

# Economic Impact of HIV/AIDS

**Stakeholder Workshop  
March 2, 2007**



## Structure of Presentation

- Review of Terms of Reference
- Assessment of BIDPA (2000) Model
- Macroeconomic Models
- Firm/industry review
- Fiscal impact
- Household/poverty impact
- Conclusions





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# Terms of Reference



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## Terms of Reference

- Review and update the BIDPA (2000) macroeconomic impact study, in particular:
  - the methodology, assumptions and choice of models;
  - evaluate the findings of the study vis a vis subsequent trends, and ascertain the predictive capabilities and suitability of the models chosen





## Terms of Reference

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- Analyse the likely impact of HIV/AIDS on the Botswana economy to 2021 using quantitative models; contrast the findings with those of BIDPA (2000)
- Estimate the trend paths of key economic variables under alternative HIV/AIDS scenarios, including the without-AIDS scenario, specifically:
  - economic growth, savings, investment, human resource capacity, labour supply, productivity, competitiveness and poverty



## Terms of Reference

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- Estimate the disaggregated current and future costs, direct and indirect, to the Government and the economy, of HIV/AIDS, with implications for the Government budget.
- Reconcile model predictions of the micro and macro level impacts of HIV/AIDS. This will involve estimating the household and sectoral impacts of HIV/AIDS.





## Terms of Reference

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- Determine what policy levers the Government has at its disposal to mitigate the economic impact of HIV/AIDS, the extent to which such levers have been used and to what effect.
- Investigate the strategies that firms have employed to protect their businesses from HIV/AIDS and the extent to which they have been successful in this regard.



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## Review of BIDPA Study (2000)



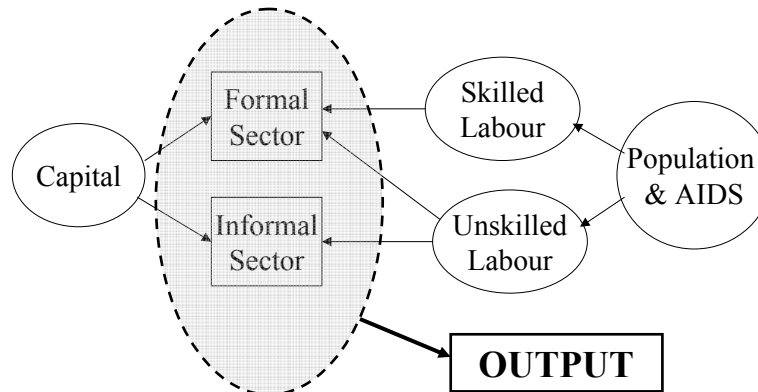
## Review of BIDPA Study

### ○ Macro Model Structure

- BIDPA model – aggregated growth function, formal & informal sectors, skilled & unskilled labour
- Accommodates “with” & “without” AIDS scenarios
- Relevant parameters (infection rates, productivity, labour force growth) can vary
- Calibrated to 1995/96 actual data, simulations to 2021 based on demographic projections
- Projections of real GDP growth; per capita incomes; wages; employment
- Household (poverty) impact using HIES data



## Diagram of Model Structure



## Survey of HIV & AIDS Economic Impact Studies – Model Types

| <i>Type of Model</i>           | <i>No.</i> |
|--------------------------------|------------|
| Econometric estimation         | 2          |
| Aggregate growth model         | 5          |
| Macro-econometric model        | 3          |
| Computable general equilibrium | 3          |



## Review of BIDPA Study

- Methodology was sound – aggregate growth model is most widely used; notably IMF studies on Botswana, 2001 & 2004, also Malawi & Tanzania
- Model is transparent, data requirements modest, maths & programming tractable
- Assumptions used were based on best available data at the time, although subsequent developments not always as assumed
- BIDPA study has been widely referenced and quoted
- Household impact analysis (simulation based on HIES data):
  - BIDPA study was first of its kind
  - Used in other studies subsequently



## Review of BIDPA Study

- Other methodologies also useful where data is available
- Disaggregated approach can be useful – more detailed simulation of economic changes
- CGE models used for SA, Tanzania, Zambia
- Macro-econometric models in SA



**Actual Outturn vs BIDPA (2000) Projections & Assumptions**  
(period averages)

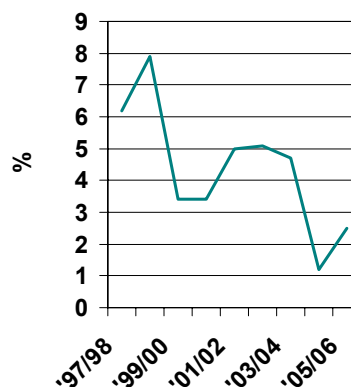
|  | 1995/6 - 2000/01 | 2000/01 - 2005/06 |
|--|------------------|-------------------|
| <b>Economic Growth</b>                 |                  |                   |
| BIDPA                                  | 3.1%             | 2.9%              |
| Actual (non-mining)                    | 5.9%             | 4.7%              |
| Actual (non-mining private sector)     | 5.4%             | 3.7%              |
| <b>GDP per capita (growth)</b>         |                  |                   |
| BIDPA                                  | 1.3%             | 1.1%              |
| Actual                                 | 2.8%             | 3.8%              |
| <b>Population Growth</b>               |                  |                   |
| BIDPA                                  | 2.5%             | 0.8%              |
| Actual (CSO)                           | 2.4%             | 0.9%              |
| Actual (CARE)                          | 2.5%             | 1.7%              |
| <b>Labour Force Participation Rate</b> |                  |                   |
| BIDPA                                  | 48.5%            | 48.3%             |
| Actual                                 | 49.8%            | 56.5%*            |
| <b>Investment (% GDP)</b>              |                  |                   |
| BIDPA                                  | 25%              | 25%               |
| Actual                                 | 30%              | 21%               |
| <b>Productivity (TFP) Growth</b>       |                  |                   |
| BIDPA                                  | 0.25%            | 0.25%             |
| Actual                                 |                  | 1.3%*             |
| <b>HIV prevalence (15-64 yrs, %)</b>   |                  |                   |
| BIDPA                                  | 31%              | 30%               |
| Actual                                 |                  | 24%*              |

\* different time period



## Summary of Model vs Outcomes

- Average GDP growth over 2001-2005 higher than predicted
- However, recent growth of non-mining private sector close to predicted rates




## Summary of Model vs Outcomes

- Population growth higher than predicted (+)
- Higher labour force participation (+)
- Investment close to predicted value
- HIV prevalence lower than forecast (+)
- Productivity (TFP) higher (+)
- ART available







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# Choice of Macroeconomic Modelling Approaches



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## Channels of Potential Economic Impact

- Morbidity
  - Productivity (sickness, time off)
  - Expenditure (health care, training)
  - Savings (diversion of incomes)
  - Investment (uncertainty, profits, savings)
- Mortality
  - Smaller population and labour force
  - Changed age structure (experience)
  - Loss of skills



## Macro Modelling Approaches

- Updating of BIDPA model
  - Calibrate to 2001 (from 1996) with new economic data
  - Incorporate 2006 demographic projections
  - Incorporate "with ART" & "no ART" scenarios along with "No AIDS" counterfactual
  - Pay more attention to costs of HIV/AIDS treatment, impact on savings, investment & growth
  - Impact of ART on labour force, productivity
  - Improve modelling of productivity growth
  - Use 2002/03 HIES data, but no new labour force data (since 1996)



## Macro Modelling Approaches

- Other macro modelling approaches
  - Macro-econometric model
    - needs pre-existing model – not available in Botswana
    - model building a long and complex process
  - CGE model
    - feasible to build CGE for this project
    - well-suited to analysis of HIV/AIDS impact





## Basis of CGE Model

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- As with aggregate growth model, also works by simulating behaviour of economy
- More detailed economic structure – disaggregated by sector, labour category, household income group
- Can model many interaction channels simultaneously
- Based on Social Accounting Matrix (SAM)
- Very demanding data requirements
- Can be linked with HIES for simulations



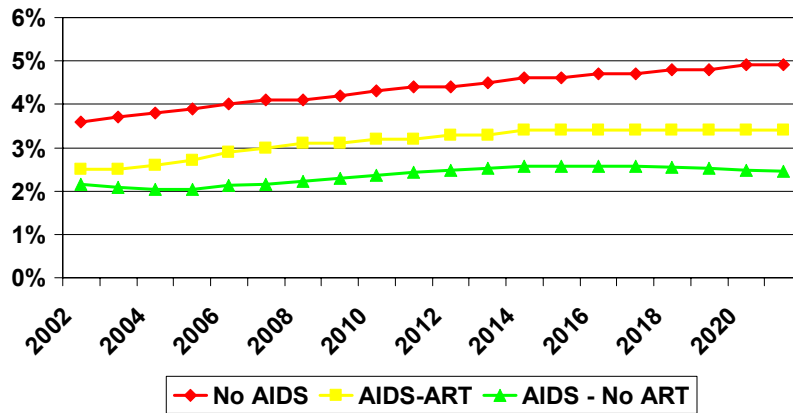
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## Key Findings

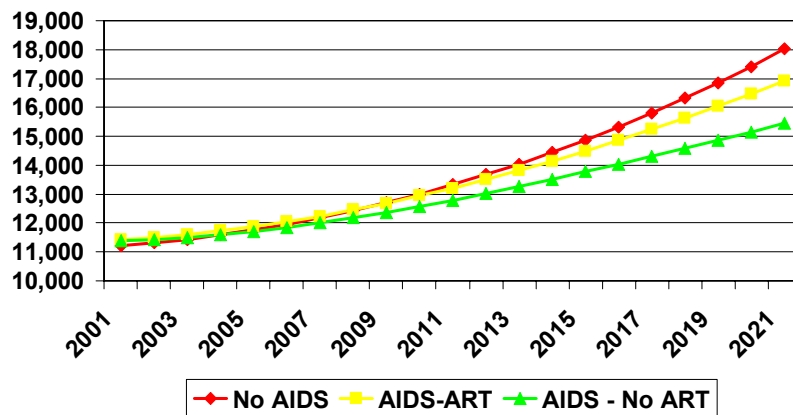
## Macroeconomic Impact



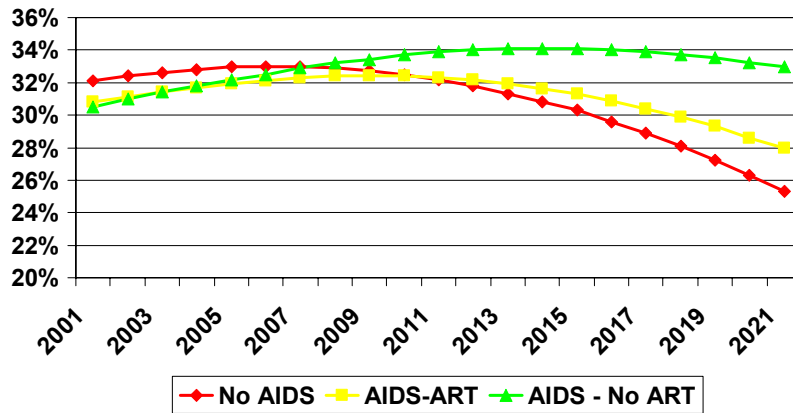
## Simulated GDP Growth Rates, 2002-2021 (Fig. 5-8)



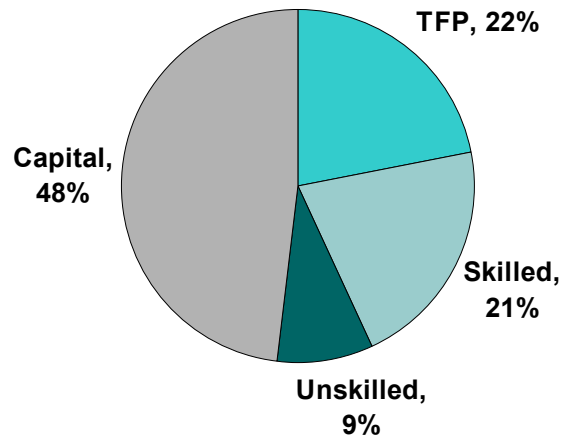
## Simulated Real GDP per capita 2002-2021 (Fig. 5-7)



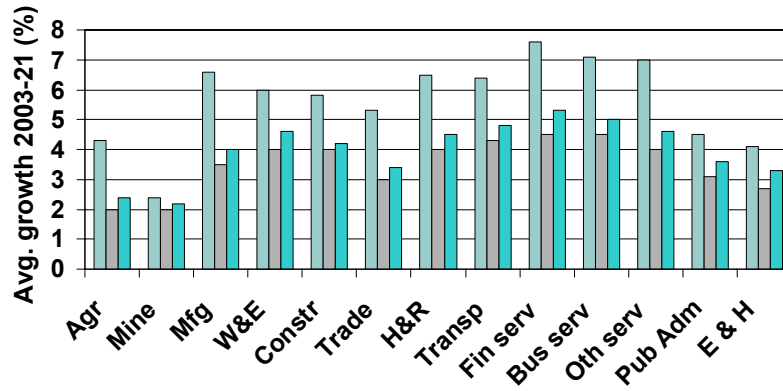
## Simulated Underemployment, 2002-2021 (Fig. 5-9)



## Contributions to GDP Growth No-AIDS vs AIDS with ART



## Sectoral Impact



Labour intensive sectors dependent on less-skilled workers most affected

NO AIDS AIDS ART



## Key Findings

## Household Impact



## Household (Poverty) Impact

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- Wide range of possible impacts on HH
  - Income and Expenditure
  - Direct and Indirect Channels
  - Temporary and Permanent Effects
- Possible channels
  - Costs of medical provision
  - Funeral costs
  - Changed household composition (fewer or more members; income-earners vs dependents)
  - Loss of income as breadwinners fall sick or die
  - Changed employment opportunities
  - Impact on general wage levels
  - Government orphan support



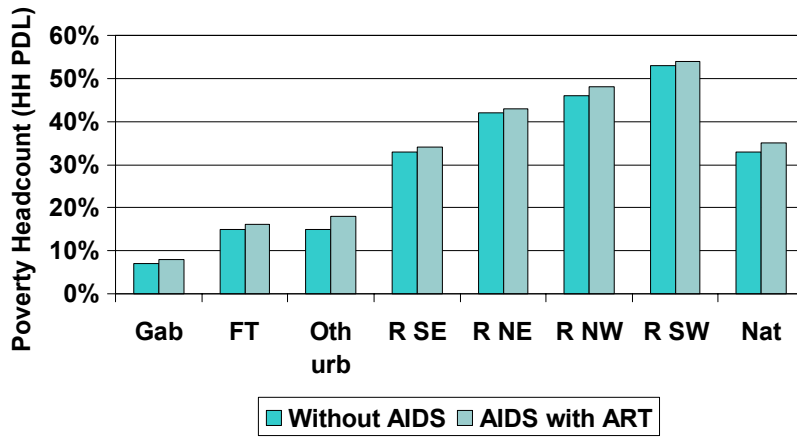
## Household (Poverty) Impact

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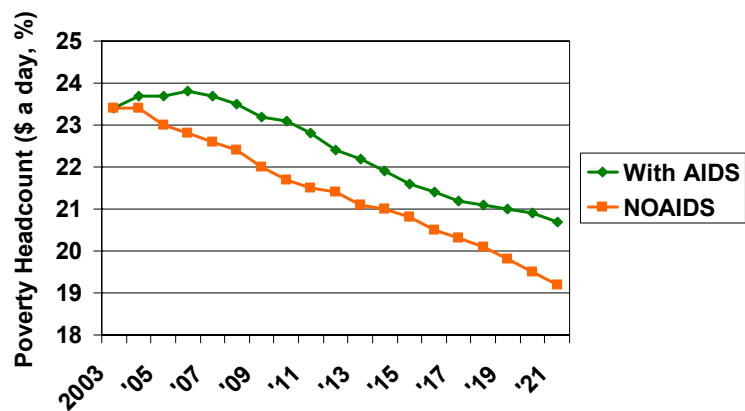
- Modelled through:
  - Simulating impacts on HIES source data over 10 years (as per BIDPA study)
  - CGE modelling to 2021 (new)



## Simulated Poverty Impact (HIES)



## Simulated Poverty Impact to 2021 (CGE)







## Household (Poverty) Impact

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- HIV & AIDS has clear negative impact on poverty
- Poverty headcount up to 3% higher due to HIV/AIDS
- ART provision offsets this by 1/3 to 1/2.
- Orphan welfare provision also has significant poverty benefits



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## Key Findings

### Firm-level Survey





## Firm-level Survey - Introduction

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- 25 firms were interviewed in different sectors
- Survey was not intended to be nationally representative but was sufficient to bring out the salient issues about HIV/AIDS



## General Results

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- Generally a bigger loss of unskilled workers due to illness and death than skilled workers
- 75% of firms reported negative impact of HIV & AIDS on output and productivity
- Most firms (56%) responded that HIV/AIDS has no significant impact on investment:
  - other factors affecting profitability more important
  - some firms reported delays in expansion and diversion of spending
- Difference in impact across sectors – level of skills a major factor
- Sectoral impact similar to SA
- Firms reported a reduced effect of the disease due to the availability of ARV since 2001/2002, esp. for skilled workers.

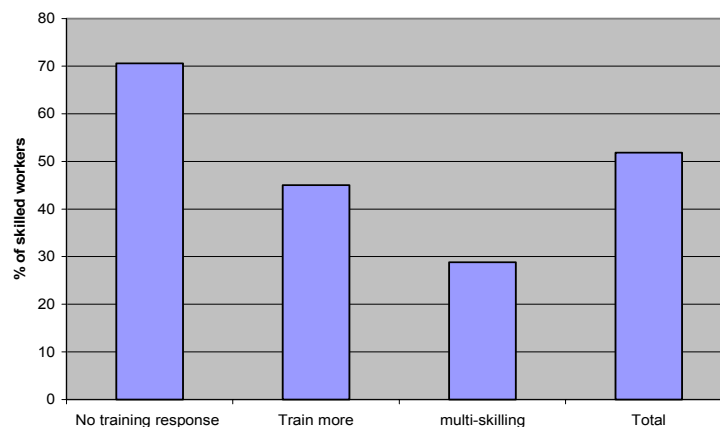


## Firms' Responses

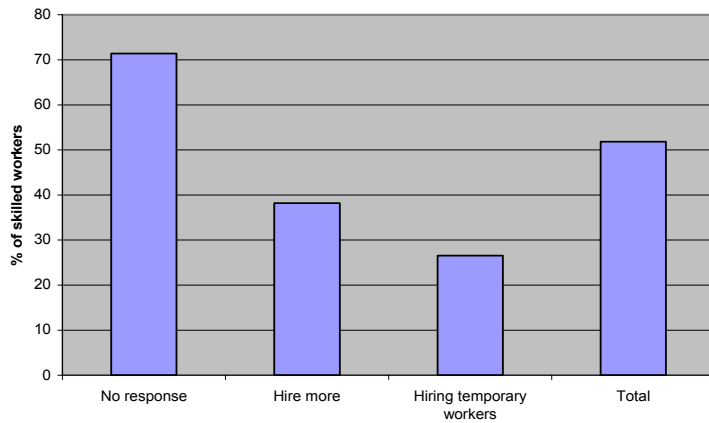
- Firms have been innovative in their responses, especially those that have been impacted most by the disease:
  - training more workers than needed;
  - keeping additional workers on standby.
  - over-employ for critical positions
  - multi-skilling
  - mechanisation
  - more overtime
  - temporary staff
- Although output could be maintained, training costs increased significantly



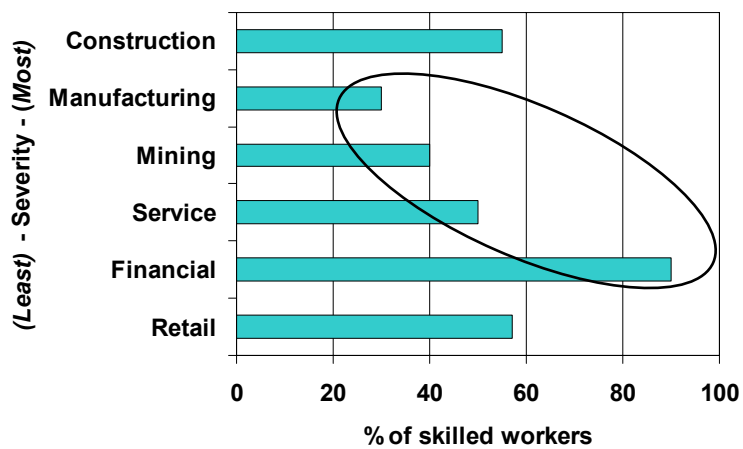
## Response in training by skill level



## Response in hiring by skill level



## Severity of Impact by Sector





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# Fiscal Impact of HIV/AIDS



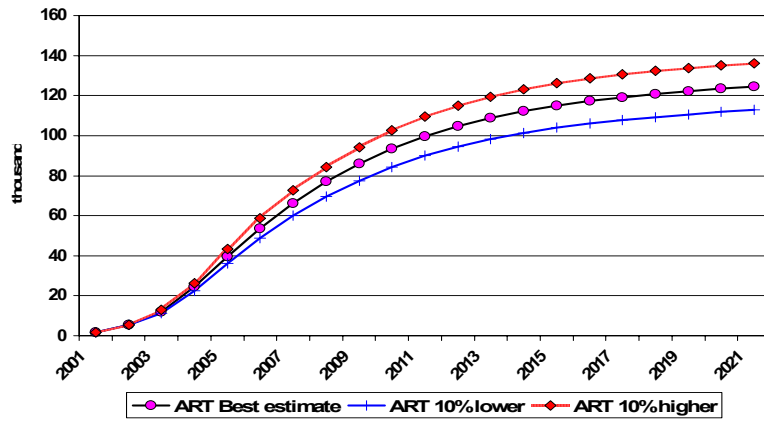
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## Cost Implications

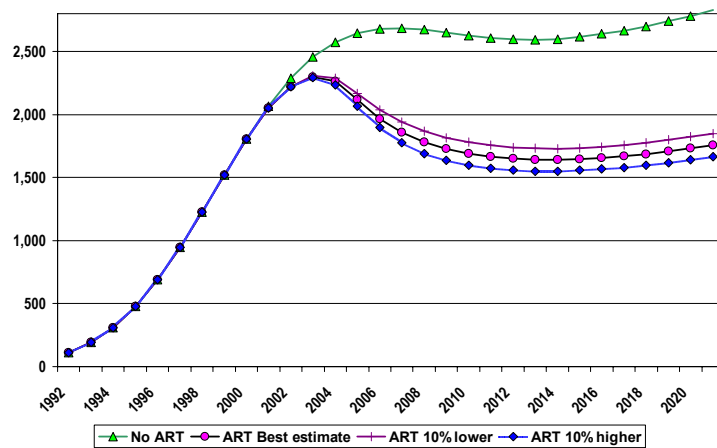
- ART
- Hospital in-patient
- Ambulatory
- Orphan care
- Home-based care
- Prevention
- Programme management
- Old age pension



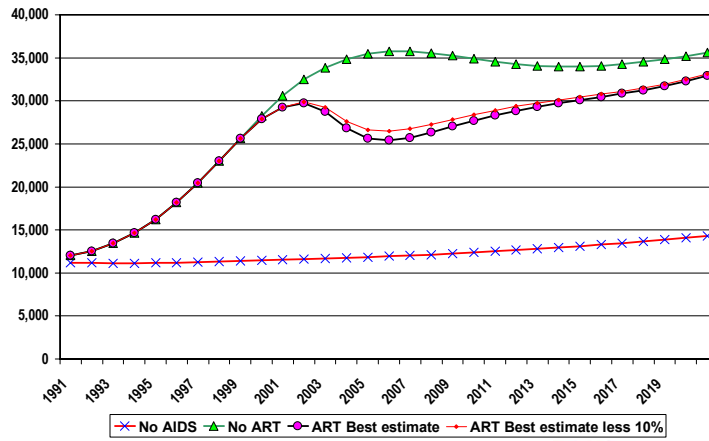
## Projected Total Number of adults and children on ART



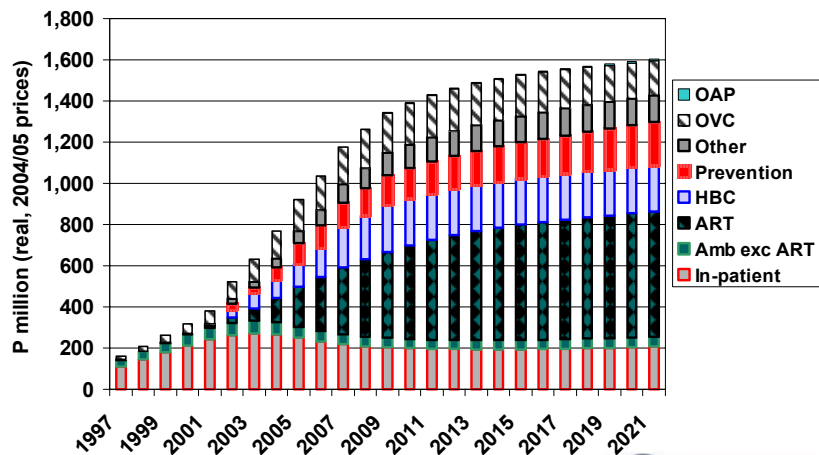
## Hospital bed needs for HIV and AIDS per year



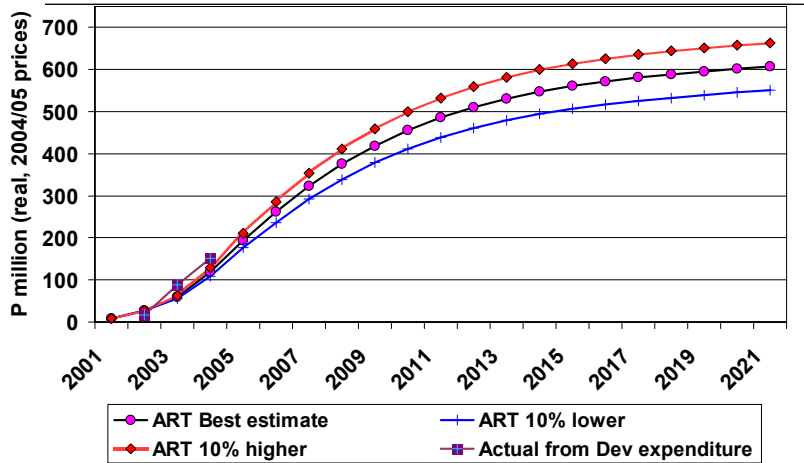
## Projected Number of Total deaths per year



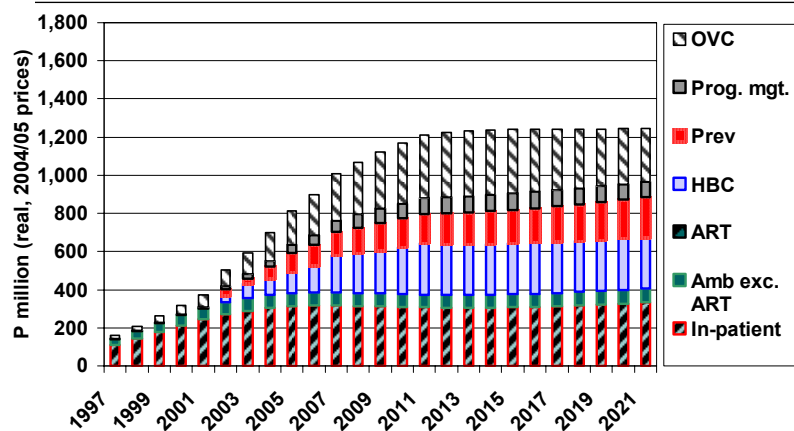
## Projected Costs – with ART



## Projected ART costs

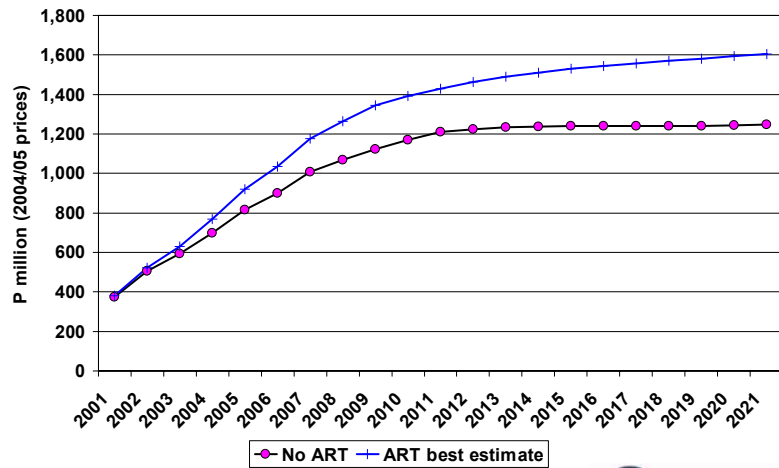


## Projected Costs – selected interventions No ART

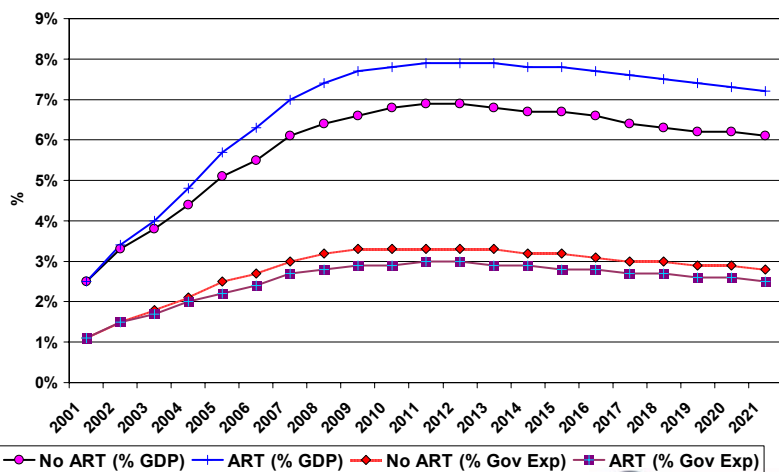




### Total costs by scenario (P million)



### Total costs by scenario (% of GDP and Gov Exp)





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# Conclusions, Policy Implications and Recommendations



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## Macroeconomic Implications

- Real GDP growth reduced by 1.5% - 2% a year without ART
- Economy will be up to one-third smaller by 2021 due to HIV & AIDS
- Result of reduced labour force growth, younger LF, reduced productivity & investment
- GDP/capita growth 0.5%-1% lower





## Macroeconomic Implications

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- ART provision adds 0.4% - 0.8% to average GDP growth (cf. no-ART)
- Eliminates approx one-third of negative growth impact
- Economy still 20%-25% smaller by 2021
- Avg. incomes growth higher with ART
- In both scenarios investment channel is most important



## Labour Force & Employment

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- Reduced labour supply and labour demand – so overall effect uncertain
- Models suggest that demand effects dominate
- Leading to lower employment and lower wages with HIV & AIDS





## Macroeconomic Recommendations

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- Efforts to improve economic efficiency and reduce costs crucial to offset negative HIV & AIDS impacts
- Implement measures supportive of private sector investment & economic diversification
- Skills development, shared training costs
- Make it easier for firms to recruit citizens and non-citizens
- Poverty reduction and social welfare policies crucial to minimise poverty impact



## Fiscal Implications

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- HIV & AIDS is having a major impact on govt budget – approx 6% of govt spending
- Cost will rise by 60% in real terms by 2021, peaking at 8% of spending/3% of GDP
- ART drugs largest single component (40% of total)
- No-ART scenario costs are lower, but ART savings offset by higher other costs (health, OVC, HBC etc.)
- Economic growth and govt revenues would be lower in No-ART scenario
- Hence incremental ART (as % of GDP and govt spending) costs are small



## Fiscal Recommendations

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- Costs are manageable but large & imply fiscal adjustments if budget is to be sustainable
- Fully funding HIV & AIDS costs from budget deficits not feasible – needs trade-offs & cuts in spending elsewhere
- Prioritising of expenditures crucial to make cuts in lower priority areas
- Focus on cutting costs of HIV & AIDS programmes e.g. generics, lower cost services
- Work with donors to secure resources to maintain programme



## Fiscal Recommendations

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- Consistent data a problem – spread across many spending departments
- Need for NASA/NAA
- NSF costings rough and ready
- Need for more accurate and better documented NSF costings to:
  - Allow more accurate assessment of resource needs
  - Enable updating using consistent methods
  - Facilitate consensus approach
  - Engage meaningfully with donors



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**Thank You**

