UIS Workshop on Education Financing
Dakar, May-30 to June-03, 2016
Educational Finance Indicators
Indicators derived from UIS QB

- Government expenditure on education as % of total government expenditure
- Government expenditure on education as % of GDP
- Expenditure on primary (secondary, tertiary) as % of expenditure on education
- Expenditure per pupil, per level (as % of GDP per capita, in PPP$)
- Expenditure by nature: Share of spending on teacher salaries, other current expenditure, capital expenditure
How does UIS derive indicators

1. Public expenditure on education as % of total government expenditure

\[
\text{Total expenditure on education from the government} \quad = \quad \frac{\text{Government expenditure from all sectors}}{	ext{Total expenditure on education from the government}}
\]

2. Public expenditure on education as % of GDP

\[
\text{Total expenditure on education from the government} \quad = \quad \frac{\text{Government expenditure from all sectors}}{\text{Gross domestic product}}
\]

- Total government expenditure from data reported to UIS or the IMF
- GDP data from the World Bank
3. Educational expenditure in primary (secondary, tertiary, etc.) as % of total educational expenditure

\[
\text{Government expenditure on an education level (ex. primary, secondary)} = \frac{\text{Government expenditure on education on all levels}}{\text{Total expenditure on an education level (ex. primary, secondary)}}
\]

4. Public expenditure per pupil as a % of GDP per capita

\[
\frac{\text{Number of pupils in that level}}{\text{Gross domestic product per capita}}
\]

- Expenditure on education as reported to UIS
- GDP per capita data from the World Bank
Refer to UIS annual Country Review

### Total public educational expenditure per pupil as a percentage of GDP per capita, Primary

<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>(EFA base year)</td>
<td>1999</td>
<td>8.2</td>
</tr>
<tr>
<td></td>
<td>2000</td>
<td>9.2</td>
</tr>
<tr>
<td></td>
<td>2001</td>
<td>8.4</td>
</tr>
<tr>
<td></td>
<td>2002</td>
<td>9.1</td>
</tr>
<tr>
<td></td>
<td>2003</td>
<td>10.5</td>
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<td>2004</td>
<td>11.7</td>
</tr>
<tr>
<td></td>
<td>2005</td>
<td>13.8</td>
</tr>
<tr>
<td></td>
<td>2006</td>
<td>14.4</td>
</tr>
<tr>
<td></td>
<td>2007</td>
<td>...</td>
</tr>
<tr>
<td></td>
<td>2008</td>
<td>...</td>
</tr>
<tr>
<td></td>
<td>2009</td>
<td>...</td>
</tr>
<tr>
<td></td>
<td>2010</td>
<td>15.0</td>
</tr>
<tr>
<td></td>
<td>2011</td>
<td>17.5</td>
</tr>
</tbody>
</table>

**Definition**
Total public expenditure per student in primary education as a percentage of GDP per capita.

**Formula**
Finance year ending in 2011

\[
\text{Public expenditure per pupil as a \% of GDP per capita} = \left( \frac{45100}{25647} \right) \times 100 = 17.5
\]

### Total public educational expenditure per pupil as a percentage of GDP per capita, Secondary

<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>(EFA base year)</td>
<td>1999</td>
<td>22.7</td>
</tr>
<tr>
<td></td>
<td>2000</td>
<td>25.2</td>
</tr>
<tr>
<td></td>
<td>2001</td>
<td>30.9</td>
</tr>
<tr>
<td></td>
<td>2002</td>
<td>25.9</td>
</tr>
<tr>
<td></td>
<td>2003</td>
<td>45.2</td>
</tr>
<tr>
<td></td>
<td>2004</td>
<td>28.3</td>
</tr>
<tr>
<td></td>
<td>2005</td>
<td>30.9</td>
</tr>
<tr>
<td></td>
<td>2006</td>
<td>36.4</td>
</tr>
<tr>
<td></td>
<td>2007</td>
<td>...</td>
</tr>
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<td></td>
<td>2008</td>
<td>...</td>
</tr>
<tr>
<td></td>
<td>2009</td>
<td>...</td>
</tr>
<tr>
<td></td>
<td>2010</td>
<td>33.2</td>
</tr>
<tr>
<td></td>
<td>2011</td>
<td>36.0</td>
</tr>
</tbody>
</table>

**Definition**
Total public expenditure per student in secondary education as a percentage of GDP per capita.

**Formula**
Finance year ending in 2011

\[
\text{Public expenditure per pupil as a \% of GDP per capita} = \left( \frac{9240}{25647} \right) \times 100 = 56
\]
@UIS data centre, download data to compare how your country performs compared to others in your region.
Salient points for policy making, based on Government expenditures

• Indicators on government expenditure may suggest how important education is for a country – for example when comparing priority between countries.

• Indicators suggest relative importance of different levels compared to total education spending. For example, where the economy is expanding, higher/more technical level skills may be needed and more may have to be spent on secondary and post-secondary levels of education.

• Combined with private and international expenditures provides information on the relative contribution of the private sector (including households)
Financing in Education 2030 agenda

1. Education expenditures by pupil/student, education level and financing source
2. Average teacher salary relative to other professionals (requiring comparable level of training and qualification)
3. Percentage of total education expenditure borne by households
4. Percentage of total aid to education allocated to low-income countries
5. Number of higher education scholarships awarded by beneficiary country
6. Percentage of countries which have an explicit formula-based policy reallocating education resources to disadvantaged populations
7. Volume of official development assistance (ODA) flows for higher education scholarships by beneficiary country.

Estimation of missing data
Why imputation of missing data?

Key education finance indicators require availability of specific data per education level:

- Total expenditures in education and by source (Government, private, international)
- Number of teachers and mass salary
- Number of students
- Mass salary of non-teaching staff
- Cost for administrative services and capital expenditures, etc.

➢ All these data are not always readily available, hence the necessity to use estimates for the calculation of the indicators of interest through compensation procedures.
Compensation procedures

Generally applied to micro data such as school census surveys data, households-based surveys data, etc where three different situations occur:

i) non coverage:
   ✓ weighting adjustments based on an external data source

ii) total non-response
   ✓ weighting adjustment

iii) item non-response
    ✓ Imputations, by assigning values for missing responses
Somme imputation procedures

Two classes of imputations (i. use of auxiliary variables, and ii. a randomization process is used in assigning imputed values:

1. Deductive imputation
2. Mean imputation overall
3. Random imputation overall
4. Mean imputation with classes
5. Random imputation with classes
6. Hot-deck imputation
7. Flexible matching imputation
8. Predicted regression imputation (Education sector review studies, estimates of number teachers in lower secondary and in upper secondary in countries where both cycles happen to be mixed or separate; using number of students as explanatory variable)
9. Random regression imputation
10. Distance function matching
Splitting expenditure data by level
(Use of auxiliary variables)

Four main choices:
1. Wage bill estimate (number of teachers + average salary by level and grade)
2. Number of teachers by level
3. Number of students by level
4. Based on already split expenditure
Splitting spending by education levels

*In this order:*

1. Assign easy items
   - Ex. if a Ministry is responsible for tertiary education, all of its expenditure can be allocated to tertiary education

2. Focus on largest expenditure item(s)—usually staff compensation
   - If expenditure reports do not separate the teacher wage bill by education level, need to look at payroll and other HR documents to estimate

3. Use qualitative analysis of remaining programmes + where needed, help from enrolment data
   - What does the programme do? Who benefits?

4. Remaining unallocated items (ex. general administration) can be split following already allocated proportions
## Splitting the wage bill

Splitting the wage bill based on teachers per level and average teacher salary

<table>
<thead>
<tr>
<th>Available information</th>
<th>G1-6 (primary)</th>
<th>G7-9 (lower-secondary)</th>
<th>G10-12 (upper-secondary)</th>
<th>Total G1-12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of teachers by grades</td>
<td>100</td>
<td>80</td>
<td>50</td>
<td>230</td>
</tr>
<tr>
<td>Total salary expenditure in Ministry of Education</td>
<td>unknown</td>
<td>unknown</td>
<td>unknown</td>
<td>$150,000</td>
</tr>
<tr>
<td>Average teacher salary</td>
<td>$400</td>
<td>$600</td>
<td>$700</td>
<td></td>
</tr>
</tbody>
</table>

### Estimation

<table>
<thead>
<tr>
<th>Estimated salary mass per level</th>
<th>$40,000</th>
<th>$48,000</th>
<th>$35,000</th>
<th>$123,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated shares per level</td>
<td>33%</td>
<td>39%</td>
<td>28%</td>
<td>100%</td>
</tr>
<tr>
<td>Applying share per level to actual total salary mass</td>
<td>$48,780</td>
<td>$58,537</td>
<td>$42,683</td>
<td>$150,000</td>
</tr>
</tbody>
</table>

33%*$150,000 = $ 48,780  
39%*$150,000 = $58,500  
28%*$150,000 = $42,000  
33%*($150,000-$123,000) + $40,000= $ 48,910  
39%*($150,000-$123,000) + $48,000= $ 58,530  
33%*($150,000-$123,000) + $35,000= $ 43,910
Using enrolment data

- Assumes unit/pupil costs are the same across levels, which is rarely true.

<table>
<thead>
<tr>
<th>Available information</th>
<th>Primary</th>
<th>Lower-secondary</th>
<th>Upper-secondary</th>
<th>Total line-item</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1-6 (primary)</td>
<td>unknown</td>
<td>unknown</td>
<td>unknown</td>
<td>$150,000</td>
</tr>
<tr>
<td>G1-6 (primary)</td>
<td>G7-9 (lower-secondary)</td>
<td>G10-12 (upper-secondary)</td>
<td>G1-12 (Total)</td>
<td></td>
</tr>
<tr>
<td>Number of pupils by grades</td>
<td>100,000</td>
<td>80,000</td>
<td>50,000</td>
<td>230,000</td>
</tr>
<tr>
<td>Estimated resource allocation</td>
<td>43%</td>
<td>35%</td>
<td>22%</td>
<td>100%</td>
</tr>
</tbody>
</table>

43% * $150,000 = $ 65,217
### Allocation based on spending already allocated

- Good option when main items have already been split, and what is left is admin. costs, ministry, research, etc.

<table>
<thead>
<tr>
<th>Expenditure unknown/not allocated reallocated by ISCED</th>
<th>Pre-primary</th>
<th>Primary</th>
<th>Lower-secondary</th>
<th>Upper-secondary</th>
<th>Post-secondary non-tertiary</th>
<th>Tertiary</th>
<th>Unknown/not allocated</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expenditure</td>
<td>8</td>
<td>77</td>
<td>46</td>
<td>23</td>
<td>4</td>
<td>92</td>
<td>0</td>
<td>250</td>
</tr>
<tr>
<td>All expenditure reallocated by level</td>
<td>58</td>
<td>577</td>
<td>346</td>
<td>173</td>
<td>29</td>
<td>692</td>
<td>0</td>
<td>1875</td>
</tr>
</tbody>
</table>

31\% \times \$250 = \$77
Exercises
Thank you

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