TWINNING CONTRACT

JO/13/ENP/ST/23

Strengthening the capabilities of the Department of Statistics in Jordan

MISSION REPORT

on

Activity 1.18: Price Indices

Mission carried out by

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Table of contents

List of Abbreviations

PPI	Producer Price Index
STS	Short Term Statistics
CoP	European Statistics Code of Practice
DoS	Department of Statistics of Jordan
IMF	International Monetary Fund
MS	Member State
RTA	Resident Twinning Advisor
SD	Statistics Denmark
ToR	Terms of Reference

1. General comments

This mission report was prepared within the Twinning Project „Strengthening the capabilities of the Department of Statistics in Jordan, component 1: National Accounts". It is the only mission to be devoted to the PPI within component 1 of the project. The mission was aimed at giving the DoS staff an introduction to index theory and to give recommendations on improving the PPI.

The concrete objectives of the mission were:

- To briefly discuss index theory
- To discuss with the DoS staff how to update the producer price index (PPI) in terms of:
    - Sample design
    - Questionnaire design
    - Data collection
    - Calculating the index number
    - Calculating the weights
    - Updating the index number
- Presentation of the Danish and in general the European Union, experience in producer price index

The primary focus of the mission has been the methods used to compute the producer price index in DoS. The experts from SD have not considered the quality of the collected data but methods for ensuring the quality of data were discussed. Examination of the accuracy of the actual data would require a more thorough analysis and time spend with the price collectors. Furthermore the experts did not look into the IPI and this report will not include any recommendations regarding the IPI exclusively.

The consultants would like to express their thanks to all officials and individuals met for the kind support and valuable information which they received during the stay in Jordan, and which highly facilitated the work of the consultants.

The views and observations stated in this report are those of the consultants and do not necessarily correspond to the views of EU, DoS or Statistics Denmark.

2. Assessment and results

Very fruitful discussions with the BC Price Experts gave a good overview over the methodology and the working processes connected to the production of the Jordanian PPI.

The Jordanian PPI is compiled in line with international standards set out for the compilation of a PPI in the Producer Price Index Manual: Theory and Practice 2004 (ILO, OECD, Eurostat, United Nations, and the World Bank). The overall assessment of the quality of the Jordanian PPI is that it is of high quality. However some possible areas of improvements were identified when discussing index theory, the methods used in the Danish and Jordanian PPI's and the methods required by the EU regulations (STS) covering PPI's in the EU. The most important possible improvement would be to update the weights and sample more often than currently approx. every 10 years.

2.1 Introduction to index theory

The experts from SD gave an introduction to index theory. The presentation covered different types of indices, choice of the ideal index based on the axiomatic approach, choice of elementary aggregate indices, choice of higher level indices and how to handle missing observations and quality adjustments.

2.2 The Danish PPI

The following section describes how the PPI is compiled at Statistics Denmark. This was presented to the experts from DoS. Statistics Denmark has three employees working with the compilation of the PPI. One person has the overall responsibility for the quality of the index. Two persons are responsible for the monthly collection and validation of price data and for the monthly computation of the index.

Sample:
The sample for the entire Danish PPI consists of approximately 6000 prices. Of these, approximately 3300 are producer prices and approximately 2700 are import prices.

The prices are collected from approximately 1100 different companies.

The sample of prices is divided in approximately 1050 elementary aggregates (EA). The elementary aggregates are the main commodity groups that are the basic building blocks when compiling the PPI. The elementary aggregates are chosen so that they represent the whole population of CN codes (The combined nomenclature) that are included in the PPI definition.

Sample design:
The sampling frame for the producer price index is based on turnover values from other in-house statistics. The industrial commodity statistics deliver production values for the Danish production, the internal trade statistics deliver import and export values and the business register delivers data on company informations.

These informations are used for creating a complete population of commodity groups that sets the base for choosing the sample in the following steps:

1. Selection of elementary aggregates from a complete list of commodity groups:
    - Elementary aggregates are chosen from the commodity groups that have the largest production values (up to 70 percent). The method used is top-down sampling in order to cover as much turnover as possible.
    - This is supplemented with elementary aggregates that have smaller production values in order to reflect the entire population.
2. Selection of companies:
    - Prices are collected from companies with the largest turnover to cover as much turnover as possible.
    - This is supplemented with prices from smaller companies in order to reflect the entire population.

The selection of the specific items is left to the establishments.

Data Collection and questionnaires:
Electronic questionnaires are the primary mode of sampling.

A standard email with a link to the electronic questionnaire is sent out to about 1300-1600 company codes a few days before the 15th of every month.

The price data is automatically imputed into the PPI production system once the companies have reported their prices.

Classification used:
The elementary indices follow the combined nomenclature (CN), which is a commodity divided classification.

The sub- and total indices for the industry aggregations follow the NACE Rev. 2 classification.

Weights compilation:
Weights are assigned to every detailed group of commodities and used for weighting the base indices together for sub-indices and for the total PPI. The weights, which are based on the supply and use tables from national accounts for the year 2010, are equal to the sum of the import- and production values for the domestic market. The weights sum up to 100 within total danish production and import.

Index calculation formulas:
The PPI indices are calculated in a hierarchical system where the first calculation is made for the most detailed group of commodities, i.e. the elementary aggregates. These indices are calculated as short term geometric Jevons indices. The detailed elementary aggregates are subsequently weighted together for sub-indices and in the end for the total PPI indices. These are calculated as Laspeyres type indices.

Missing prices and quality adjustments:
In case of missing prices, different solutions can be used. If a price is missing temporarily, the price can either be carried forward from a previous month, or the price is estimated from a similar product.

If a product is no longer available, the company will be asked to select a new product that can replace the old product. The replacement of an old product to a new product is made by using a simple overlap.

Quality adjustments are hence corrected with the use of overlapping prices.

Data and index validation:
The first validation concerns the reported prices that are all evaluated separately. This validation consists of an automatic check made by the production system based on a unit value range. The unit value consists of a fixed price range for each item number (EA), and the reported prices are analysed in relation to this price range. The interval in these fixed price ranges (the unit-value) is calculated from the minimum and maximum prices of the last 13 months for the different commodity groups. If the new price information is within the defined range, the price will be approved automatically.

If the price information is not within the defined range, the price change will be send to manual inspection. This means that the prices are validated by the staff. Usually price changes up to +/- 15 pct. will be accepted.

The second validation concerns the calculated indices and consists of a visual inspection. First all elementary aggregates indices are visually reviewed, and thereafter all sub-, and total indices are visually reviewed.

Other challenges:
The Danish producer price index has the following challenges.

<u>Unique products</u>:
For certain product categories it is very difficult to measure price movements, because the manufactured products are unique, i.e. the product conditions are agreed with each customer, and an order with the exact same content will almost never occur from month to month. Since contract manufacturing within certain industries have a very significant extent, the companies can't be excluded from the selection of representative products. Therefore, a number of different pricing methods for determining a product of this type makes it possible to measure price movements in spite of the challenges. These methods are:

- Transaction prices
- Contract prices
- Model prices
- Unit value
- Component prices

Transfer prices:
Transfer prices are internal prices, when trading occurs between companies in the same group. A transfer price is often sat for tax purposes and is not a market price. This is a problem in Denmark, especially in the pharmaceutical industry. As it is important for the deflators to the National Account, that the transfer prices are included in the indices, the PPI have to collect them. This is not appropriate for the price indices, but it is necessary for the deflators.

Publication:
The producer price index publishes a press release at the 15th of every month. At the same time all indices are published in www.statbank.dk and send to Eurostat.

2.3 The Jordanian PPI

The following section describes how the PPI is compiled at The Department of Statistics of Jordan. DoS have one employee in the price division working with the compilation of the PPI. Besides that two price collectors are working in the fields collecting the price data. It is the observation of the price experts from SD that the employees in the price division (CPI, PPI, IPI and WPI) work closely together regarding the index calculations.

Sample:
The price observations in the Jordanian PPI are divided into 67 activities (product groups). In total approx. 900 price observations are collected every month to cover these 67 activities. The price observations are being collected from a sample of approx. 200 companies.

Sample design:
The product groups and the sample of companies are drawn using information regarding turnover values from the establishment census.

This information is used for creating a population of commodity groups that sets the base for choosing the sample in the following steps:

1. Selection of industries from the complete census list:
   - The industry groups (ISIC groups) are selected based on their turnover values until a certain percentage of the total industry turnover has been reached. The industries are selected based on a top-down approach.

2. Selection of companies:
   - The companies within a given industry group (ISIC group) are selected based on their turnover values until a certain percentage of the total turnover within the industry group has been reached.
   - To ensure that the sample of companies reflects the population of companies within a given industry group reasonable well (representativity of the sample), the samples drawn by the top-down method is checked and if necessary companies with a low turnover is selected to increase the representativity.

The selection of specific sample products is left to the establishments.

At present, a new establishment census based on the year 2010, is under preparation.

Data Collection and questionnaires:
Data for the producer price index is collected monthly by two price collectors. All Jordanian companies are represented in Amman which makes it possible for two people to do all the price collection.

The employee at the office at DoS prepares paper questionnaires for the price collectors to bring to the companies. In most cases the price collector fills in the questionnaire while talking to the company

representative. In a few cases (less than five percent), the company will fax the questionnaire back to DoS.

Once the questionnaires return to the office at DoS, the PPI employee will type in the responses into an excel sheet.

The collection of data takes place from the middle of the month to the end of the month.

The quantity values for the IPI are collected at the same questionnaire as the price information. The values are collected from the same companies and often for the same detailed products.

Classification used:
DoS is currently using the ISIC Rev. 3 classification. With the implementation of the sample update, DoS will implement ISIC Rev. 4.

Weights compilation:
Weights are assigned to every detailed price and used for weighting the price changes together for companies, sub-indices and for the total PPI. The weights are currently based on the establishment census from the year 1999.

Once the sample has been updated regarding the new establishment census, the weights will also be updated to represent the year 2010. It is still uncertain when the implementation of this update will take place.

Index calculation formulas:
DoS are calculating weighted Laspeyres indices for the most detailed price level. These are subsequently weighted together for company indices, sub-indices and for the total producer price index.

Missing products and quality adjustments:
In case of missing prices, different solutions can be used. If a price is missing temporarily, the price will be estimated/imputed from a similar product sometimes from another company.

If a product is missing permanently, the missing product will be left out and the company will be asked to select a new product that can replace the old one together with a new current price and a new base price. Currently the base price will be the price in 1999. Often it is not possible for the companies to report the price as it would have been in 1999 (in case of new products). In this case the base price must be estimated.

Quality adjustments are corrected with the use of overlapping prices.

Data and index validation:
The data and index validation is done by visual inspection.

The first inspection of the price data happens when the price collectors talk to the companies. In this process the price collector will ask questions if a product has a high and unusual price change. The second inspection takes place when the employee at DoS types in the prices.

Other challenges:
DoS know the concept of unique products from the printing companies. The challenge is solved by using model prices as is done in Denmark for the printing industry.

DoS have no problems with transfer prises.

Publication:
The producer price index is published 45 days after a given month with a short press release and a more detailed report.

2.4 Requirements to PPI's in the EU STS regulations

Annex A regarding Industry in The Council Regulation No 1165/98 concerning short term statistics, specifies the requirements from the EU for it member states on the producer price index. The Annex applies to all activities listed in Sections B to E of NACE Rev. 2 with some exceptions.

The producer price index must be calculated and published every month no later than 45 days after the end of the month.

For section C of NACE Rev. 2 the index are to be transmitted at the 3-digit or 4-digit level of NACE Rev. 2. This requirement only applies for countries where the transmitted indices at the 3-digit or 4-digit levels represents at least 90 percent of the total value added of Section C in the NACE Rev. 2 and/or for countries whose total value added of section C in NACE Rev. 2 in a given base year represents more than 4 percent of the European Community level.

Weights and base year must be updated at least every five years on the years ending with a 0 and a 5.

3. Conclusions and recommendations

DoS is producing a PPI of high quality with methods in line with international standards set out for the compilation of a PPI in the Producer Price Index Manual: Theory and Practice 2004 (ILO, OECD, Eurostat, United Nations, and the World Bank). However some areas of possible improvements have been identified. The most important improvement would be to update the weights and sample more often than currently approximately every 10 years.

On the background of the findings in this mission the below recommendations regarding the PPI compiled by DoS have been drawn up in close cooperation between the BC Price Experts and the MS Price Experts. The recommendations are listed in prioritised order:

Recommendation 1:
The current weights and sample of companies and product groups used in the PPI are based on the establishment census. This census is only compiled approx. every 10 years. It would be an important improvement if the weights and sample behind the PPI could be updated more often.

Recommendation 1: It is recommended that DoS looks at possible ways to increase the frequency of weight and sample updating in the PPI from currently every 10 years. Currently the price division is working on updating the weights and sample based on the 2010 establishment census. We recommend that these updates are implemented in the PPI as soon as possible. A promising option for a more frequent weight update in the future could be to look at data from National Accounts which is currently being updated and improved. When new input-output tables from the improved National Accounts have been finalized it is recommended to examine whether such data could be used for a more frequent weight update in the PPI. It is recommended that the input-output tables from National Accounts will contain data that are suitable for the weights to be used in the PPI. A promising option for a more frequent sample update in the future could be the establishment of a business register containing among other things data on turnover in Jordanian companies.

Recommendation 2:
Data editing in the Jordanian PPI is to a large extent done by manual inspection of the data. In this process the Jordanian staff looks for unusual and/or big price changes which are then controlled and explained with the help of the companies if necessary.

Recommendation 2: It is recommended that DoS assist the manual data editing with the use of functions in excel (conditional formatting) that marks and highlights data for closer inspection according to predefined criteria. These criteria should not only cover price changes above/below a certain level but also prices that have remained unchanged for longer periods of time e.g. for the last two years or more (so called inlier data editing). It is recommended to control prices that have remained unchanged for long periods with the help from the companies in the sample if necessary.

We recommend that this is implemented in the near future.

Recommendation 3:
The Jordanian PPI is calculated in one step using the Laspeyres formula. The price development of a single product constitutes an elementary aggregate index and these elementary aggregates are aggregated into indices for companies and then industry groups (according to ISIC) using the Laspeyres formula. This is possible due to having very detailed weights at the level of the single product. En most (European) countries the PPI is calculated in a two-step procedure. Firstly elementary aggregates are compiled using for instance the Jevons index formula and in the second step the Laspyres (type) formula are being used on these elementary aggregates.

Recommendation 3: A Laspeyres index is known to show an upward bias especially when keeping the weights fixed over long time periods which is currently the case in the Jordanian PPI. It is strongly recommended to consider reducing this very likely upward bias by calculating the PPI in a two-step procedure using the (weighted) Jevons formula at the level of the individual product up to the company level. In the second step the Laspeyres type formula can be used at the level of the companies up to the industry groups (4-digit and 2-digit ISIC). It is recommended to support this decision by calculating the PPI using both the current method as well as the two-step procedure for historical data and for a period going forward. Looking at the differences between these two calculations should support the decision on whether to change the calculation method.

Recommendation 4:
If it is decided to switch to a two-step procedure in the calculations then two possibilities arise concerning the detailed product weights. The Jevons index (elementary aggregate index) for a company could be compiled using the detailed weights and hence a weighted Jevons index should be compiled. As long as the detailed product weights reflects the real world reasonable well this is the preferred option. If detailed product weights are not available or are a questionable reflection of the reality then an unweighted Jevons index should be preferred. If for instance input-output tables from National Accounts (in the future) only can deliver information on weights at higher levels of aggregation than currently used, then a switch to the use of unweighted Jevons indices could be recommended (and necessary).

Recommendation 4: If a two-step calculation procedure will be used it is recommended to use detailed product weights and a weighted Jevons index if such detailed weights are available and gives a good picture of the actual market shares of the given products. It is recommended to check once in a while (perhaps every second year) whether the detailed weights are still reasonably correct, especially the older the weights are. This could perhaps be done once in a while in connection with the price collection.

Recommendation 5
A decision to use the two-step calculation procedure also lead to the question of whether to use a direct Jevons index where the price reference period (base period) is the period where the weights was implemented or if it is better to use a monthly chained Jevons index (also called a short term Jevons) where the price reference period (base period) is the previous month. The advantage of the monthly chained Jevons index is that it is only necessary to know the current price and the price in the previous month when including new products in the sample. This is often easier for the companies to report. If a direct Jevons index is used then the companies will have to report the price in the price reference

period that could be years back in time. This is often more difficult for the companies to report and then the base price will have to be estimated.

Recommendation 5: If a two-step calculation procedure will be used then it is recommended to use a short term (weighted) Jevons index since this will make it easier for companies to report the base price in case of a product change in the sample. On the other hand DoS already has a procedure for estimating the price in the base period and the use of a direct Jevons Index would also be acceptable if preferred by DoS.

Recommendation 6:
When new weights and a new sample are taken into use in the Jordanian PPI then the current practice is to recalculate historical indices from the time period that the weights belong to. For instance will weights based on the 2010 establishment census be implemented in the future. At this point all the indices back to 2010 will be recalculated using the new weights (and new sample) and the weights (from 2010) will be used from 2010 and up to the present and there will be correspondence between the weight reference period and the price reference period (also 2010). The advantage of this method is, that a theoretical correct Laspeyres index will be calculated and the recalculated indices will be more correct. On the other hand the already published PPI indices are in effect revised. This could be a (big) disadvantage for some users, for instance if they have used the index for indexation of contracts. It is possible to link indices calculated with the new weights to the already published indices and hence avoid the revision of historical indices.

Recommendation 6: The current method in the Jordanian PPI in connection with a weight update is to recalculate already published indices. This is the recommended method if the preferred option is to compile indices that are as correct as possible. If DoS on the other hand would avoid revising already published PPI's which could be a burden for users then the recommended option is to chain the new indices using the new weights onto the already published indices. It is recommended to consider this issue and make a decision on the preferred method to be used in connection with weight updates in the future.

Recommendation 7: Handheld computers (PDA's) are already being used in the Jordanian CPI in connection with the price collection. It would be beneficial if PDA's could also be used in the PPI. It is recommended to consider the possibilities and the costs and benefits of implementing PDA's in the price collection in the PPI. The use of PDA´s would for instance remove the possibility of typing errors when entering the price information into the excel calculation system.

Annex 1. Terms of Reference

Terms of Reference

EU Twinning Project JO/13/ENP/ST/23

25 - 29 January 2015

Component 1: National Accounts

Activity 1.18: Price Indices

0. Mandatory results and benchmarks for the component

- The national accounts system in Jordan updated to SNA 2008 (Apr 2015)
- The national accounts system in Jordan will cover the informal sector (Apr 2015)
- Assessment report on current situation (Jan 2014)
- Review of the GDP methodology (Apr 2014)
- Plan for how to change base year in the fixed price calculations (Jan 2015)
- Plan for how to improve the current accounts (Jan 2015)
- Present and discuss the concept of different types of agricultural accounts (Jan 2015)
- Data sources, compilation methods, and balancing in relation to supply and use tables reviewed and updated towards SNA08 principles (Apr 2015)
- Provide recommendations on how to update input-output tables (Apr 2015)
- Update the methodology for calculation the informal sector (Apr 2015)

1. Purpose of the activity

- To briefly discuss index theory
- To discuss with the DoS staff how to update the producer price index (PPI) in terms of:
  - Sample design
  - Questionnaire design
  - Data collection
  - Calculating the index number
  - Calculating the weights
  - Updating the index number
- Presentation of the Danish and in general the European Union, experience in producer price index

2. Expected output of the activity

- DoS staff introduced to index theory
- Recommendations prepared on updating the producer price index in relation to sample design, questionnaire design, data collection, calculating the index number, calculating the weights, updating the index number.
- DoS staff introduced to the Danish and in geneal European experiences in price indices

3. Participants

DoS:
Mr Mohammad Abdel Razzaq, Head of Price Division

Staff from the Price and cost of living division

Staff from the National Accounts division

MS experts
Ms. Connie Anders, Senior Head Officer, Prices and Consumption Division, Statistics Denmark
Ms. Janni Stavad, Head of Section, Prices and Consumption Division, Statistics Denmark
Mr. Martin Birger Larsen, Senior Adviser, Prices and Consumption Division, Statistics Denmark

Programme for the mission

Time		Place	Event	Purpose / detail
Sunday, morning	08.30 – 10.00	Hotel /DoS	Meeting with RTA	To discuss the programme of the week
Sunday, morning	10.00 – 12.00	DoS	Meeting with BC Component Leader and BC Experts	Discussions of the week's programme Brief introduction to index theory by experts.
	12.00 – 01.00		Break / Preparations / Report writing	Break / Preparations / Report writing
Sunday, afternoon	01.00 – 03.30	DoS	Meeting with BC Component Leader and BC Experts	Introduction to the set up in Statistics Denmark regarding price indices. Introduction EU-requirements regarding price indices.
	03.30 – 04.00		Preparations / Report writing	Preparations / Report writing
Monday, morning	08.30 – 09.00	DoS	Preparations / Report writing	Preparations / Report writing
	09.00 – 12.00		Meeting with BC Component Leader and BC Experts	Presenation by DoS on the Current setup and compilation of the Industrial Production index (IPI) and the Producer Price Index (PPI)
	12.00 – 01.00		Break / Preparations / Report writing	Break / Preparations / Report writing
Monday, afternoon	01.00 – 03.30	DoS	Meeting with BC Component Leader and BC Experts	Discussions on how to update the industrial producer price index (PPI) in terms of: -Sample design -Questionnaire design -Data collection -Calculating the index number -Calculating the weights -Updating the index number
	03.30 – 04.00		Preparations / Report writing	Preparations / Report writing
Tuesday, morning	08.30 – 09.00	DoS	Preparations / Report writing	Preparations / Report writing
	09.00 – 12.00		Meeting with BC Component Leader and BC Experts	Continued from Monday afternoon
	12.00 – 01.00		Break / Preparations / Report writing	Break / Preparations / Report writing
Tuesday, afternoon	01.00 –	DoS	Meeting with BC	Continued from Tuesday morning

	03.30		Component Leader and BC Experts	
	03.30 – 04.00		Preparations / Report writing	Preparations / Report writing
Wednesday, morning	08.30 – 09.00	DoS	Preparations / Report writing	Preparations / Report writing
	09.00 – 12.00		Meeting with BC Component Leader and BC Experts	Continued from Tuesday afternoon
	12.00 – 01.00		Break / Preparations / Report writing	Break / Preparations / Report writing
Wednesday, afternoon	01.00 – 03.30	DoS	Meeting with BC Component Leader and BC Experts	Continued from Wednesday morning
	03.30 – 04.00		Preparations / Report writing	Preparations / Report writing
Thursday, morning	08.30 – 09.00	DoS	Preparations / Report writing	Preparations / Report writing
	09.00 – 11.30		Meeting with BC Component Leader and BC Experts	Discussions of open issues.
			Ad-hoc meetings	Final clarifications with BC Experts, preparation of report and presentation for BC Project Leader
Thursday, morning	11.30 – 12.30	DoS	Meeting with BC Component Leader	Presentation for BC Project Leader
Thursday, noon	12.30 – 01.00	DoS	Debriefing with BC Project Leader	Conclusions and decisions and their consequences for the next activity and the implied work programme for BC Experts

Annex 2. Persons met

DoS:
Mr. Mohammad Abdel Razzaq, Head of Price Division
Mr. Ali Hamed Alranamnen, Price Division
Mr. Adel Ali Alkhalil Price Division
Mr. Ralal Alshukry, Price Division
Mr. Dergham Obeidar, Price Division
Mr. Wasri Alali, Price Division