Accounting for Market Distortions in an Integrated Investment Appraisal Framework

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Concerns about a project

- Is the project **financially** or **fiscally** sustainable?
- Is the project **economically** worthwhile?
- Who are the **stakeholders**? How are they impacted? By how much?
- What are the **risks** associated with the benefits accruing to the stakeholders?
Components of a proper analysis

No strong linkage between the components!
**The Big Picture**

- **Financial Analysis**
  - (Financial values for cost or benefit items)
  - **Non Market Goods**
    - (Public Services, Social Impacts, Environmental Impacts)
  - **Market Goods**
    - (Tradables and Non Tradable Goods and Services)
  - **Sector Specific Analysis**
    - (WTP, WTA, Coping costs, Value of time, Social and environmental impacts, etc.)
  - **Commodity-Specific Conversion Factors (CSCF)**
    - Factoring for the market distortions, independent from the project

- **Economic Analysis**
  - (Economic values of all cost or benefit items - net impact on the economy)

- **Deduct Financial Values**

- **Stakeholders Analysis**
  - (Value of externalities for the same cost or benefit items)

- **Cash Flow Statement**
- **Resource Flow Statement**
- **Statement of Externalities**
Contributions by Our Paper

- Adjustments required to convert the financial values of investment projects into their corresponding economic values
- Comprehensive framework and practical approaches to the estimation of the economic prices and Commodity-Specific Conversion Factors (CSCFs) for project inputs and outputs
- Application of the framework to tradable and non-tradable goods and services in Rwanda
- Estimation of CSCFs for more than 5,000 tradable commodities and non-tradable goods and services, i.e. transportation, construction, electricity, and telecommunication
Relationship between Tradables and Non-tradables

Classification 1: International Trade

- Project’s demand for an input is ultimately met through an expansion of imports or a reduction of exports
- Production of a good/service by a project leads to a reduction in imports or an expansion of exports

Classification 2: Determination of the price

- ** Tradable:** Price is set in the world market
- ** Non-tradable:** Local demand and supply dynamics determine the price of the good/service
  - e.g. local transportation, construction, electricity, telecommunication, water supply, all public services, hotel accommodation, real estate; goods with very high transportation costs such as gravel
Classification of a Project’s Outputs and Inputs

- **Outputs**
  - Tradable
    - Importable
    - Exportable
  - Non-Tradable
    - Importable
    - Exportable

- **Inputs**
  - Tradable
    - Importable
    - Exportable
  - Non-Tradable
    - Importable
    - Exportable
Importable/Exportable Goods and Services

Imported/Importable

- **Imported:** Produced in a foreign country but sold domestically
- **Importable:** Include imported goods and their close substitutes produced and sold in the domestic market

Exported/Exportable

- **Exported:** Produced domestically but sold abroad
- **Exportable:** Exported ones and domestically consumed goods of the same type or close substitutes to the goods being exported
Requirements of the Economic Analysis

What do we need to convert financial values into their corresponding economic values?

- Conversion factors for tradable and non-tradable inputs
- Conversion factors for outputs
- National parameters

  - **Foreign Exchange Premium (FEP):** captures the distortions created by the indirect taxes, trade tariffs and subsidies levied in the markets in which foreign exchange is used or generated
    - The FEP of a country is defined as the percentage or proportion by which the economic value of foreign exchange exceeds the market exchange rate of that country.
    - **Rwanda:** 5.3%

  - **Premium on Non-tradable Outlays (NTP):** is a premium equivalent to the FEP that is associated with non-tradable outlays
    - **Rwanda:** 1.05%
Taxes Levied by the Rwanda Revenue Authority on Imported Commodities

- Import duty is levied on the Cost, Insurance and Freight (CIF) value of imports
- Excise duty is levied on the CIF value and the amount of import duty
- Value Added Tax (VAT) is levied on the CIF and the sum of the import and excise duties

<table>
<thead>
<tr>
<th>Import Duty ($T_m$)</th>
<th>$CIF \times T_m$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excise Duty ($T_e$)</td>
<td>$T_e \times (CIF + CIF \times T_m) = CIF \times T_e \times (1 + T_m)$</td>
</tr>
<tr>
<td>VAT</td>
<td>$VAT \times [CIF + (T_m \times CIF) + (T_e \times CIF + T_e \times T_m \times CIF)]$ $= CIF \times VAT \times (1 + T_m + T_e + T_e \times T_m)$</td>
</tr>
</tbody>
</table>
Conversion Factor for Importable Inputs and Outputs

Financial value:
\[ \text{CIF} \times [1 + T_m - k_m + T_e \times (1 + T_m - k_m) + \text{VAT} \times (1 + T_m - k_m + T_e + (T_e \times T_m))] \]

Economic value:
\[ \text{CIF} \times (1 + \text{FEP}) \]

\[ \text{CSCF}_{II/IO} : \]
\[ \frac{1 + \text{FEP}}{1 + T_m - k_m + T_e \times (1 + T_m - k_m) + \text{VAT} \times (1 + T_m - k_m + T_e + (T_e \times T_m))} \]
Examples from the Database

Commodity-Specific Conversion Factors Database for the Republic of Rwanda

This database contains Commodity-Specific Conversion Factors (CSCFs) for estimating economic values for more than 5000 tradable commodities and CSCFs for economic values of Construction, Electricity, Telecommunication and Transportation.
Examples from the Database (cont.)

Animal or vegetable fertilisers

Import duty: 0%  
Excise duty: 0%  
VAT: 18%  
FEP: 5.3%

<table>
<thead>
<tr>
<th>HS Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>31</td>
<td><strong>Fertilisers</strong></td>
</tr>
<tr>
<td>31.01</td>
<td>Animal or vegetable fertilisers, whether or not mixed together or chemically treated; fertilisers produced by the mixing or chemical treatment of animal or vegetable products.</td>
</tr>
<tr>
<td>31.01.00.00</td>
<td>Animal or vegetable fertilisers, whether or not mixed together or chemically treated;</td>
</tr>
<tr>
<td>31.02</td>
<td>Mineral or chemical fertilisers, nitrogenous.</td>
</tr>
<tr>
<td>31.02.90.00</td>
<td>- Other, mineral or chemical fertilisers, nitrogenous, including mixtures</td>
</tr>
<tr>
<td>31.03</td>
<td>Mineral or chemical fertilisers, phosphatic.</td>
</tr>
<tr>
<td>31.03.90.00</td>
<td>- Other mineral or chemical fertilisers, phosphatic</td>
</tr>
<tr>
<td>31.04</td>
<td>Mineral or chemical fertilisers, potassic.</td>
</tr>
<tr>
<td>31.04.90.00</td>
<td>- Other mineral or chemical fertilisers, potassic</td>
</tr>
<tr>
<td>31.05</td>
<td>Mineral or chemical fertilisers containing two or three of the fertilising elements nitrogen, phosphorus and potassium; other fertilisers; goods of this Chapter in tablets or similar forms or in packages of a gross weight not exceeding 10 kg.</td>
</tr>
</tbody>
</table>
### Conversion Factors for Tradables

**Item Name:** Animal or vegetable fertilisers, whether or not mixed together or chemically treated;

#### Select Commodity Type

<table>
<thead>
<tr>
<th>Home</th>
<th>Importable Input</th>
<th>Importable Output</th>
<th>Exportable Input</th>
<th>Exportable Output</th>
</tr>
</thead>
</table>

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**CSCF_{II} = 0.8924**

#### Conversion Factors

<table>
<thead>
<tr>
<th>Factor</th>
<th>Base Input Values - 2014</th>
<th>Updated Input Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreign Exchange Premium (FEP)</td>
<td>5.3%</td>
<td>5.3%</td>
</tr>
<tr>
<td>Value Added Tax (VAT)</td>
<td>18%</td>
<td>18%</td>
</tr>
<tr>
<td>Import Duty (T_{in})</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Import Subsidy (k_{in})</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Excise Duty (T_{e})</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

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Recalculate  Reset
Conversion Factor for Exportables

Inputs

Financial value: \( FOB \times (1 + k_x - T_x) \times (1 + VAT) \)
Economic value: \( FOB \times (1 + FEP) \)

\[
\text{CSCF}_{EI} : \quad \frac{1 + FEP}{(1 + k_x - T_x) \times (1 + VAT)}
\]

Outputs

Financial value: \( FOB \times (1 + k_x - T_x) \)
Economic value: \( FOB \times (1 + FEP) \)

\[
\text{CSCF}_{EO} : \quad \frac{1 + FEP}{(1 + k_x - T_x)}
\]
Conversion Factor for Non-tradable Goods and Services

Economic value:

\[ P_x^e = W_x^s P_x^m (1 + k_x) + W_x^d P_x^m (1 + t_x^v - d^*) \]

\[ - W_x^s \left[ \sum_i a_{ix} P_i^m d_i + \sum_j a_{jx} \left\{ W_j^s P_j^m (t_j^e + g_j - k_j) + W_j^d P_j^m (d^* - t_j^v) \right\} \right] \]

\[ + [P_x^m \times T_x \times \text{FEP}] + [P_x^m \times \text{NT}_x \times \text{NTP}] \]

This formula can be used to estimate the economic price of a non-tradable good, that is either an intermediate input used by a project or an output produced by it.

Conversion factor:

\[ \text{CSCF} = \frac{P_x^e}{P_x^m \times (1 + t_x^v)} \]
Calculation of Economic Value for Non-tradables

Step One: Adjusting for distortions in the market for good or service

\[ P^e_x = W^s_x P^m_x (1 + k_x) + W^d_x P^m_x (1 + t^\nu_x) \]

Step Two: Adjustment for distortions in markets where diverted demand moves

\[ -W^d_x P^m_x d^* \]

Step Three: Adjustment for distortions in the markets of the inputs used in the production of a non-tradable

\[ -W^s_x \left[ \sum_i a^o_{ix} P^m_i d_i + \sum_j a^o_{jx} \left\{ W^s_j P^m_j (t^e_j + g_j - k_j) + W^d_j P^m_j (d^* - t^\nu_j) \right\} \right] \]

Step Four: Adjust for the premiums on foreign exchange (FEP) and non-tradable outlays (NTP)

\[ [P^m_x \times T_x \times FEP] + [P^m_x \times NT_x \times NTP] \]
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