

Computing Value of Production (VoP) for the Ag-Incentives NRA dataset

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Generating the value of production in the Ag-Incentives database involves several steps to provide a consistent dataset.

Notations

We will use the following notations in this note:

- $VoP_{i,r,t}^{FG}$ The value of production in current USD at Farm Gate prices (FG) for item i (a product or aggregate) for country r in year t ;
- $VoP_{i,r,t}^{RP}$ The value of production in current USD based on reference prices (RP) for item i (a product or aggregate) for country r in year t ;

The list of product includes:

- f , elements of the set F including all the FAO individual products;
- k , elements of the set K including all the individual MPS products as defined in the Ag-Incentives dataset, excluding the non-MPS aggregate XE ;
- g , elements of the set G including various aggregates;
- h , elements of the set H , that includes all the elements of K and G .

We also have defined some mapping functions $\mu: F \rightarrow H$. We consider that each element of F belongs to one element, or several elements, of H , $f \in h$.

We note $\overline{F}_{r,t}$ the set of FAO commodities not mapped to a MPS commodities.

In this note, we will drop the country and year indices, except if required for clear understanding.

Available information

1. From all source files, or after preliminary processing for MAFAP, we obtain $VoP_{k,r,t}^{FG}$. After transformation using price data, we also compute $VoP_{k,r,t}^{RP}$.
2. For OECD and IADB sources, we also have $VoP_{XE,r,t}^{FG}$ for the non-MPS aggregate, and we also obtain $VoP_{TOTAL,r,t}^{FG}$ for the total value of production. By definition we expect, $VoP_{TOTAL,r,t}^{FG} = VoP_{XE,r,t}^{FG} + \sum_k VoP_{k,r,t}^{FG}$. Note that during the information extraction, we may actually use this relation to compute the total, or the “XE” sub-aggregate if not directly available, such as $VoP_{XE,r,t}^{FG} = VoP_{TOTAL,r,t}^{FG} - \sum_k VoP_{k,r,t}^{FG}$.
3. From FAOSTAT, we have obtained $VoP_{f,r,t}^{FG}$ for all f . For the sake of clarity, we will rename this series as $VoPFAO_{f,r,t}^{FG}$. Please note that based on FAOSTAT description, this source is expressed in “farm gate” prices. While we can use different series to have a complete collection, all values should be expressed in current USD.
4. Average NRP by country is available and is defined as $NRP_{.,r,t} = \frac{\sum_k VoP_{k,r,t}^{FG}}{\sum_k VoP_{k,r,t}^{RP}} - 1$. It is the average NRP on MPS commodities.
 - a. Please note that potential extension could occur here in the future, by using sub-categories of NRP to fine tune the analysis.

Identifying key steps

The processing of the value of production is aimed to generate a vector of $VoP_{h,r,t}^{RP}$ for all elements of h , either **individual products or aggregates**.

These values should be expressed in **Reference Price**.

The dataset should be **internally consistent**, making sure that total and sub-aggregates are consistent with disaggregated data.

Procedure

We detail here the step by step procedure required to generate the final output.

While different pathways could be designed, our approach is to be as systematic as possible, by realigning elementary elements, VoP from FAOSTAT, to existing aggregates.

Aligning VoP for MPS commodities

For several sources, MPS commodities are associated with well-defined VoP and should be considered as a primary source for data. We use it to rescale the existing FAO data such as:

$$VoP_k^{FG} = \sum_{f \in k} \gamma_k^{FG} \cdot VoPFAO_f^{FG} \text{ and } VoP_k^{RP} = \sum_{f \in k} \gamma_k^{RP} \cdot VoPFAO_f^{RP}$$

The first step is to compute the γ_k vector.

CAVEAT 1: The major risk at this stage is that γ_k^{RP} could not be computed if a product is missing from the FAO VoP dataset while existing in the NRP dataset. Indeed, having $VoPFAO_f^{FG} =$

$0, \forall f$ if $\exists VoP_{k=\mu(f)}^{FG} > 0$ will lead to an indetermination. In such a case, a simple rule should be applied. As a pretreatment, we want to make sure that create minimal values for all cells. Therefore, we should identify the observations associated with such “missing” tuples (f, r, t) and create them with $VoPFAO_{f,r,t}^{FG} = 1E^{-3}$. We could actually do it for the whole database, but could create a lot of irrelevant observations.

For the valuation in FG, it is straightforward since, thanks to the FAO-Ag-incentives mapping we can compute by summation:

$$\gamma_k^{FG} = \frac{VoP_k^{FG}}{\sum_{f \in k} VoPFAO_f^{FG}} \quad \text{Eq. 1}$$

Then we define the scaling factor, corrected from price valuation bias, such as

$$\gamma_k^{RP} = \gamma_k^{FG} \frac{VoP_k^{RP}}{VoP_k^{FG}} \quad \text{Eq. 2}$$

Therefore, we can start filling our final set of VOP at the more detailed level, i.e. on the set F, \widehat{VoP}_f :

$$\widehat{VoP}_f^{RP} = \gamma_k^{RP} \cdot VoPFAO_f^{FG} \quad \text{Eq. 3}$$

And

$$\widehat{VoP}_f^{FG} = \gamma_k^{FG} \cdot VoPFAO_f^{FG} \quad \text{Eq. 4}$$

At this stage, we should make a couple of quality checks by comparing the existing VoP from the NRP dataset with the elements we have just computed. In particular,

$$VoP_k^{RP} = \sum_{f \in k} \widehat{VoP}_f^{RP}, \forall f \text{ and } VoP_k^{FG} = \sum_{f \in k} \widehat{VoP}_f^{FG}, \forall f$$

In Excel

| | |
|------------------------------------------------------------|-----------|
| VoP_k^{FG} | F2 |
| $VoPFAO_f^{FG}$ | J2 |
| γ_k^{FG} | L2 |
| $\widehat{VoP}_f^{RP} = \gamma_k^{RP} \cdot VoPFAO_f^{FG}$ | N2 |

Aligning VoP for non-MPS commodities

We start by computing the value of non-MPS commodities from the FAOSTAT dataset

$\sum_{f \in \bar{F}_{r,t}} VoPFAO_{f,r,t}^{FG}$ and from this compute a scaling factor $\theta_{r,t}^{FG}$ such as

$$\theta_{r,t}^{FG} = \begin{cases} \frac{VoP_{XE'',r,t}^{FG}}{\sum_{f \in \bar{F}_{r,t}} VoPFAO_{f,r,t}^{FG}}, \forall VoP_{XE'',r,t}^{FG} > 0 \\ 1, \forall VoP_{XE'',r,t}^{FG} = 0 \end{cases} \quad \text{Eq. 5}$$

We also can obtain the adjustment factor for series expressed in reference prices:

$$\theta_{r,t}^{RP} = \frac{1}{1 + NRP_{r,t}} \cdot \theta_{r,t}^{FG} \quad \text{Eq. 6}$$

Therefore, we can start filling our final set of VOP at the more detailed level for all non-existing observations i.e. $\forall f \in \bar{F}_{r,t}$ or equivalently for all $\widehat{VoP}_f = 0$ or NA, i.e. not defined yet.

$$\widehat{VoP}_f^{RP} = \theta_{r,t}^{RP} \cdot VoPFAO_f^{FG} \quad \text{Eq. 7}$$

And

$$\widehat{VoP}_f^{FG} = \theta_{r,t}^{FG} \cdot VoPFAO_f^{FG} \quad \text{Eq. 8}$$

At this stage, we should make a couple of quality checks by comparing the existing total non-MPS commodities. In particular,

$$VoP_{XE,r,t}^{RP} = \sum_{f \in k} \widehat{VoP}_f^{RP}, \forall f \text{ and } VoP_{XE,r,t}^{FG} = \sum_{f \in \bar{F}_{r,t}} VoPFAO_{f,r,t}^{FG}$$

Computing all needed aggregates

Based on the completed series of \widehat{VoP}_f^{RP} and \widehat{VoP}_f^{FG} , we can now complete all the required information in terms of VoP value, \widehat{VoP}_h^{RP} and \widehat{VoP}_h^{FG} , either for all Ag-incentives products, or for any aggregates (used for total, non-MPS, GCT equivalent etc).

Final check should be done on VoP for total aggregates.

This final set of VOP could be merged with the payments dataset.

Other points to check

We need to cross-check what is happening when we drop a specific k,r,t observation from the NRP database, e.g., when we remove one year of data for a very weird observation. If we do it “before” or “after” the VoP treatment it may alter some of the procedures. By default, but without careful investigation, will be to use the final NRP dataset – with all the exclusions – as a reference to define which (k,r,t) tuple is a MPS commodity or not.

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