
  - The CBS has not yet established the practice of prosecution for reporting units that refuse to cooperate (only in certain exceptional cases), although the Official Statistics Act provides for this possibility
  - Persons from professional associations or companies sometimes have problems with comprehending statistical concepts and the rationale of statistical production
  - The accuracy of the Business Register is a permanent problem when it comes to choosing a sample frame
    - Requires regular updates and quality checking
  - Despite of all challenges, the overall response rate for SPPI surveys is rather high – it amounts up to 80% on average

Reoptimizing/updating sample for PPI - Dorothee Blang (Germany)
- Need data on which we would like to collect prices – both data on the prices and the companies and the products that they sell.
- Framework conditions.
  - No production statistics in the service sector.
  - No information on the services provided by companies beyond the economic focus.
    - No information on what the companies actually sell beyond their classification in an industry.
    - For filling gaps or rotating sample it is not easy.
  - The recruitment for rotation or to fill gaps in the current survey is often unsuccessful.
    - New companies often reply that they do not sell that product at all.
      - Solution 1: Send the companies the correct industry survey.
      - Solution 2: Accept possibility that companies are out of scope and accept the smaller sample.
    - Solution 1 The random sample is designed to be considerably larger than the number of reporting entities actually required.

- - Solution 2 A preliminary survey is first conducted in accordance with the Federal Statistics Act to define the reporting population.
- Determining the number of price observations.
  - What do we need?
    - Distribution of price changes in the aggregates.
    - Weight of the first aggregates.
    - Maximum acceptable sampling error.
  - Number of price observations required at the lowest level.
  - Impact on the number of reporting entities required.
  - But the distribution of price changes is not available for a new survey.
    - Approximations must be used.
  - Existing surveys – calculations to readjust sample can lead to a decline in observations or a need for more observations.
- Sample of enterprises.
  - Considering a smaller sample size.
  - Fear that it is not robust against outliers.
  - Subsamples of original size drawn to see what the outcome would have been for the smaller sample size.
  - Blue line is trend line, yellow bar show the spread from the sample.
  - Loss of quality in the smaller sample, but in cost/benefit analysis it is appropriate.
  - Proposal could not be tested for larger sample sizes.
  - Total number of enterprises required depends on??
  - Guided by past experience to arrive at total sample size.
  - Structure of the industry affects structure of the index.
  - Want sample to represent at least 75% of the turnover in an industry.
  - Employment placement agencies example.
    - Only three large companies in the industry.
    - Strata defined as total market leaders.
  - Freight air transport example.
    - Only 5 large companies accounting for 95% of the industry turnover.
    - Assume that price from strata below would not affect index trend due to small weight
    - The data would have to defer largely in order to impact the index.
    - Random sample not drawn, sample outside the large stratum not selected.
- Recruiting
  - When price statistics are provided for the first time their company information is populated.
  - Companies legally required to answer electronic questionnaire.
  - Questionnaires identical for most industries.
    - Three sections: Contact details of the SPPI team/Contact info for the respondent, Description of the service, Price of the service.
    - Only have to determine the price characteristics for the industry.
    - If the service has to be replaced by another one, the information in the values column has to be updated.
    - If service is unchanged, this part of the questionnaire doesn't have to change.
    - Price of the service.
      - Up to four quarters can be collected in the paper questionnaire.
        - Only used for the initial survey.

- Prices of four quarters can be examined to see if the company has already passed on wage increases to their customers.
- Reporting company must specify if there has been any change since the last quarter – what has changed and for quality adjustments what the service would have cost in the previous quarter.

Introducing a questionnaire to update samples – Alain Jacquot (France)
- Determining which services will be retained for price recording over a five-year period.
- In person or video interview with engineer-surveyors who:
  - Find the right contact person within enterprises (businesses).
  - Check the turnovers within industries and domains.
  - Define families of services within industries x domains and collect related turnovers.
    - To assign weights for the families.
  - Select representative services for each family of products and make sure that they are precisely defined (in terms of price determining characteristics).
  - Collect prices for these representative services over the 4 last quarters.
- Use of a self-administered questionnaire to speed up updates and optimize resource use.
  - Main issues:
    - Difficult maintaining large staff.
    - Difficulties updating questionnaires every 5 years as specified by European regulations.
    - Considering moving to self-administered questionnaire to make more efficient use of the human resources.
    - How to define families of transactions?
      - Ex ante, based on previous updates, incorporated in the questionnaire.
      - Annual data shows turnover data at 4-digit NACE level but not useable for monitoring producer prices.
    - How to deal with industries where defining the price is complex (ex: movies, advertising)?
      - Keep actual process for those industries (face-to-face interviews).
    - How to design the questionnaire to ensure quantity and quality of responses?
      - Pre-pilot questionnaire, part of a 3-year project, step-by-step approach, working groups on different subject.
- Excerpt of First Questionnaire.
  - Planning to implement over three-year period.
  - Will keep interview process in place where the exercise would be too difficult to do under a self-completed questionnaire.
- Survey details.
  - Contact details.
  - Turnovers by domain.
  - Turnover by families of services.
    - How prices are determined by service.
  - Representative transactions.
    - Units of measurement for the data provided by the firms.
- Some remaining questions.

- - - Three-year project but there is very little experience with self-completed questionnaire – welcome any relevant information from other countries who have experience on self-guided questionnaires.
  - Three remaining questions and uncertainties about success of the project:
    - Will the businesses understand the families of transactions? How to deal with changing families? Should we allow enterprises to create their own families of transactions, or do we propose them options that they can pick?
    - Should the number of representative services be capped for enterprises which have a great number of families of transactions? How to determine all relevant price determining characteristics?
    - What response rate could we expect? How to maximise it? How to answer to respondents who have questions? How to check the quality of the answers? Will a lot of data editing be needed?

Updating the SPPI Baskets in Israel Weights, Sample and Base Year - Ruth Vizner (Israel)

- SPPIs in Israel.
  - Updating SPPI and updating the industries.
  - End of 2022 it began, ongoing task being carried out by the SPPI team working with methodology and business surveys.
  - Updating classes and existing baskets.
- Reasons for updating the baskets.
  - Change in the structure of the market.
  - New technologies, new services.
  - Globalization, export of services.
    - 2021 export exceeded imports of goods.
  - Change in the way services delivered (e-commerce).
- Objectives and Coverage.
  - Updating and expanding the sample of:
    - Companies.
    - Services.
    - Transactions.
  - Updating the structure and weights of the indices.
  - Calculating according to a new base year.
- Coverage.
  - The indices of 4 out of 8 industries are to be updated in the first stage:
    - Legal activities (691).
    - Accounting, bookkeeping and auditing activities and tax consultancy (692).
    - Activities of head offices and management consultancy activities (70).
    - Advertising and market research (73).
- The process:
  - Industry research.
    - Meet with market experts to learn about concentration, industry characteristics, etc.
  - Sample design.
  - Questionnaire.
  - Survey and data collection.
  - Data processing.

- - - Setting weights, structure of index.
    - o Calculating the index, publishing.
- Sources for sample.
    - o Business Surveys.
        - ▪ The Survey of Industries (2019) are used as a sampling frame.
        - ▪ The frame includes all of the active dealers, according to VAT sources.
        - ▪ The main sources of the survey data are financial reports of dealers presented to the Income Tax authorities and employers' reports to the National Insurance Institute.
        - ▪ The survey measures the employment, revenue, output, and gross value added (GVA).
        - ▪ Only includes businesses about classification at the 4-digit.
        - ▪ Not always up to date.
    - o Market Data.
        - ▪ Professional organizations and companies.
        - ▪ Market research companies.
        - ▪ Marked databases (D&B) includes data about activities, workers, revenues, and more.
        - ▪ Internet portals.
- Sample Design: Probability sampling.
    - o The samples are drawn at the class level (ISIC 4 digit).
    - o The companies are selected according to revenues and number of jobs.
    - o Strata sampling according to size: large, medium and small companies.
    - o Range defined for each size level.
    - o In each level companies are including using probability proportional to size.
    - o Addition companies added to the sample using other criteria (old companies, special companies).
- Sample of services.
    - o In the first stage, a sample of companies is drawn.
    - o Second stage sample of services drawn according to the data received from each company about the distribution of revenues.
    - o Services were selected from each group, including the pricing method.
- Questionnaire.
    - o Telephone, interviewer, email questionnaire options.
    - o Cooperation for email questionnaire difficult.
    - o Mandatory questionnaire but burden of response on the responder – need to understand the importance.
    - o Visit respondent, speak with them to collect information.
- Example 1: Legal Activities.
    - o Collect distribution of revenues and data about hourly fees and retainer.
    - o Collect by type of employees.
- Example 2: Survey data.
    - o Firms classified in accounting according to the main activity but also provide management consultancy service and technology consulting.
    - o In the frame it is classified only in accounting.
    - o Important to get the detail as it influences the weights and measurements.
- Example 3 – Market data.

- o   Sometimes market data is used instead of survey data if it is good data.
        - o   Distribution of revenues among media in Israel.
        - o   Use data for revision and not data from the survey.
        - o   Can give information of advertising among media sources.
- Summary:
        - o   In 2023-24 we conducted surveys for updating the baskets of the SPPIs.
        - o   During 2024 and beginning of 2025 we will calculate and publish the indices with new samples of companies, services, weights, and a new base year.
        - o   The remaining industries will be updated in 2025.

Q&A Session

Siiri Pesonen (StatFi) Dorothee, how often do you review the samples for "old" industries?

Dorothee Blang (Germany): Every 5 years

Olivier D To Dorothe Blang : in your questionnaire you ask if there is a change of quality what would have been the value in the previous period. Do you have a lot of changes ? Does it depend on services?

Dorothee Blang (Germany): Normally when we have quality changes the price is unchanged.

Olivier D: To Ruth Vizner : when you know from your survey that a part of turnover is not in the right Service section (Eg consultancy in an accounting firm) do you take information for the priority survey and not the other information?

Ruth Vizner (Israel): Take all information. Can be used to revise the other industries as well. It is good to do it for all the industries because it can be used in other areas. Use information in the consultancy industry but we take all of the information because we don't want to have to ask about it again.

Bonnie Murphy (US BLS) – Our experience is that after the pandemic a number of businesses and officials are working from home, and it is more difficult to find them in order to conduct the surveys. Have you found the same thing and has it made it more difficult to recruit respondents?

Alain Jacquot (France): Yes, this is a concern because we have difficulties contacting people in the first place.

Dorothee Blang (Germany): Initial contact lasts longer than before the pandemic. It takes a week or two until the contact person in the company receives the questionnaire. After the first reporting, switching to electronic questionnaire then contact is by email for the next period and it is no longer a problem.

Maja (Croatia)– We also have this issue, especially with the smaller sized industries.

Ruth (ICBS) – During the pandemic when visits were not possible, for a few months, but afterwards it is not a problem. With the war as well, there has been some challenges.

Michael Elizarov (ICBS) – We have the phone numbers for respondents, so this has mitigated many problems. Now we can get the prices.

Mariagrazia Moschetta (Italy) – Will provide some information to some of France's questions.

Practical experience using the checklist for evaluating alternative data fitness for use - Rohan Draper (Denmark)

- Practical experience from Denmark, Sweden and USA.
- Thank you to Kyle, Scott, and Anthony, who are involved in putting together the guidelines for incorporating alternative data sources in orifical statistics.
- Background of the project:
  - Work dating back to 2020 – documentation from the 2020 meeting which maps papers to particular alternative data sources.
  - Defining and mapping.
    - Defining Alternative Data Sources to enable constant application.
    - Mapping of existing Voorburg Group knowledge.
    - Evolution and application of Alternative Data Sources over time.
  - Guidelines for Incorporating in Official Statistics (2022).
    - Task force formed to put together guidelines presented in 2022.
- Guidance and practical applications.
  - Questionnaire brings together Generic Statistical Business Process Model mapped to quality dimensions (based on Statistics Canada's model) and incorporating measurable metrics (many coming from Stats NZ).
  - Quality Dimensions.
    - Relevance, accuracy, timeliness, coherence, accessibility to align with quality dimensions at your own institution.
  - Metrics or QPIs (Quality Performance Indicators).
    - Connect up to the questions to be used to qualitatively assess the quality of the data.
  - Questions are part of development process – what should you be looking at from a sustainable cycle?
- Questionnaire.
  - Question, GSBPM, Quality Dimension, Measures & Mitigation.
  - Attempt to make a questionnaire that was accessible and readily useable – there has been some positive feedback and some areas to improve upon.
- Learnings from Denmark and Sweden.
  - Usefulness – shared sentiment that they wish they had checklist earlier.
    - Positive views, seen as questioning tool that is not just useful for the development stage, both at the startup phase and during review processes.
  - GSBPM – feedback received that guidelines could be a little clearer and more targeted for the user.
    - Need to find ways to structure the questions in a more readily available format.
  - Key documentation
    - More examples of documentation – approach letters, data delivery agreements, explanations of data transformation tools.
    - Would be helpful to hear about countries where experimental statistics fall outside statistical legislation, how this shapes communication and documentation towards data providers.
  - Format
    - The questionnaire on first approach was cumbersome to understand and utilise, however helpful and necessary in its completeness.

- ▪ Balancing checklist for different stakeholders.
- ▪ Reflection that detail is required but just how much detail someone needs when they're face to face with a company or in an email context.
  - o Definitions of data sources
    - ▪ Suggestions on looking into further documentation – dimensions used to discuss the division of data sources and the degree of structure.
    - ▪ At time of producing, ground work was going on but no formal documentation that could be tapped into at that time. Now there may be more useful documentation available.
    - ▪ Terminology of alternative data compared to administrative data.
  - o Broad-based feedback
    - ▪ Definitions of data sources.
    - ▪ Further sources and/or developments.
      - • UN Scanner Data Guidelines, ESS handbook for quality and metadata reports.
  - o Developments from Statistics Sweden
    - ▪ Group approval processes and dedicated resources for incorporating new data sources in the production of official statistics.
      - • Special team put in place to look for and evaluate new data sources.
      - • Centralization of how the data is coming in and team looking at quality control and aspect of shared use.
    - ▪ Shared use
      - • Potential for shared use high on agenda.
      - • Before they produce solutions, looking at shared use data first and enabling all potential uses that have been identified from day one rather than trying to fit solutions to new users.
      - • Fitting to the "collect once use many times" mantra.
    - ▪ Approval process consists of five steps from initial assessment all the way through to a formal agreement with the data provider. So maybe some templates there that we might be able to tap into with their permission.

Evaluating alternative data fitness for use - Melanie Santiago (US BLS)

- • Background
  - o Guidelines for Incorporating Alternative Data Sources in Official Statistics.
    - ▪ Presented at the 37th Voorburg Group meeting in 2022.
    - ▪ Fitness for use questionnaire.
    - ▪ Requested volunteers to test the questionnaire.
  - o U.S. BLS evaluated two potential data sources and compared the questionnaire to our own evaluation process.
    - ▪ Two projects underway to evaluate questionnaire.
    - ▪ Own internal review underway which was compared to the questionnaire.
- • Alternative data in the U.S. PPI
  - o Used non-survey, publicly available data since inception of Bureau – since as early as 1934 when releasing a spot market price index that included agricultural commodities using open market exchange prices as the data source. Since then, alternative source data has been used in many models, hedonic models, frames, sample refreshing, etc.

- o Search for alternative data built into regular process.
- General steps for alternative data projects.
    - o Previously an Ad Hoc process – no formal process or criteria. Each time a potential source identified, it would be evaluated for fitness of use doing a cost-benefit analysis.
    - o This year process has been formalized by creating an oversight group that sets standards for validating the quality of the alternative data by providing methodological expertise for how to best use the data, and it ensure a consistent application of quality and methodology standards to all of the sources.
    - o General steps of the process, but it isn't always a linear process – at any point in the process if the data is not suitable or an issue is found, it can be sent back to an earlier stage for further evaluation.
        - Identify Source.
        - Evaluate feasibility.
        - Establish research plan.
        - Evaluate data quality over predefined time.
        - Test methods.
        - Evaluate results.
        - Risk assessment.
        - Transition to production.
- Overall impressions of the Voorburg questionnaire.
    - o Questionnaire is very detailed and thorough.
        - Not all questions will be relevant for every alternative data project.
        - May be daunting for those filling out the questionnaire, but the questions are necessary.
    - o Accounts for a wide variety of circumstances.
    - o Included methodological considerations as well as practical implementation questions.
        - Will be expanding internal scorecard and evaluations to include some of these not previously thought of.
- 1. Specify needs
    - o Clear concise questions on the intended goals, costs, and timeliness.
        - Crucial questions to consider early in the evaluation process.
    - o Question 1.d Does the data set exhibit the characteristics of an administrative data set? Or an alternative data set?
        - Differing use of terms across countries.
        - U.S. defines administrative data as a subset of alternative data.
        - May want to include definitions of terms within the questionnaire.
        - Some issues with differences in the use of terminology and definitions, a lot covered in accompanying paper. But if questionnaire is created as a standalone document, some definitions should be included.
- 2. Design
    - o Clear, concise questions on the coverage of the data set and whether it adequately covers the target population.
    - o Essential information to assess early in the process – fundamental suitability of the data.
    - o Aligns with questions on the US BLS scorecard.
- 3. Build
    - o The third section on the need for building new infrastructure had not been considered in US quality evaluation previously, it was more on the implementation side.

- o Question 3.a What new components may be needed…? (e.g. data acquisition channel, data processing component, machine learning model evaluation, dissemination component).
- o These are additional costs not included in the price of a dataset.
    - Will these be one-time costs, or will there be maintenance?
    - Can these new systems/processes be used for other datasets?
    - Cost to build and maintain these have to be considered as part of the cost of using the data. The data could have been free, but if you have to build a lot of infrastructure around it, that really changes the perspective.
- o Possibility of these changes being used in other projects as well, so it can be worth the investment, even though it might seem large for that initial data set.
- o US example: getting dataset from different company but using different method than had already been set up. Took a lot of time to get the system set up to get the data, dealing with securities and firewalls (large time investment).
    - Now that knowledge is there, can be more easily done for any other companies who want to provide data in that way.
- 4. Collect
    - o Collection and consistency questions were difficult to answer. This data is often not provided by vendors, particularly questions on error rates and response rates.
        - Not sure how to evaluate the data in this sense - authenticity, response, edit failures – not able to get the answers to some of these questions, and in some cases weren't really sure what the question was asking.
    - o Question: 4.b Is the data available at the level of granularity that is required to fulfill the needs of your statistical program?
        - Could be expanded to include more questions on what is and what is not available.
        - Multiple dimensions of granularity (customers, quantities, configurations, geography, etc.) that might be good to explicitly note in the questionnaire, noting exactly what is missing to help you determine if that missing piece is a showstopper (cannot proceed at all without that aspect of the data) or is there another way to supplement from another source, or impute from what you do have.
- 5. Process
    - o Mixed questions on assessing data and on how it will be processed.
    - o Response errors and bias questions difficult to answer as data providers not always willing to provide this information.
        - Not always able to get the answers to the questions.
        - Just because the question is hard to answer, doesn't mean it isn't important to ask. Not saying to remove the questions, just important to note you may not have answers to all of the questions.
    - o Question: 5.d "…Does the NSI have the ability to maintain the independence of their statistical outputs with respect to the objective of the data provider or the originally intended use of the data?"
        - This is important enough to be addressed as a stand-alone question.
        - In current form it is combined with other questions related to possible bias, but this is more about the motives behind the data and what influence using the data might occur.
        - US BLS had not considered asking this previously as an explicit point of quality.

- 6. Analysis
    - US BLS – have previously run into many restrictions about storing the data, linking with other sources, disclosing the source of the data.
        - Restrictions can stop a project in the early phases or extend the timeline of the project while you end up legally trying to sort through and negotiate how you can use the data in the end.
    - Question: 6.a Are there obligations to the data provider or the constituent target population on the dissemination of data derived from the alternative data source? Do specific disclosure control measures need to be put in place?
        - Terms of service and purchase agreements can impose many restrictions.
        - What is meant by "obligations to … the constituent target population"?
- 7. Disseminate
    - Some goals should be set earlier in the process as you evaluate a source.
    - The starting goal may also impact some responses to earlier questions.
    - 7.a Will the final data products replace existing statistics or be new to the NSI?
    - 7.b Will they be "official" or "experimental" statistics?
    - Dissemination is at the end of the usual NSI processes.
    - Goals should be set early in the process.
        - Not necessarily linear process, so back and forth in answering questions.
    - Necessary to inform responses to parts 1 through 6.
- 8. Evaluate
    - 8. Each section of this questionnaire provides an opportunity to evaluate the statistical process as well as questions on data ethics. The NSI should review this questionnaire and record their reflections at various intervals…to ensure that expectations are realized and/or re-evaluated.
        - This is more an introduction to how to use the questionnaire and would be more useful at the beginning.
        - Process doesn't just end, there should be constant evaluation in the process and re-visiting the decision over time as things can change around the source itself.
        - Noting the evaluation at both points in the process would be useful.
- Final thoughts
    - BLS splits this process into two steps with two different documents:
        - Preliminary checklist to evaluate feasibility.
        - In depth research to assess the dataset and develop an implementation plan.
    - The full questionnaire should only be completed if a preliminary analysis indicates the dataset may be viable.
    - BLS will be updating our evaluation procedures to incorporate some questions and scenarios from the questionnaire.
    - Overall, BLS has found adding more structure on analysis of alternative data has been very useful in moving the projects forward – more confident in decision making procedures – knowing that what you are putting out has had a quality review.
- Next steps
    - Feedback from countries who have evaluated questionnaire and make some revisions.
    - Post on Voorburg website for anyone to use.
    - Call for volunteers to help with this update – if you are interested in working on the questionnaire please let Melanie and Rohan know.

Suggestion from Bonnie – when new questionnaire is posted please make an announcement on Yammer that it has been added to the website.

Update on the work done together with IWGPS (Inter-Secretariat Working Group on Price Statistics) – Rohan Draper (Denmark)

Meeting Outcome – Group of Experts on CPI, June 2023
- A summary version of the framework was presented and well received.
    - Presentation also included case studies from Canada, Switzerland, Finland, and Sweden.
- Work progressed and was raised at the International Working Group on Price Statistics (IWGPS).
- The IWGPS agreed to review both papers and are happy to refer to the papers on the IWGPS website – also agreed to consider the material in the update of the PPI manual.
- Comments and reviews given back and will be reviewed and discussed with the counterparts in the next couple of weeks.

Establishing common ground for sustainable collaboration
- Technical framework.
- Practical considerations.
- Nice example of the way that there are outlets outside of Voorburg group to consider to policy and contribute to guidance, to contribute in task forces, contribute to policy and have guidance ratified.
- Benefit of thinking of CPI and PPIs as part of price statistics.

Next steps
- Heading towards an official framework using contributions by Voorburg members and colleagues in CPI.
- Working together with Melanie and other stakeholders to take it to a formal next step.
- Combined version of both papers uploaded to current manuals and considered to be part of the next iteration of the PPI manual, using case studies and theoretical aspects as well.

Upcoming revision to the Manual on Statistics of International Trade in Services - Antonella Liberatore (OECD)

- Work on BPM7 chapter on services coming to an end – draft to be circulated to lead reviewers by April 2024.
- Drafting team for MSITS 2026 in place.
  - Holistic view on trade in services in the broadest sense, encompassing different statistical frameworks (BPM and FATS) and different dimensions/perspectives.
    - How trade takes place (modes of supply, digital trade).
    - Who trades (STEC, gender dimension…).
    - What is traded (with additional granularity/focus on important aspects such as environment…).
  - Manual has concepts only (no compilation guidance).
- Substantial changes in structure compared to MSITS 2010.
  - Work ongoing on new annotated outline and on updates of core chapters (residents to non-residents, commercial presence/FATS, modes of supply).
- New chapter envisaged to cover additional indicators on the international supply of services
  - Quantitative indicators.
  - Volume/ indicators on volume, movements of the trading services so only include price indices for trading services.
    - Behind on service trade measurements – need to be a priority.
    - Inflationary pressures important in many countries.
- Call for potential contributors
  - Expertise of Voorburg Group would be of great help, and in line with expanded mandate in drafting this chapter or section, which is also in line with the expanded mandate of the group, which also considers import price indices for services.
  - For any inputs, suggestions, interest to contribute, please contact:
    - MSITS chief editors
      - Antonella.Liberatore@oecd.org, Barbara.Dandrea@wto.org –
    - UNSD Secretariat & VG member
      - Markie Muryawan, muryawan@un.org

Session: Planning the 39th VG meeting - Voorburg Group co-chairs: Marcus Fridén (Sweden) and Bonnie Murphy (US BLS)

- Evaluation feedback
  - All delegates will be emailed a link to a secure website after the meeting from INEGI, Mexico.
  - Complete the short survey within one week of the meeting.
  - Mexico will compile the results and they will be used to make improvements at future meetings.
- Voorburg Group Bureau
  - Bonnie Murphy will be stepping down as co-chair after serving in this role for 6 years.
    - Will continue role as head of PPI in USA.
    - Continue to review papers and presentations from US BLS submitted to the Voorburg Group.
  - We would like to thank Moegi Inoue from Bank of Japan for her years of service on the Voorburg Bureau.
  - We would like to thank Craig Taylor from ONS for his contributions to the Voorburg Bureau over the last years.
  - Marcus Fridén will remain as a co-chair.
  - Welcome new co-chair Mathieu Thomassin.
  - Welcome new Voorburg Bureau members.
- Members of the 2024 Voorburg Group Bureau
  - Marcus Fridén
  - Mathieu Thomassin
  - Ariel Juarez
  - Christian Puchter
  - Ruth Vizner
  - Rohan Draper
  - Dorothee Blang
  - Mariagrazia Moschetta
  - Sahoko Furuta
  - Fahmida Qureshi
  - Melanie Santiago
- September 2024 "Touch base" meeting.
  - It will be a 3-hour virtual meeting with 6 presentations.
  - If you want to host the meeting, contact Marcus or Mathieu.
- Proposed September touch base agenda.
- Voorburg 2025 meeting.
  - Very confident that it will be an in-person meeting.
  - Host country will be announced at the September 2024 touch base meeting.
- Contributions for 2025 meeting.
  - More contributions welcomed.
  - If you want to volunteer, send an email to the Voorburg co-chairs, Marcus Fridén and Mathieu Thomassin with your name, NSO, and topic.
- Proposed 2025 Topics.
  - Cross-cutting topics
    - Alternative data industry spreadsheet.

- Implementing a data driven model for automated dynamic outlier detection during data validation.
- Automating the processing of producer price data, data validation and editing.
- Deflating annual output data in SBS.
- Structuring metadata in a harmonized way towards the enablement of universal training datasets.
- Going from a fixed base index to chain index in turnover survey.
- Guidelines document on approximations of deflators when SPPIs are not available.
- How admin data are used to derive the output measurement for short term accommodation.
- Input to upcoming update of PPI Manual.
- How does the new SNA2025 impact the service industries?
- Changes in the service industries in upcoming classification revisions: ISIC, NACE, CPC, etc.
- Measuring outsourcing of services.
    - o New Industry topics
        - Industry session on ISIC 829 Business support service activities.
        - Price indexes for post secondary education.
        - Use of non-public data sources for compiling SPPI for ISIC 491 Passenger rail transport and 493 Other passenger land transport.
        - Updated sector paper on software publishing.
        - Updated sector paper on computer programming, consultancy and related activities.
- VG 2024 Follow up tasks
    - o Co-chairs report to UNSC to be delivered by November 2024.
    - o First draft of meeting notes due May 2024.
    - o Updates to papers from this year's meeting are due no later than May 1, 2024.
    - o Update the glossary with new terms introduced at this meeting (based on meeting notes).
    - o Newsletter team, one more member to work with Angela and Dorothee.
    - o Continue to develop the work with newsletter, yammer, etc.
    - o Continue to look for the most pressing issues to maintain relevance and usefulness of the group.

Newsletter Team – Dorothee Blang
- Team of three in 2023.
- Would be great if there was a few volunteers to fill the gap.
    Would like to have newsletter between this meeting and the touch base meeting in September.

Closing of the meeting
- o Thank you to Central Bureau of Statistics (ICBS) for hosting a very successful virtual meeting.
- o Thanks to participants for contributions and insights, discussions, and participation.

Yoel Finkel – Israel CBS
- Appreciate patience and endurance of participants.

- Thanks to everyone for a wonderful meeting.
- National Statistician of Israel – appreciate leadership of the Voorburg Group.
    - Thank you for patience and accommodation of moving the meeting to a virtual setting.
- Thanks to the local group at the ICBS.
- Thanks to Denise at Live4U for all the work and assistance in running the meeting.