FISCAL MANAGEMENT OF MINING AND PETROLEUM IN WEST AFRICA

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The FARI Modelling Framework

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Agenda

- Fiscal Analysis of Resource Industries (FARI)
- FARI's Inputs
- A Closer Look at FARI's Model Structure
- FARI's main uses and Outputs
- Simple illustration
- Questions

FISCAL ANALYSIS OF RESOURCE INDUSTRIES

Background

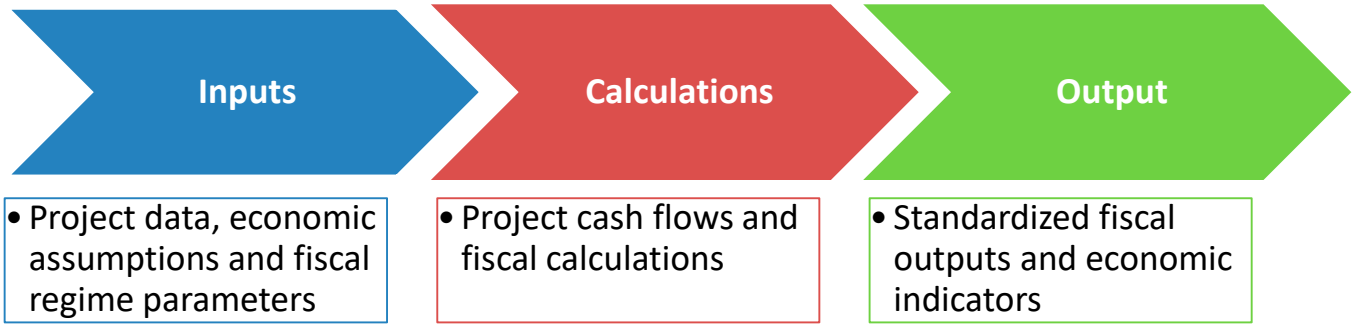
- Over the past 10 years the Fiscal Affairs Department of the IMF developed a consistent modeling framework to evaluate fiscal regimes for extractive industries
- Today FARI is widely used in FAD' technical assistance (TA) missions (over 35 countries), primarily for fiscal regime analysis but increasingly for revenue forecasting and tax administration
- FAD sometimes provides longer-term FARI training to countries, with initial support through short workshops during missions

Design Principles

- Excel based, discounted cash flow model structure
- Simple framework that can be easily picked up by analysts with limited experience on natural resource taxation
- Flexible approach to handle diversity in fiscal regimes
- Standard suite of analytical routines and outputs

Project-specific modeling approach

- The interaction of different fiscal instruments is complex and its effects varies from project to project
  - Limited insight from headline tax rates and fiscal parameters
  - For example, appropriate treatment of depreciation, loss carry forwards, and ring-fencing is important
- Thus, modeling should be project specific:



FARI’S INPUTS

Input Data

- **Production**
  - Petroleum quarterly/annual production, production rates, dates
- **Project costs**
  - Several cost categories are important
  - Exploration - Development
  - Operating - Decommissioning
  - Transportation - G&A
- **Prices**
  - Spot prices, net-back prices at delivery point, etc
- **Economic assumptions** (inflation, interest rates, etc)
- **Fiscal parameters**

Data Collection

- **Challenges**
  - Fiscal regimes not contained in one documentary source: production sharing agreements (PSAs), tax laws, sector regulations, others
  - Different negotiated contracts
  - Project data: production and cost profile has to be constantly updated, as this can change often change
- **Data sources**
  - Companies (project development plans, investor's presentations), sector ministries, third data providers
  - For project data the principal source of data should be the project operator

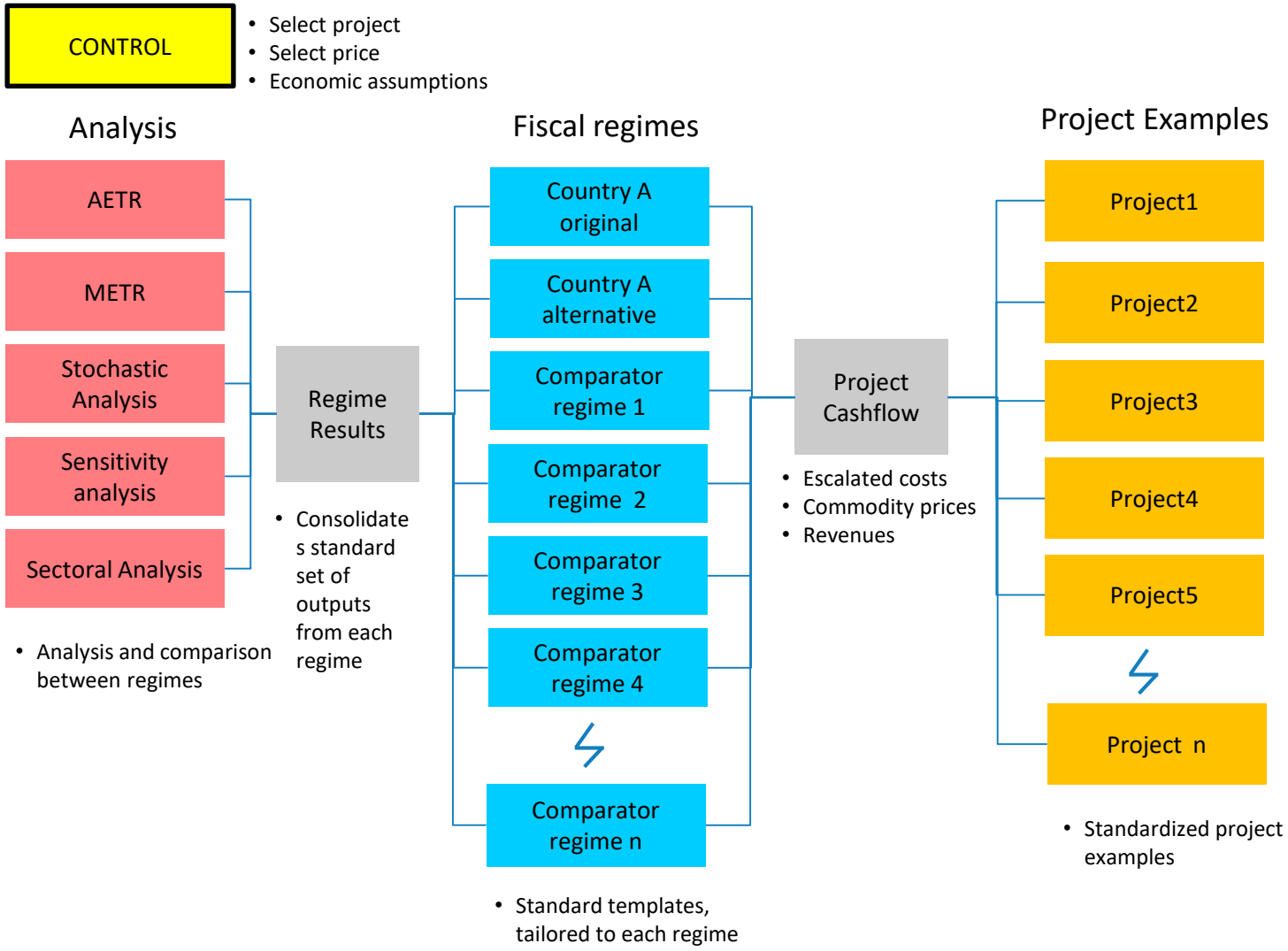
Project Example

- Simplified line items
- Multiple product, Cost breakdown relevant to fiscal calculations

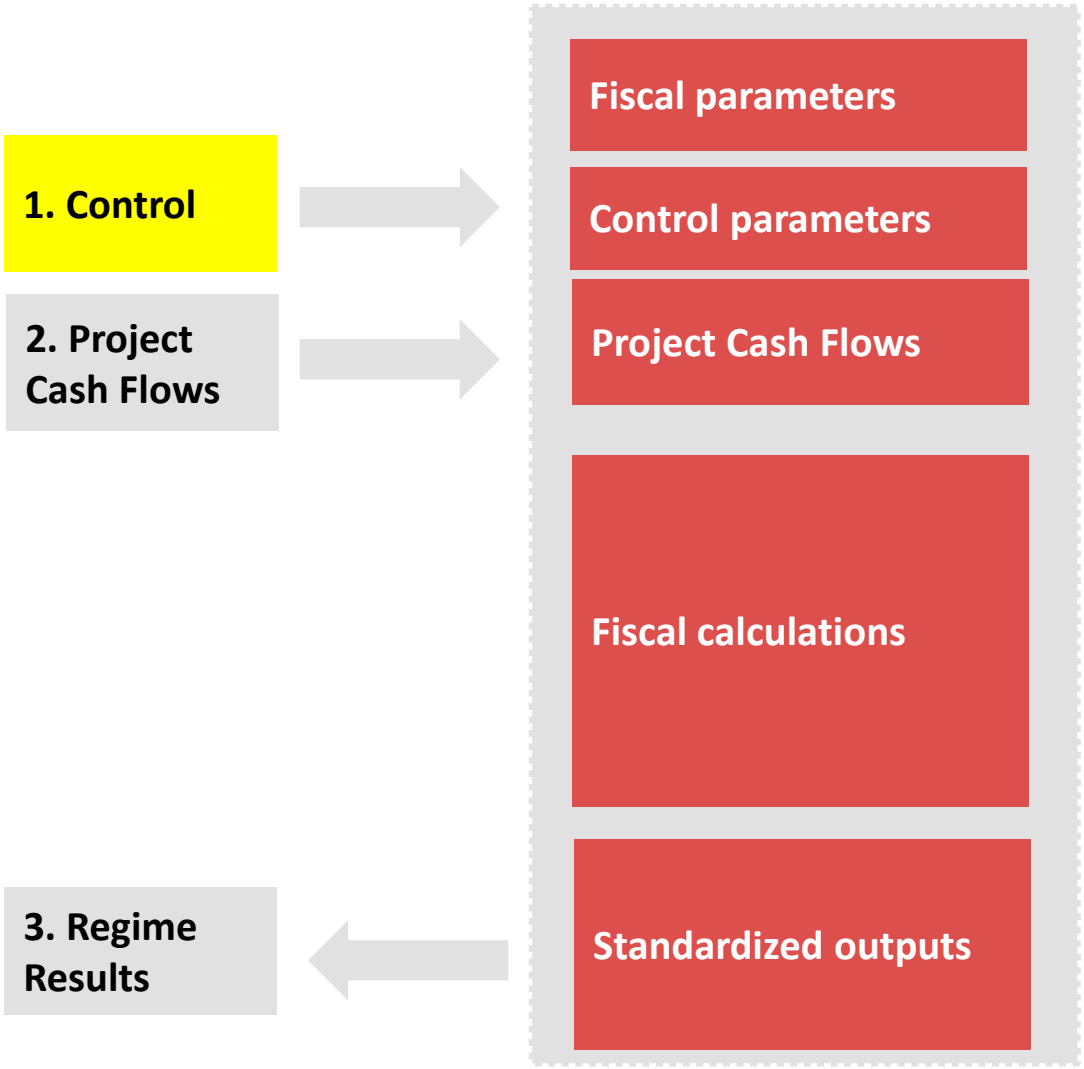
Total	PVM 100MMbbl	year	1	2	3	4	5	6	7	8	9	10
106	Production oil	Mbpd						15	15	15	15	15
0.5	Production gas	MMscf/day						10	20	20	20	20
212	Transport and processing after taxing point	$mm 2012						5	5	5	5	5
135	Exploration costs	$mm 2012	10	86	39							
700	Development costs	$mm 2012			100	180	300	220				
300	Intangible development drilling costs	$mm 2012			60	60	160	120				
100	Replacement capital	$mm 2012									50	
800	Operating costs	$mm 2012						42	42	42	42	42
180	Decomissioning costs	$mm 2012										
2012	Base year for costs	year										

A CLOSER LOOK AT FARI'S MODEL STRUCTURE

Model Structure



Individual Fiscal Country Sheets



- Single Excel sheet
- Can be stored independently
- Copied into/between mission models as required

Three sets of links to other mission model sheets

FARI'S MAIN USES AND OUTPUTS

FARI's Main Uses

1. Fiscal regime design / negotiations
   - Can be used to evaluate potential fiscal terms (e.g., introduction of R-factor mechanism), to evaluate bids in a competing round, or to perform sensitivity analysis
2. Revenue forecasting
   - Composition and timing of expected revenue streams with aggregation of multiple projects
   - Revenue management and calibration of fiscal rules
   - Stripped down revenue forecasting tool for MOF and integration with macro framework
3. Revenue administration
   - Comparing actual, realized revenues with model results.

Average Effective Tax Rate (AETR)

- The AETR is defined as "the ratio of the NPV of tax payments to the NPV of the pre-tax net cash flows from a successful project" (from Daniel et al 2010, adapted from Devereux and Griffith (2003))

$$AETR = \frac{NPV(Gov\ Revenue)}{NPV(Revenue - Expl - Capex - Opex - Decomm)}$$

- Well-known and easy to understand measure of government take: it attempts to estimate how much tax, as a proportion of pre-tax NCF, a firm will pay on an average investment

Marginal Effective Tax Rate (METR)

- the METR is defined as the wedge that the tax system drives between the minimum after-tax return that the investor requires and the pre-tax project return needed to realize it

$$METR = \frac{Pre\text{–}Tax\ IRR - \ Post\text{–}Tax\ IRR}{Pre\text{–}Tax\ IRR}$$

- The METR reflects the burden placed by the fiscal regime on a project at the margin of viability, thus indicating the extent to which the regime affects business investment decisions

Breakeven price

- A substitute (or complementary) measure to the METR is the breakeven price, which is defined as the minimum price (path) required to yield a specified post-tax return to capital over the full-life of the project

Government share of total benefits

- Total benefits are defined as revenues less operating costs and replacement capital expenditure after start-up

$$\textit{Share of Total Benefits} = \frac{NPV(Gov\ Revenue)}{NPV(Revenue - Repl\ Capex - Opex - Decomm)}$$

- They can be thought of as “quasi-rents” in that they represent the project proceeds available to meet the recovery of the original capital investment, the fiscal payments, and a required return to capital.

Other Indicators Easily Calculated

- Profit to investment ratio and payback period
- Impact of changes in prices to government take (ATER)
- Probability distribution of NPV/IRR and variance of returns using stochastic routines
- Tax induced negative NPV
- “Prospectivity gap” ($ required to match post-tax outcomes for country with similar prospectivity)

A word of caution on model outputs

- As with any similar simulation analyses, FARI results in a single project case may differ from actual project results for three main reasons:

  (1) an implied assumption of full efficiency in revenue assessment and collection by the relevant authorities;

  (2) an implied assumption of a full project ring-fence, so that no revenue is lost by deduction of costs carried across from other projects; and

  (3) for corporate income tax, whether by assessment or withholding, an applied assumption of no losses through international tax planning.

- Each of these assumptions, however, could be relaxed and the model adapted to different assumptions about the resulting effects

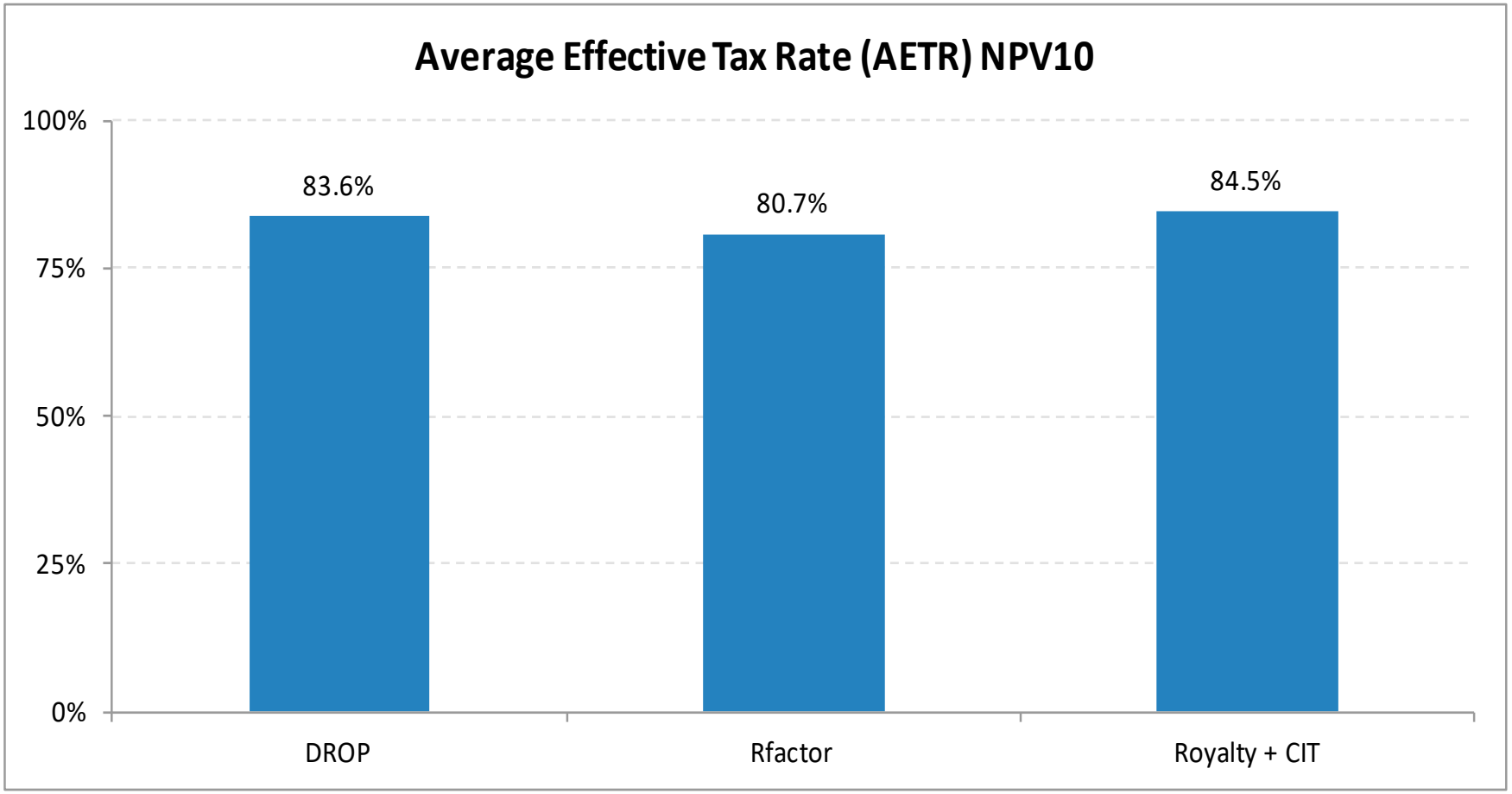
SIMPLE ILLUSTRATION

Simple evaluation for illustration purposes

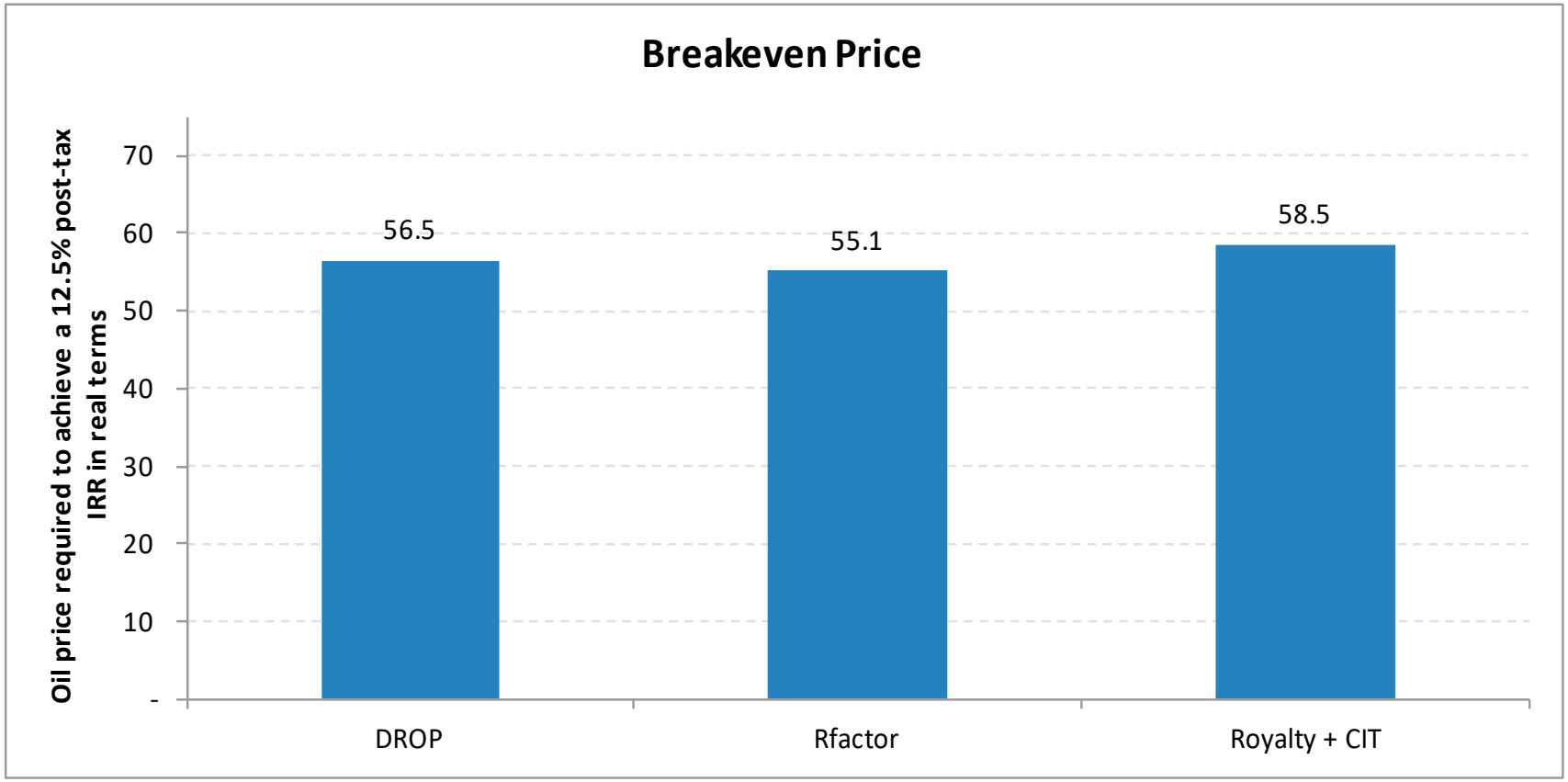
- Simple royalty and corporate income tax regime
- PSC with profit petroleum sharing based on daily rate of production
- PSC with profit petroleum sharing based on an R-Factor scheme

These regimes are evaluated on a 120 million barrel project, with a price of $60/bbl and a pre-tax IRR of 35.5%

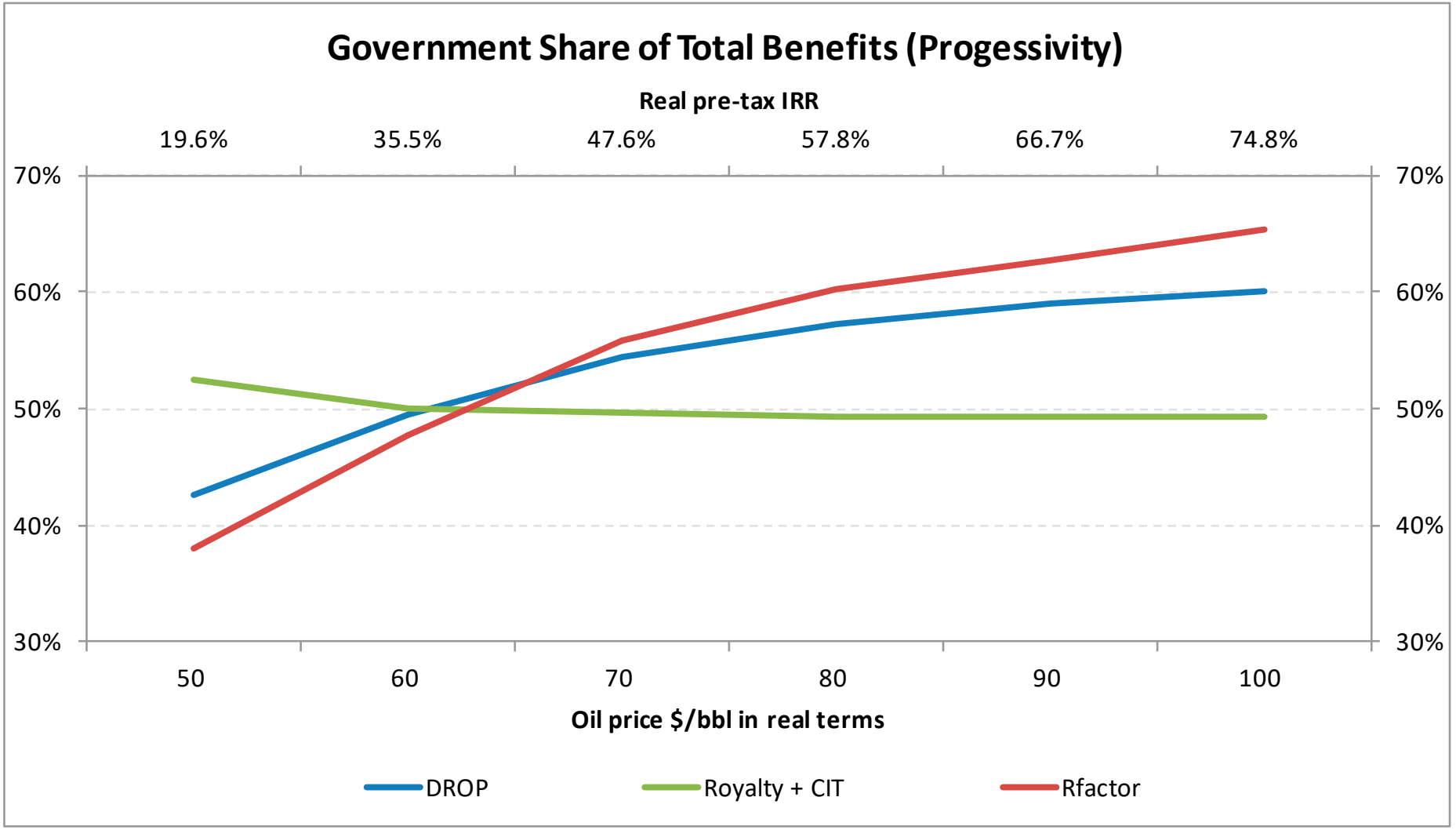
Government take (AETR)



Breakeven price

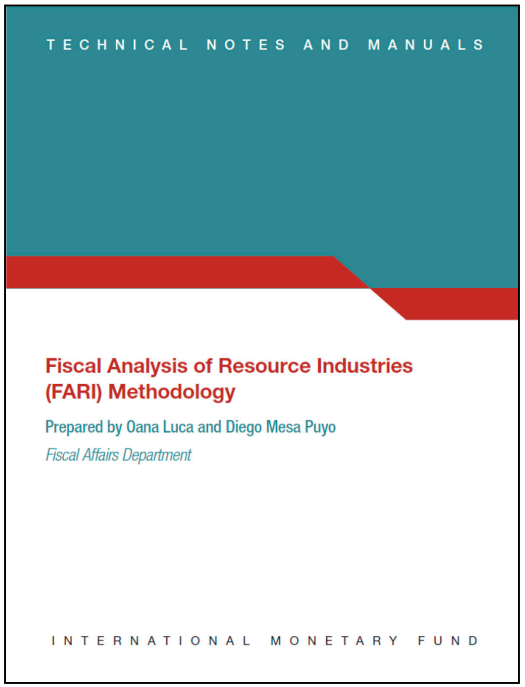


Progressivity



For More Information…

Please visit: http://www.imf.org/external/np/fad/fari/



QUESTIONS