

MAMS: What is it? Why use it?

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Presentation for the Workshop of the UNDP – UNDESA –
World Bank – LAS Project “Assessing Development
Strategies to Achieve the MDGs in the Arab Region”,
Cairo, April 2-5, 2007

Introduction

Outline of presentation

1. Issues in MDG strategy analysis – what an analytical framework should consider
2. MAMS
3. Ethiopia application
4. Research agenda / conclusions

1. Issues in MDG strategy analysis

Context:

- **Scope:** The MDGs are broad, providing targets related to most aspects of development: poverty, education, health, and the environment.
- **Time frame:** The MDGs apply to 2015. However, what happens before and after this year is also important.
- **Institutional complexity:** Reaching the MDGs requires effective government functioning (spending allocation, program design, service delivery, etc.)
- **Methodology:** It is a huge challenge to develop methods that can address questions about design, effects, and costs of alternative MDG strategies.

Features of an MDG analytic framework

A framework for analysis of MDG strategies should consider the following factors:

1. Synergies between different MDGs
2. Role of non-government service providers
3. Demand-side conditions (incentives, infrastructure, incomes)
4. Role of economic growth
5. Macro consequences of increased public spending and/or foreign aid
6. Increasing marginal cost
7. Unit service costs may rise with input costs (wages)

Inherent complexity

- Multi-sectoral economy-wide nature of MDG challenge implies *inherently complex* ex-ante evaluation and strategic frameworks
- A simple first approach establishes feasible strategies and evaluate costs in an fixed-coefficient fixed-price framework (UNMP)
- This framework does not consider important factors influencing the design of MDG strategies
→ it is limited and possibly misleading

2. MAMS

- The World Bank has developed MAMS (Maquette for MDG Simulations) – an *extended*, dynamic-recursive computable general equilibrium (CGE) model designed for MDG analysis.
- MAMS is complementary to and draws extensively on *sector and econometric research on MDGs*.
- Motivation behind the design of MAMS:
 - An economywide, dynamic-recursive, flexible-price model
 - Standard CGE models provide a good starting point
 - But CGE approach must be complemented by and articulated with a satisfactory representation of 'social sectors'.

Features of MAMS

Features:

- Most features are familiar from standard open-economy, dynamic-recursive CGE models.
- Extensions introduced to capture the processes that generate MDG outcomes.
- MAMS typically covers MDGs 1 (poverty), 2 (primary school completion), 4 (under-five mortality rate), 5 (maternal mortality rate), 7a (water access), and 7b (sanitation access).

Government

- Treatment of government in MAMS:
 - The main originality of MAMS compared to standard CGEs is the inclusion of (MDG-related) *social services* and their impact on the rest of the economy.
 - These services are produced using labor, intermediate inputs, and capital (fixed coefficients for capital, intermediate inputs, and aggregate labor; flexible coefficients for disaggregated labor).
 - Together with other determinants, they determine the "*production*" of MDGs
 - Model tracks government domestic and foreign debt stocks (including foreign debt relief) and related interest payments.

MDG “production”

- MDGs are modeled as being “produced” by a combination of factors or determinants (table following) using a (reduced) functional form that permits:
 - Imposition of limits (maximum or minimum) given by logic or country experiences
 - Replication of base-year values and elasticities
 - Calibration of a reference time path for the provision of services needed to achieve MDGs
 - Diminishing marginal returns to the inputs

Determinants of MDG outcomes

MDG	Service per capita or student	Consumption per Capita	Wage incentives	Public infrastructure	Other MDGs
2-Primary schooling	X	X	X	X	4
4-Under-five mortality	X	X		X	2,5,7a,7b
5-Maternal mortality	X	X		X	2,4,7a,7b
7a-Water	X	X		X	
7b-Sanitation	X	X		X	

Modeling education in MAMS

- Service measured per student in each teaching cycle (primary, secondary, tertiary).
- Model tracks evolution of enrollment in each cycle
- Educational outcomes: for each cycle, rates of entry, pass, repeat, and drop out; between cycles, share that continues) as functions of a set of determinants
- MDG 2 (net primary completion rate) computed as product of 1st grade entry rate and primary cycle pass rates for the relevant series of years.

Intertemporal behavior

Dynamics:

- Updating of stocks of factors (different types of labor and capital, other factors) and debt (domestic and foreign)
- TFP growth by production sector depending on
 - Growth in selected capital stocks (general or sector –specific infrastructure)
 - Openness (trade share in GDP)
- Key feature of scenarios: budget balance obtained alternatively by foreign grants, domestic borrowing or domestic taxes

Flexible modeling framework

- MAMS has evolved from an Ethiopia-specific pilot version to one that is more widely applicable, and includes:
 - multiple sectors
 - multiple households
 - wide range of taxes
 - NGO + private MDG/HD services
 - special-case sectors (resource-based export sectors, regulated utilities)
- MAMS works with standard approaches to poverty and inequality analysis:
 - aggregate poverty elasticity
 - representative household
 - microsimulation (integrated, top-down)

Data requirements

- Basic data needs are similar to other CGE models (SAM; physical labor data; elasticities in trade, production, and consumption)
- Data (and model) disaggregation highly flexible outside the government and the labor market
- Data requirements specific to MAMS:
 - SAM: government consumption and investment disaggregated by MDG-related functions; labor disaggregated by educational achievement;
 - Stocks of students by cycle; population data with some disaggregation by age;
 - Data from sector studies on MDGs and education: base-year indicators, elasticities, service expansion required to reach MDGs.

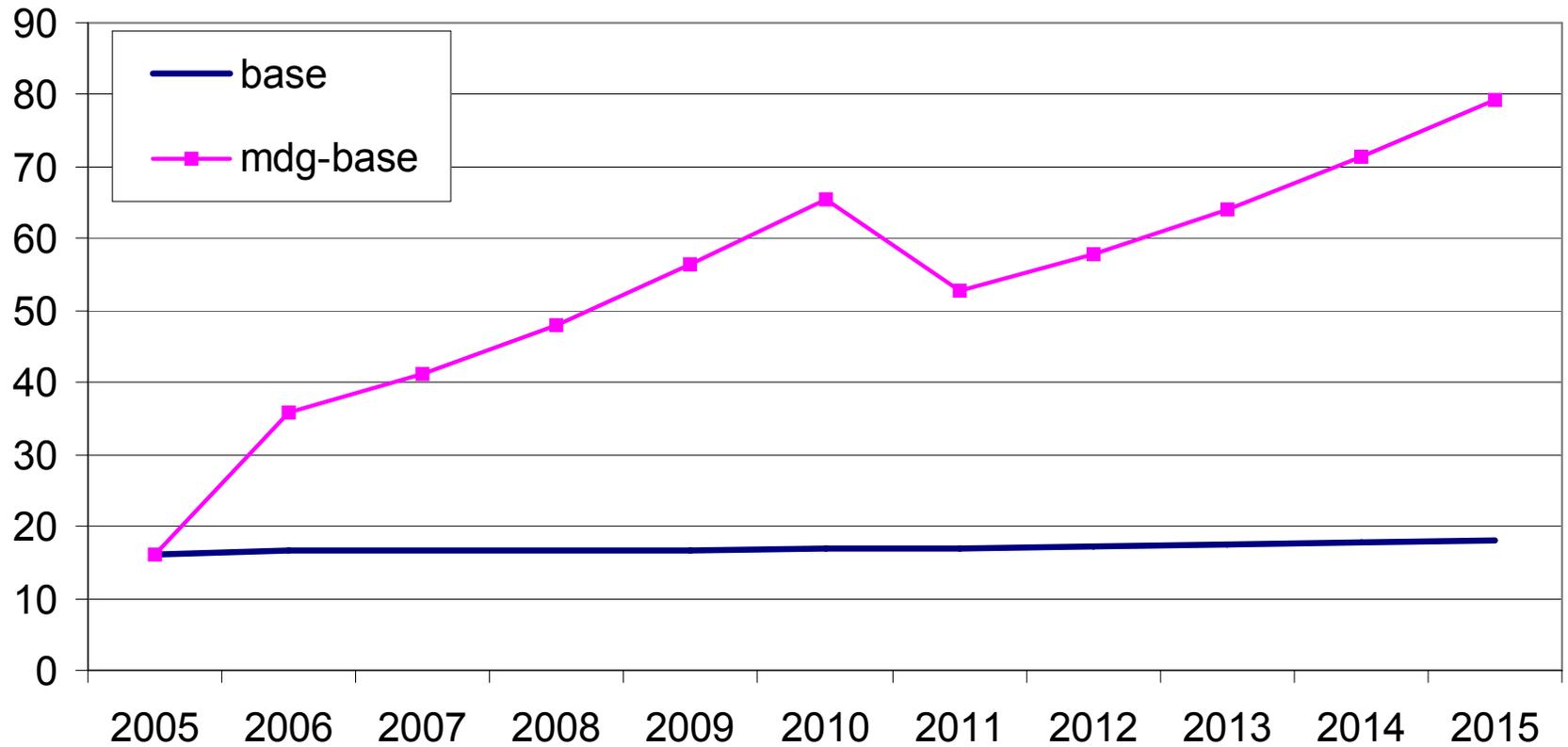
Applications of MAMS

- MAMS is being applied in numerous countries:
 - 19 in Latin America and the Caribbean (in collaboration with the UNDP and UNDESA)
 - 7 in Sub-Saharan Africa
- In Ethiopia (the pilot country), MAMS has been extensively used by the World Bank and the government in the analysis of MDG and Poverty Reduction Strategies, as well as independent studies on demography, labor market, and aid/budget policy.

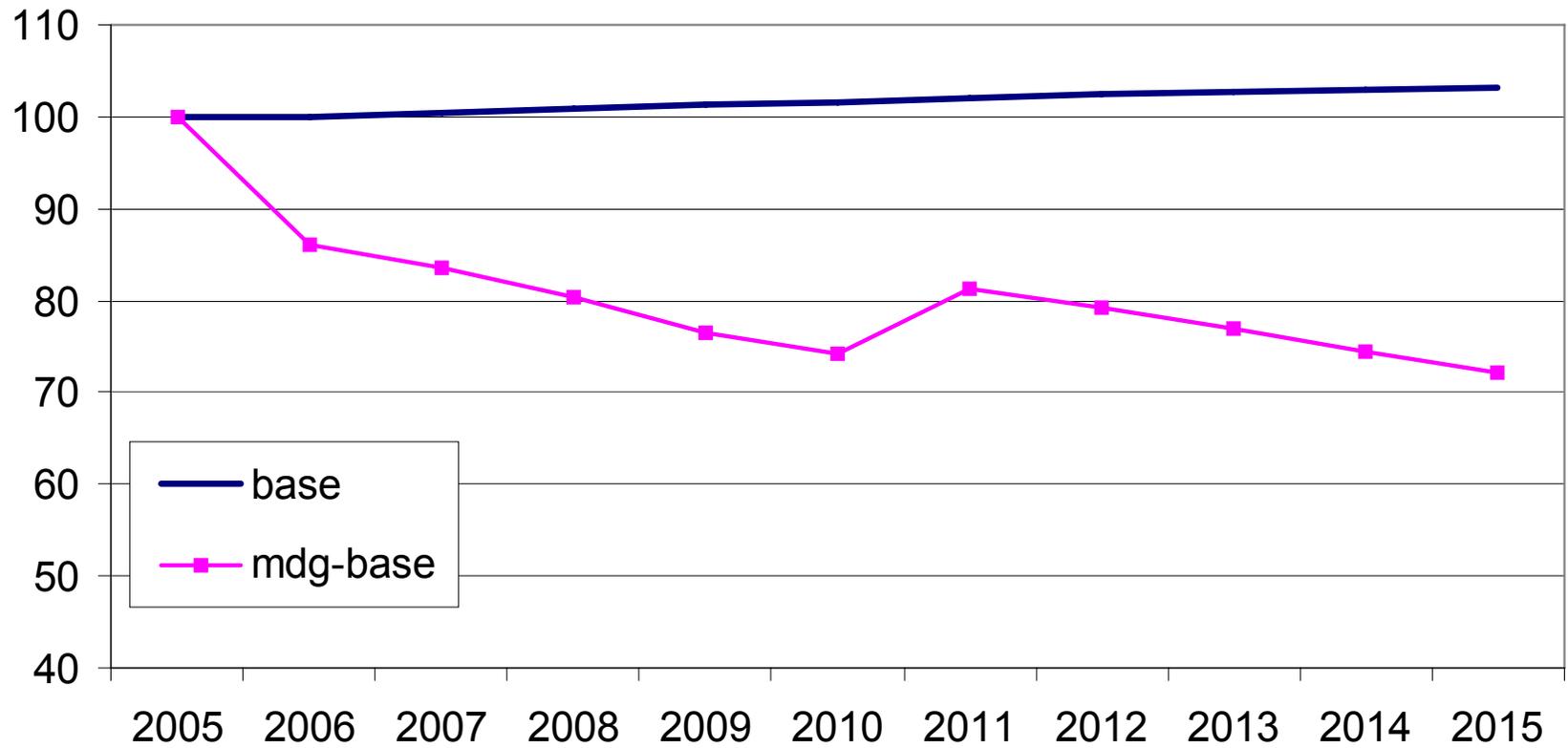
3. Ethiopia application

- Base scenario calibrated around current resource availability
- Alternative MDG-base scenario in which:
 - foreign grants adjust to meet the government financing gap
 - the MDGs that are covered (1, 2, 4, 5, 7a, 7b) are all achieved by 2015
- Following graphs show illustrative results from MDG strategy simulations

Foreign aid per capita (US\$)

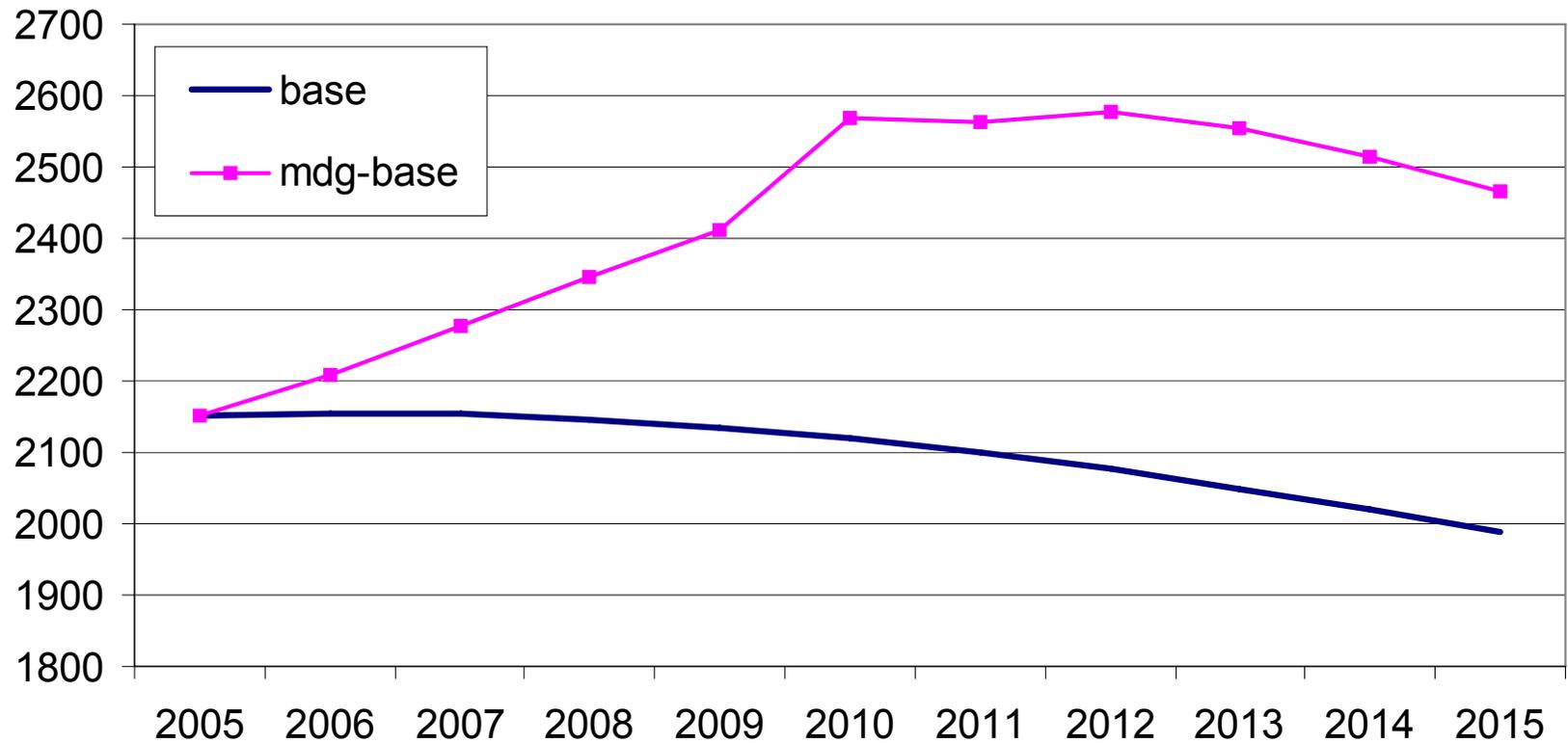


Real exchange rate



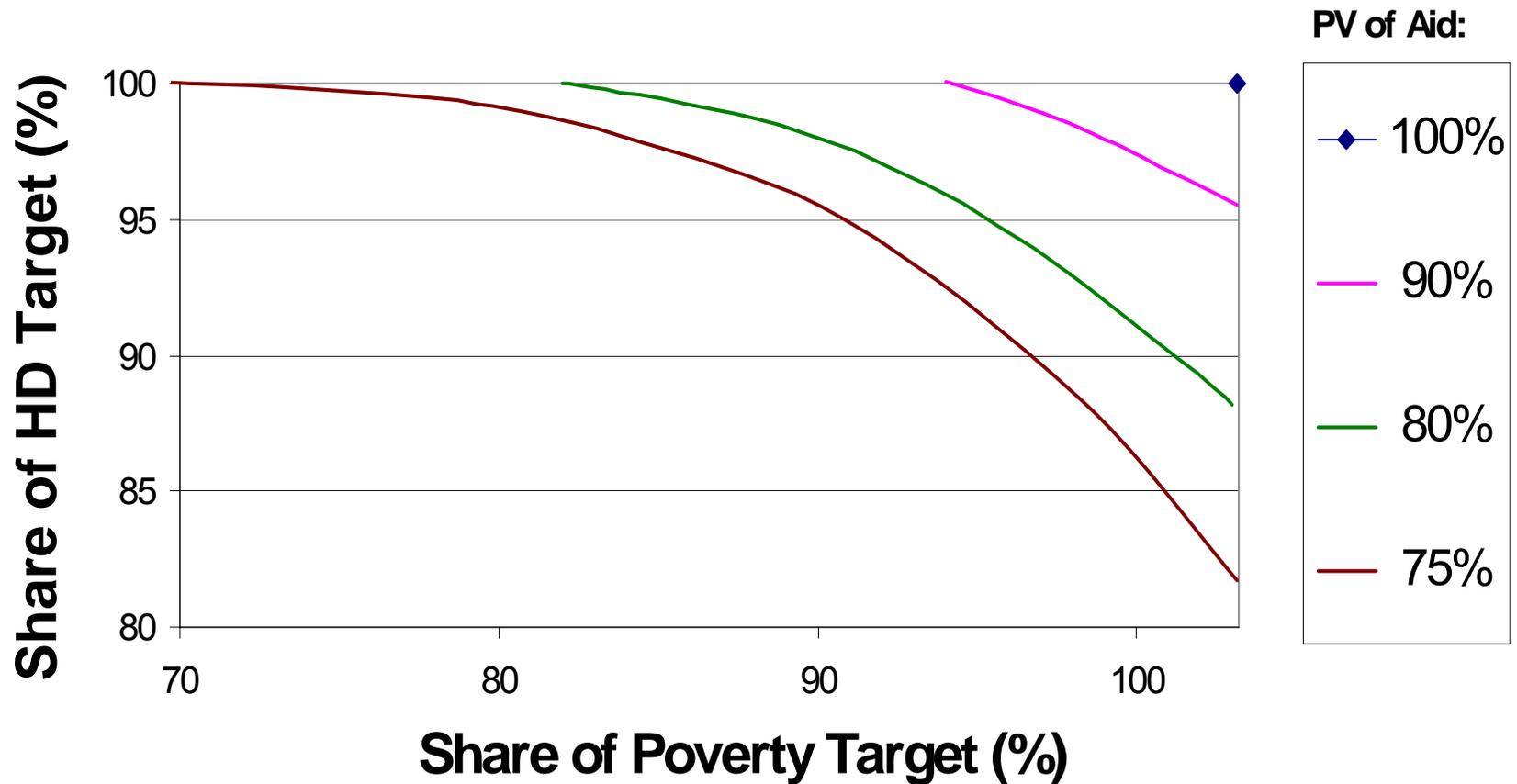
Note: Indexed at 100 in 2005

Wages for workers with secondary schooling



Unit: Ethiopian 2005 Birr

Trade-offs between human development (HD) and poverty MDGs



4. Research agenda / conclusions

What we have done so far points to what we need to understand better:

- Determinants of MDG and education outcomes (single- and cross-country econometric work)
- Effects of alternative (micro) targeting policies for health and education (extended micro-simulation analysis)
- Optimizing and taking into account the path towards the MDGs
- Incorporating information on success of MDG interventions (from impact evaluation, etc.)

4. Research agenda / conclusions

- MDG strategy analysis is a serious challenge for economists and others – need for analysis using a variety of approaches (sectoral, econometric, economywide modeling).

MAMS has been designed with this end in mind

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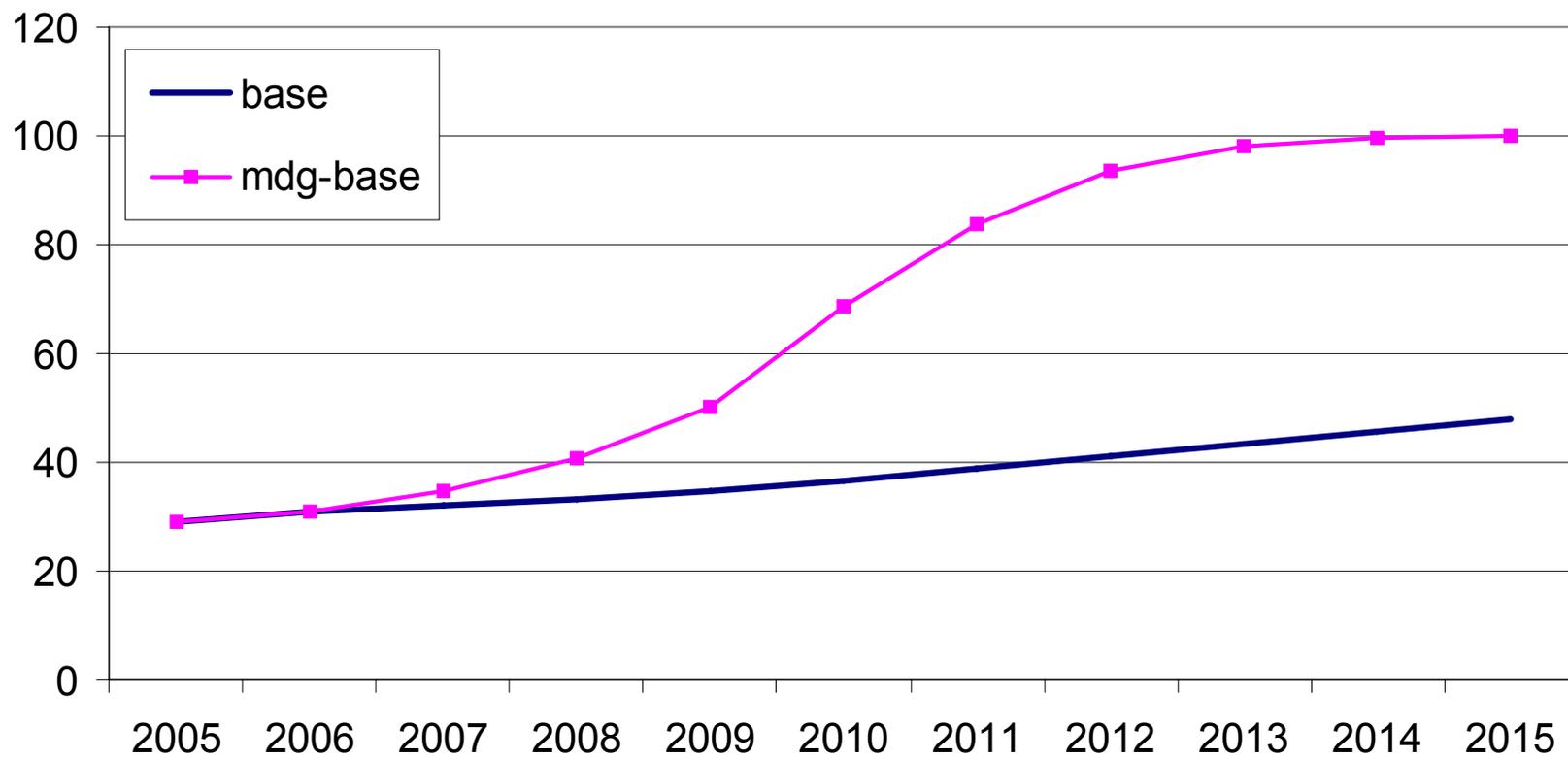
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**REMAINING SLIDES FOR
INTEGRATION OR DELETION**

Evolution over Time for MDG 2

Net Primary School Completion Rate (%)

(By Simulation)



Note: 2015 target for MDG 2 = 100%