

Brief user guide for the EFA Global Monitoring Report education costing model

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The EFA Global Monitoring Report Education Costing Model was developed to estimate total costs and external finance needs to reach full primary and secondary education in low- and lower-middle income countries. The model projects pupils, literacy, costs, and public budgets for education at the pre-primary, primary, lower secondary, and upper secondary level. It includes data for 82 low- and lower-middle income countries, and is benchmarked to 2012/3, or most recent year of data. The projection horizon is to 2030.

To make projections, the user can set targets related to pupil progression, private pupils, salaries, class size, classroom construction costs, assumed GDP growth rates, and the public budget devoted to education in one interface table. The user can run a macro that will automatically make projections for all 82 countries based on the set parameters; save selected results for each country; and produce a number of tables and graphs with aggregated data. The user can also see the entire projection results for any one country by activating the country in the user interface. This User Guide provides a brief introduction to the *use of the model*.

Model description¹

The projections of pupils are based on grade-wise progression over time, starting from the benchmark distribution of pupils over grades and future rates of promotion, transition, and repetition. By projecting pupil growth over time by grade, change occurs somewhat more gradually, limited by the time needed to progress through grades. The model assumes that all values for repetition, promotion, and transition *converge towards user-set target levels* by a user-set target year.

The costs are based on the product of unit costs and student numbers. The projection of unit costs uses a dynamic model rooted in the notions of development and convergence. Unit costs are a function of teacher salary, class size, material costs as a percent of recurrent costs, classroom investments, and other expenditures; salaries represent the lion's share of unit costs. An analysis of global data shows that on average in countries with higher income: a) class sizes are smaller; b) teacher salary as a multiple of average income is lower; and c) unit pupil costs are more uniform across countries. This observation was then woven into a model where two dynamics govern projected class size and teacher salaries: convergence causes countries to gradually move towards the average class size and teacher salaries for their income level; development, measured as GDP per capita growth, shifts those convergence values. These dynamics have important implications for future costs, because together, they make the enterprise of full primary and secondary education more affordable as countries develop.

¹ A more detailed description can be found in Wils, A. *Reaching education targets in low and lower middle income countries. Costs and finance gaps to 2030 for pre-primary, primary, lower- and upper secondary schooling*. Paper commissioned for the EFA Global Monitoring Report 2015, *Education for All 2000-2015: achievements and challenges*. <http://unesdoc.unesco.org/images/0023/002325/232560e.pdf>

Basic setup in Excel

The entire model is contained in two basic worksheets.

Data worksheet

Most of the model data were obtained from international sources. Where no international source data was available, national data or estimates were used. National data or estimates were also used in a few instances where the international sources produced contradictory results. All of the sources and estimation procedures are documented in the Data worksheet in the headings to the columns or in comments to particular cells. Data from international sources is formatted in black; data from other sources is formatted in red, blue, or purple. A snapshot overview of the data worksheet is provided below at the end of this User's Guide.

Model worksheet

The model worksheet has one interface box where the user can select a country from a dropdown list and can set all of the parameters for the scenario projections (B1:H33). The interface box is described in more detail below.

Adjacent to the interface box are graphs that reflect the active country projection results (B1:X63). At any one time, the projections are *active* for only one country - that is, the model is making calculations and country-specific graphs for only the country that is selected.

Below the graphs, are all calculations for the active country (C64:Z887).

Selected results for all countries are saved column-wise (AB1:DI789). These results are updated every time the user runs the "Run all countries and save" macro.

Selected aggregated tables and graphs are saved in columns DJ:EP.

There is an auxiliary worksheet.

Model overview worksheet

This worksheet provides a summary of the main calculations used to make the projections, in words.

Settings for the interface box

Users can set all parameters for scenarios in the interface box shown below. Specifically, as stated in the yellow highlighted cells, the steps are to 1) select a country, 2) set the parameters, and 3) (optional) run a macro. The gray textboxes provide more information for each setting.

Selecting this cell will activate a dropdown menu with the countries included in the model.

1. Select a country from the dropdown list, or type in name according to country list on the left

Cambodia countryselect2 Low income ea

2. Set the parameters of the scenario (orange cells)

Data startyear, projection startyear, scenario target year	2008	2013	2030
, GER pre-primary - target value	100		
Percent entering primary, target value	100		
Repetition, target value	5		
Percent completing primary, transition to lower secondary, targets	100	100	
Percent completing lower sec; upper sec, targets	100	100	
Use multiple of initial upper sec completion; target multiple	Use target completing (G11)		5
Private pre-primary, Primary target value	10	10	
Private lower secondary, upper secondary target value	10	10	
Min and max primary PTR	30	40	
Min and max sec PTR	30	35	
Target non-salary as % of recurrent: primary, lower sec, upper sec	25%	25%	25%
marginalized pupils (% of total), primary, lower secondary, upper secondary	20%	30%	40%
Max-min classroom cost (x GDP cap & \$)	10	\$ 3,000	
Capital - amortization =1; cash flow = 2	2		
Young adult 15-24 literacy, target value	100		
Cost of full literacy program, times annual primary student cost	1		
Long-term value and year, GDP growth	5	2020	
Use "all" or "best 50%" of salaries for salary projection	Top 50%		
Increase level of dom. budget; % of ODA assumed in dom. budget	Standard	60%	
Targets: public revenue; % publ. rev. to educ.; % of GDP to publ. ed.	30%	20%	6%
Max duration P + LS; P + LS + US (P+LS=9 in GMR projection)	9	13	
Shift excess in budgets to other levels?	Shifts between all levels		

3. Run scenario for all countries (click box)

4. View results in columns AD+

Run all countries and save

Save active country to results

Set the target year. This is the year in which the assumed targets (set below) will be reached.

Set the target levels for preprimary GER, entry, repetition, transition and completing (survival).

Option to limit upper secondary expansion. From dropdown menu in F12, select "Use target completing" for no limit; select "Use target multiple" and set multiple in H12, to limit US pupils to expansion.

Target levels % private pupils for each level

Parameters for PTR boundaries and non-salary target.

Mark-up to support marginalized children attendance (% over base costs recurrent + capital).

Post-2016 GDP growth -- all countries converge to long-term value (F23) by target year (G23)

All teacher salaries converge to long-term international trend. Select if trend is based on all countries, or top-paying 50%.

Rate at which domestic budget expands: "standard" follows UNESCO (2014:122); "high" is double that rate.

To limit international variability of P+LS duration, set max. grades in P+LS (cut off LS grades will be added to US).

Automatically runs the scenarios for all countries and saves the results to columns AD:DH

Saves just the result of the activated country to the results column for the activated country.

% education budget to each school level is constant. If there is excess in one level, allow/don't allow model to shift the excess to another level's budget.

Boundaries for classroom construction costs (F19 is max cost as multiple of GDP per capita; G19 is minimum cost)

Overview of the data worksheet

Columns	D-K	M-X	Z-AK	AM-AY	BA-BJ	BL-BW	BZ-CP	CR-CZ	DC-DI	DK-EJ
General	Metadata	WIDE variables <i>(=min/max of different WIDE estimates)</i>	Enrolment and repetition (UIS)	Literacy (WIDE and UIS)	Pre-primary	Economic statistics	Financial and resource statistics	Aid statistics	Teacher and classroom unit costs	Population
Detail	Entry age PRY Duration PRY Duration LSEC	% never in school % complete PRY % complete LSEC	Enrolment (#) PRY/LSEC Repetition (%) PRY/LSEC	Youth literacy rate	Pre-primary GER	GDP growth, constant 2010 \$ GDP per capita (current \$) Poverty head-count at \$2/day (PPP) (% pop)	Shares of educ exp* Share of teacher salaries in total current educ exp* Shares of current educ exp* Shares of private enrolment* PTR* Educ exp % GDP	ODA in US\$ mln, total public expenditure on education as % of GDP	Cost to construct classroom (times GDP/cap) Teacher salary PRY/LSEC	Population
Year	2008-2013	Last year available	2008-2013	2008-2013	2008-2013	2008-2016	2008-2013	2011-12		2008-2012, 2015-2030
Split		Male/female	Male/female Grade	Male/female	Male/female		* Level			Male/female Year
Other							Regional averages			Urban/rural