Evaluating and Comparing Fiscal Regimes for EI

NATURAL RESOURCE TAXATION IN THE ASIA-PACIFIC REGION
A forum on the design, implementation and evaluation of fiscal regimes for extractive industries
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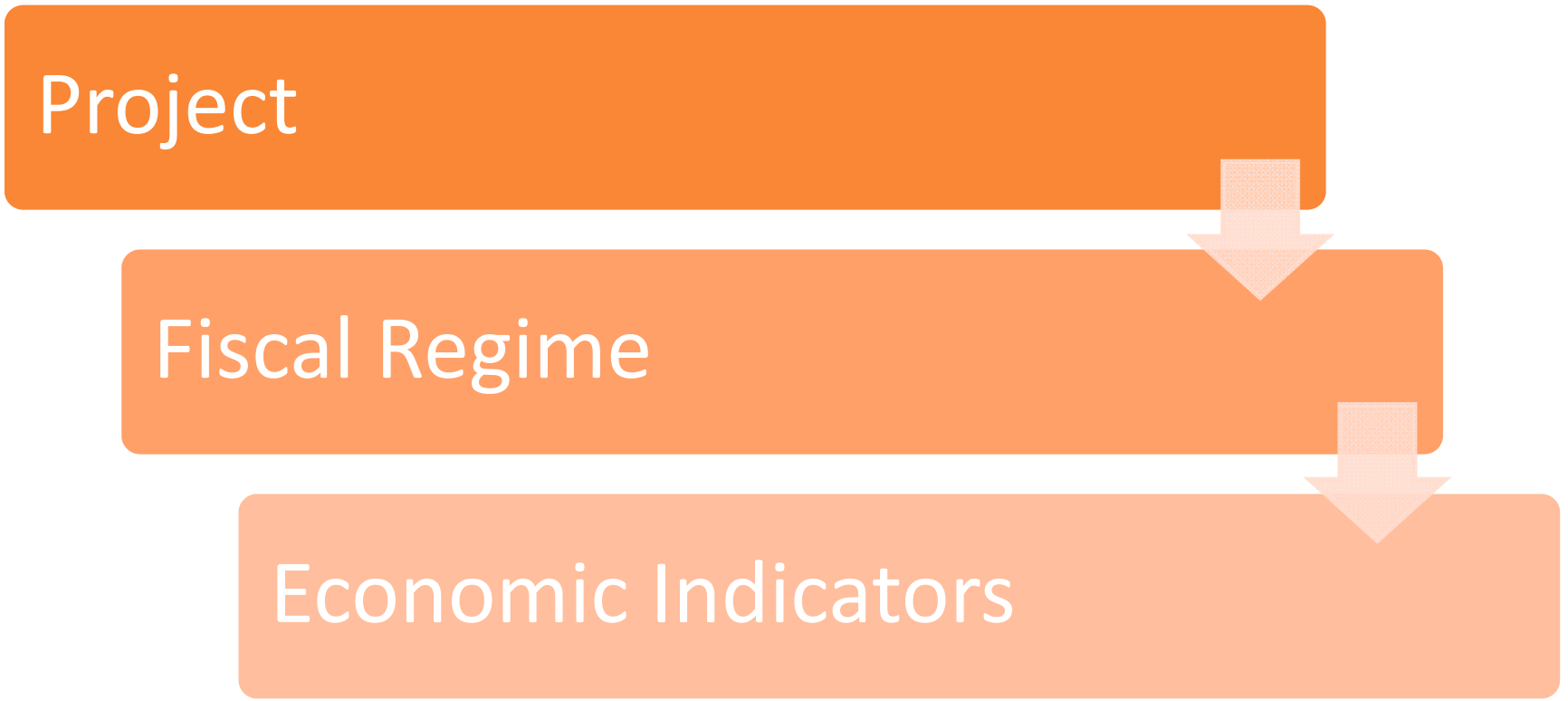
Evaluation Approach of the IMF Fiscal Affairs Department

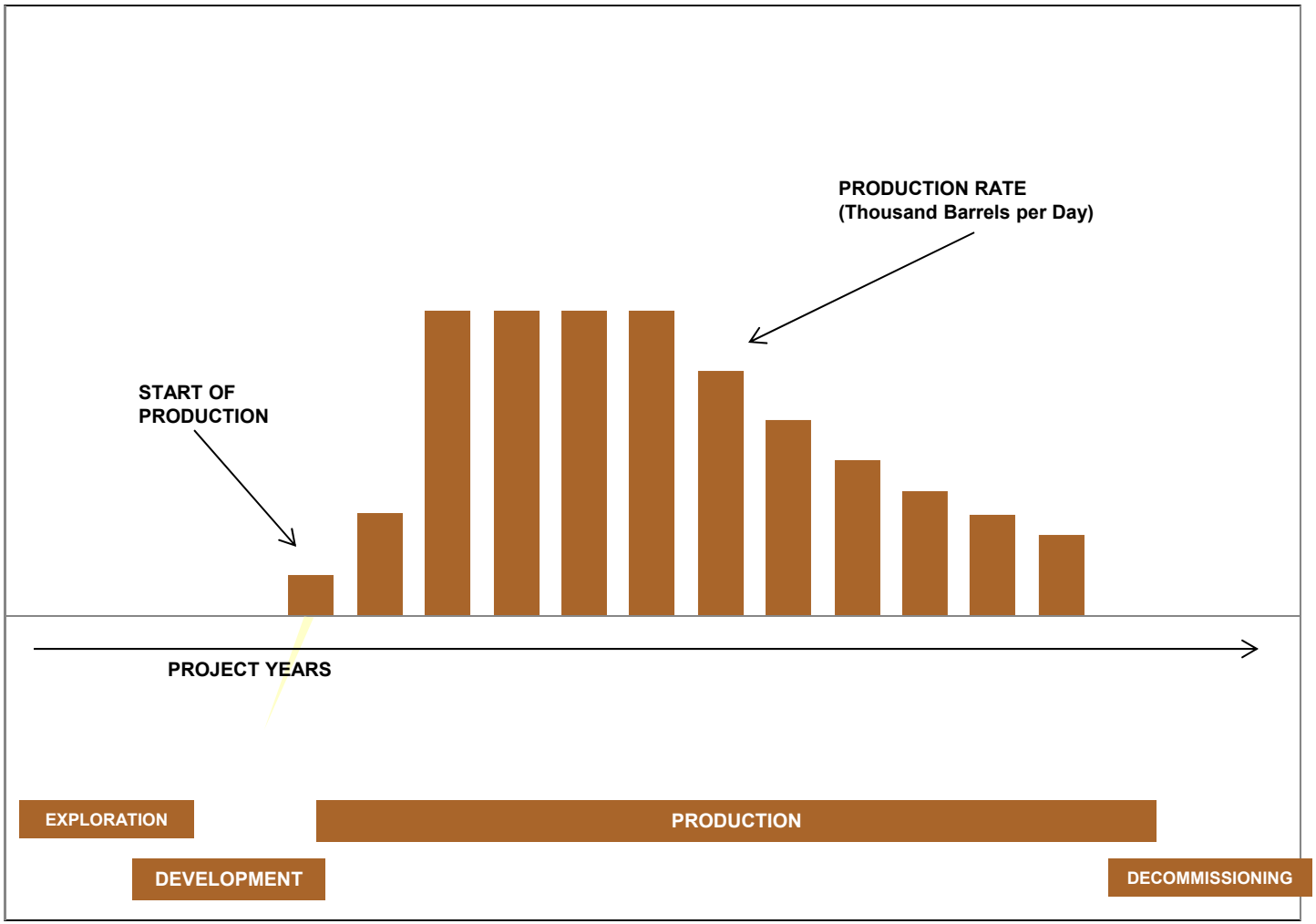
- In practice, the interaction between the different elements of a fiscal package is complex and produces effects that vary by project
- Headline parameters (e.g. Corporate Income Tax and Royalty rates) generally offer limited insight
- Modeling is therefore usually project specific

Project Level Modeling



AN ILLUSTRATION OF THE CASHFLOWS OF A HYPOTHETICAL PETROLEUM PROJECT

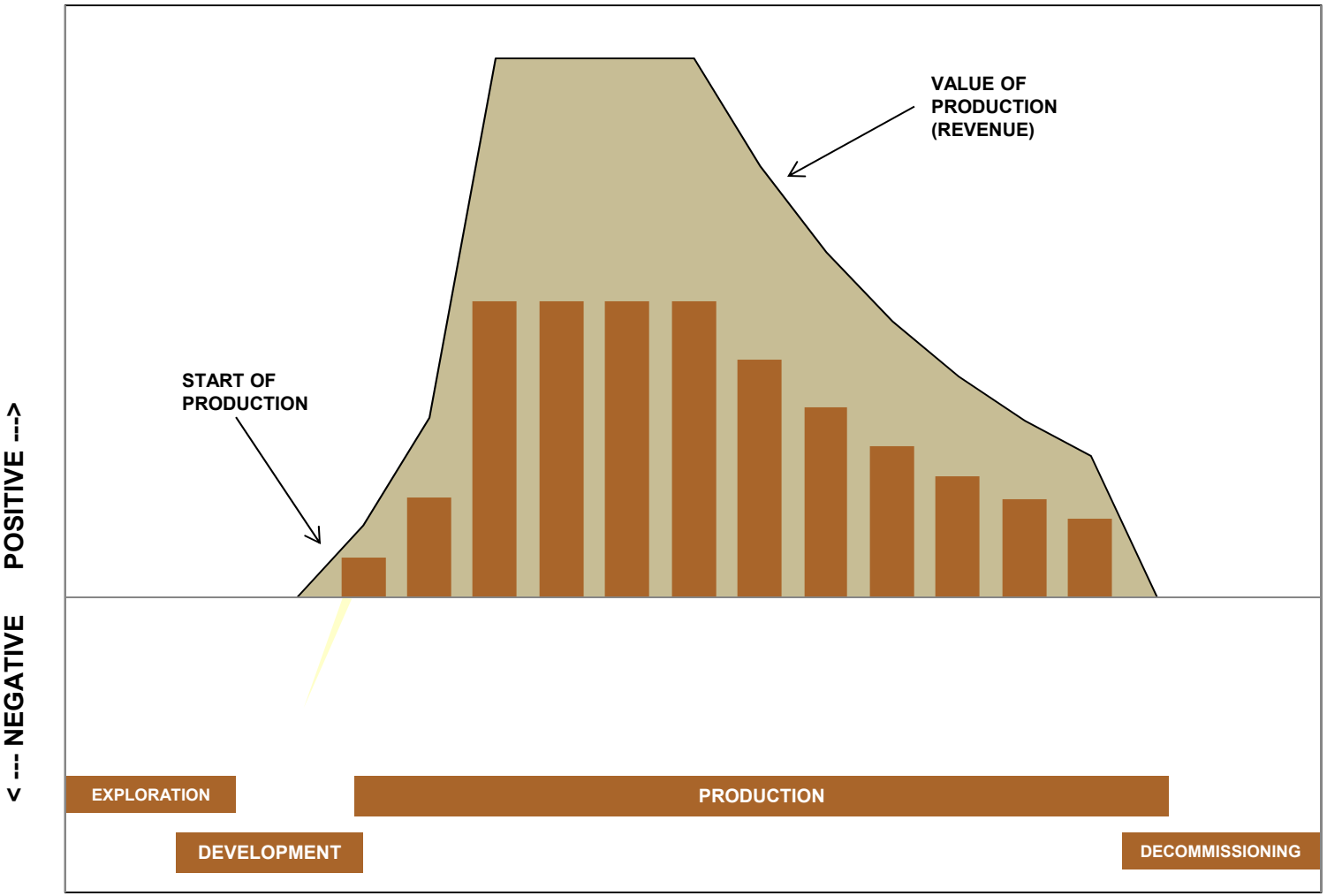
Hypothetical Oil Field



STYLIZED ILLUSTRATION

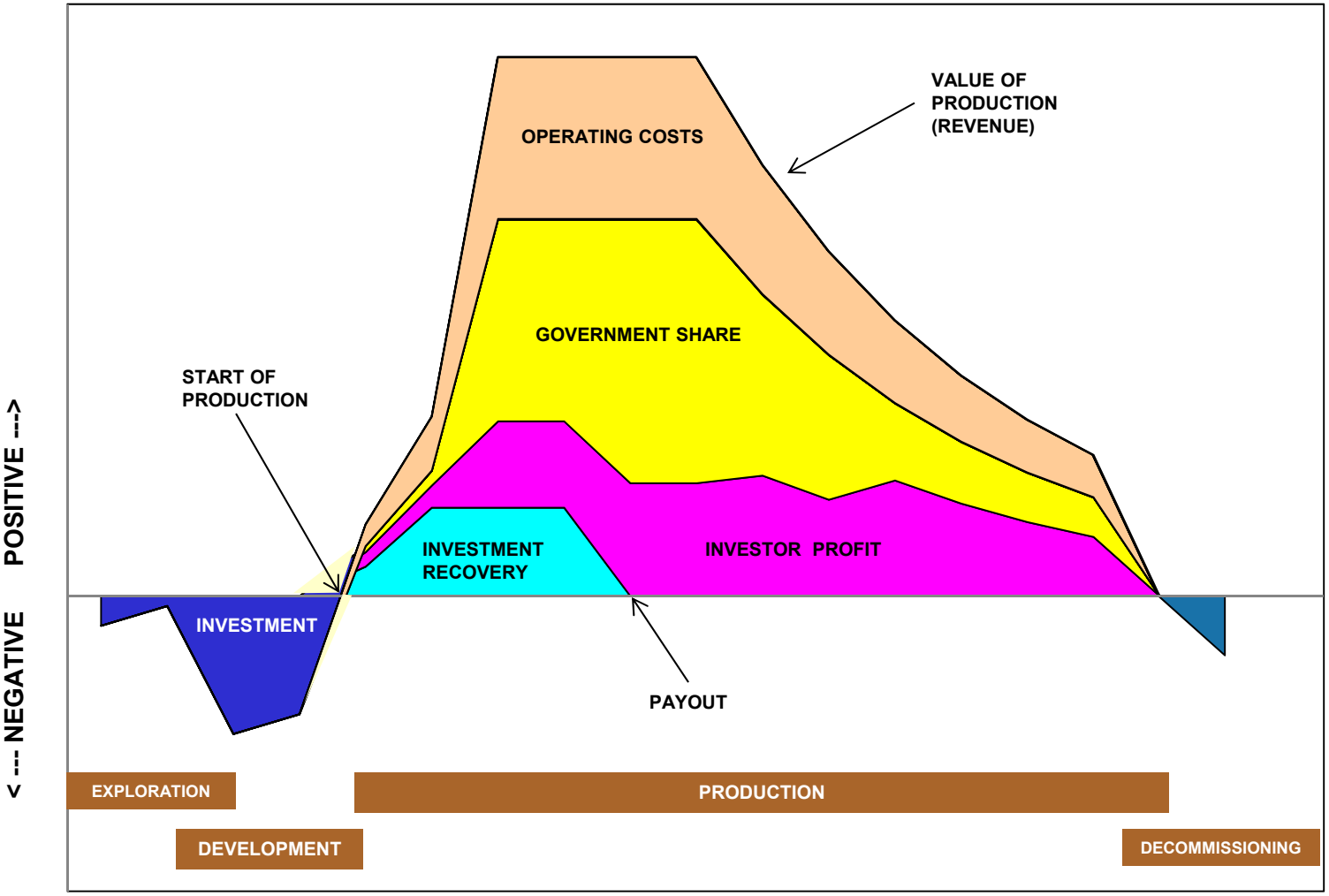
Project Revenue Profile

STYLIZED ILLUSTRATION



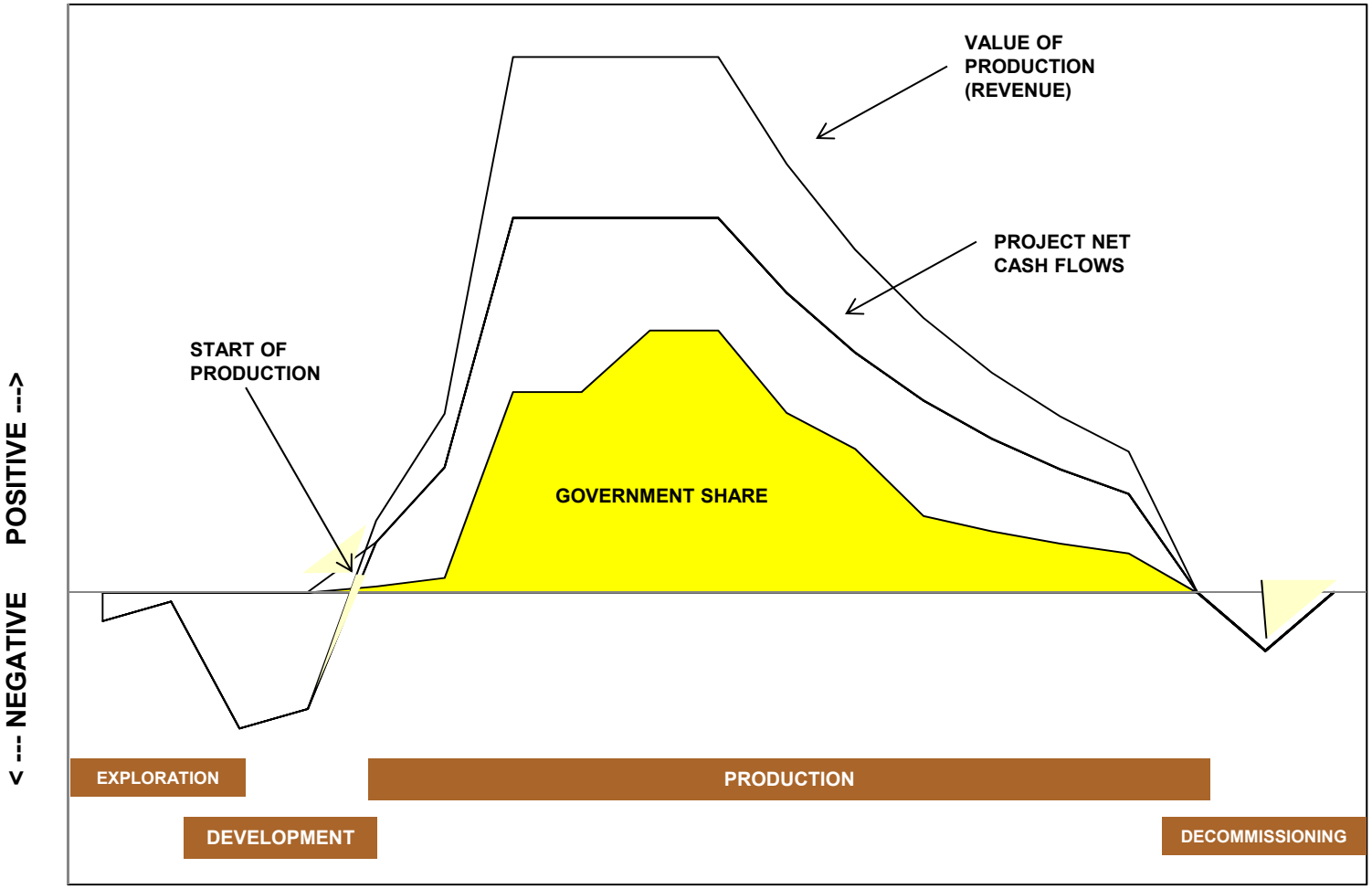
Project Revenue and Costs

STYLIZED ILLUSTRATION



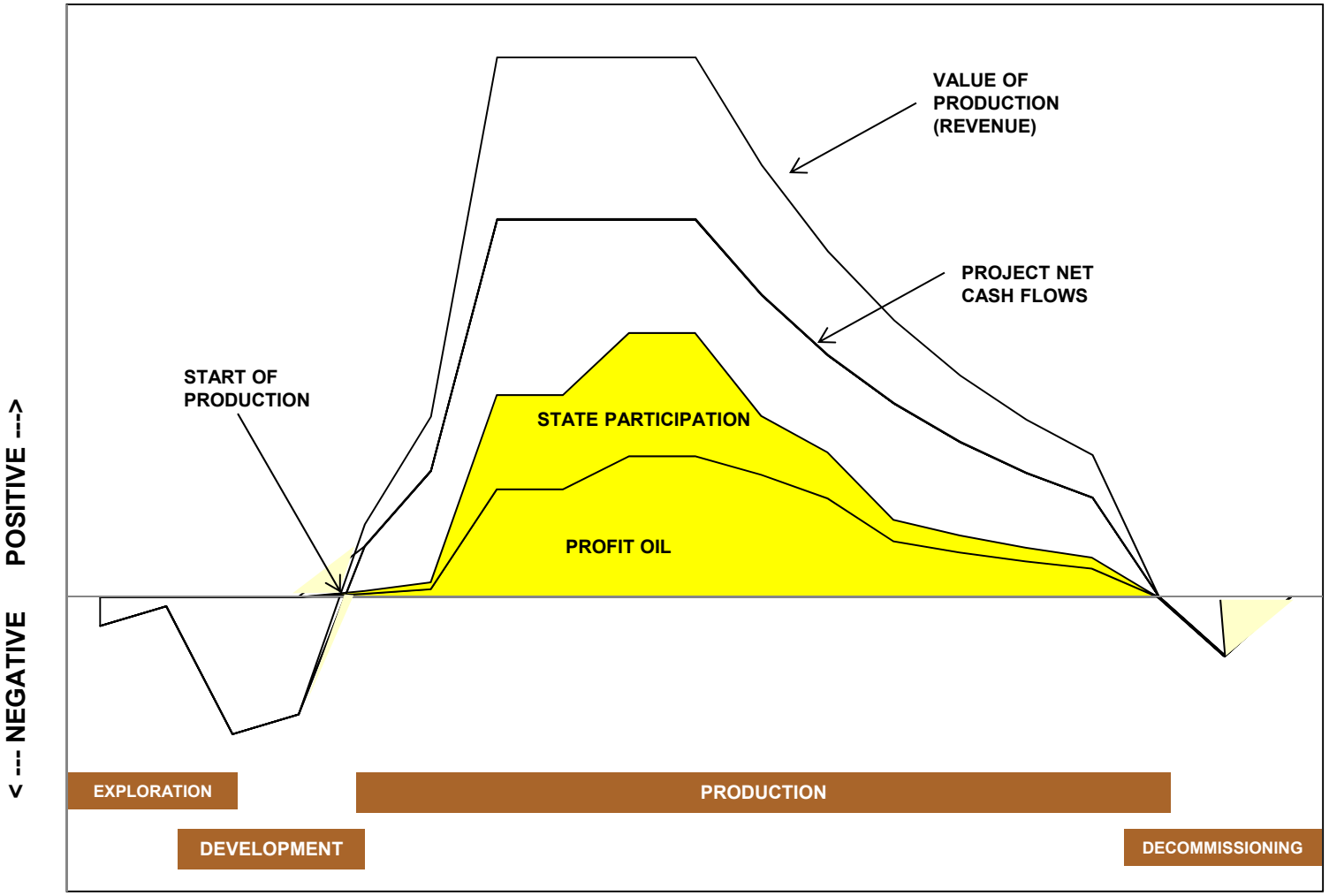
Government Revenue vs. Project NCF

STYLIZED ILLUSTRATION



Composition of Government Revenue

STYLIZED ILLUSTRATION



CRITERIA FOR ASSESSING EI FISCAL REGIMES AND A REVIEW OF THE MAIN INDICATORS

Evaluation Criteria and Key Indicators

Criterion	Key Indicators
Neutrality (avoid distortion of investment and operating decisions)	Marginal Effective Tax Rate (METR) Breakeven commodity price Probability of negative NPV under price uncertainty Gold plating analysis
Revenue raising capacity (maximize government revenue)	Average Effective Tax Rate (AETR) Expected government revenue under price uncertainty
Progressivity with price and costs	Government Share of Total Benefits
Manage government risks	Time profile of revenue Coefficient of variation of NPV of government revenues Proportion of revenues received in first n years of production
Adequate incentive to invest	Post-tax internal rate of return to investor (IRR) Years until discounted payback achieved Coefficient of variation of investor IRR and NPV Probability of negative NPV with price uncertainty Expected Monetary Value (EMV) (NPV weighted by exploration risk)
Minimize administrative burden and risks	Complexity; vulnerability to manipulation.

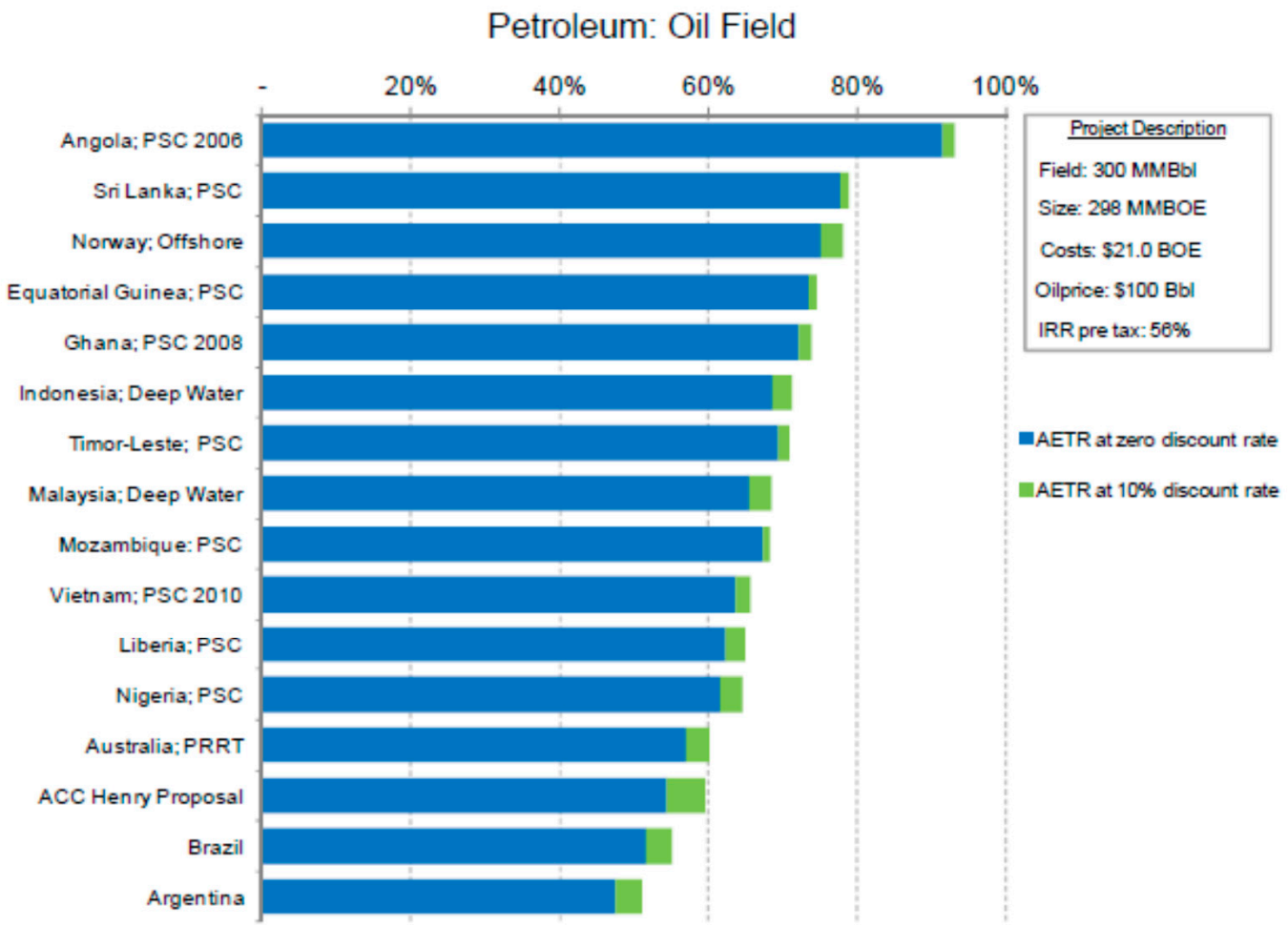
Average Effective Tax Rate (AETR)

- The "government take" in a profitable case

$$\frac{\textit{Government revenue}}{\textit{Pre-tax project NCF}}$$

- Calculated over the full project life and at various discount rates.
- At investor discount rate, if AETR >100% then project is unviable.
- The AETR usually increases with the discount rate.

Average Effective Tax Rate (AETR)



Marginal Effective Tax Rate (METR)

- Government proportion of pre-tax return for a project which is just viable post-tax for investor

$$\frac{\textit{Pre-tax return} - \textit{Post-tax return}}{\textit{Pre-tax return}}$$

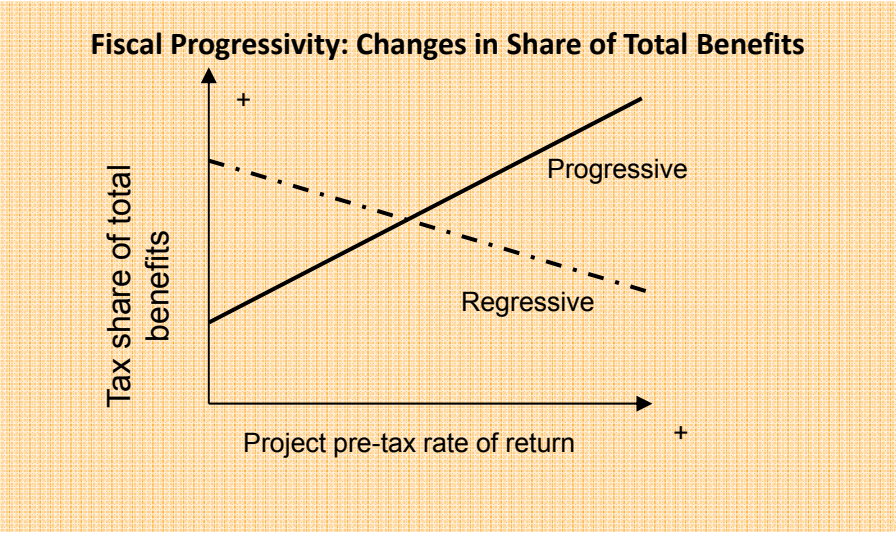
where post-tax return = investor's hurdle rate

- Calculated over the full project life
- Expressed as % or as breakeven commodity price (price required to reach hurdle return)

Progressivity

- Different indicators to illustrate progressivity.
- Most commonly used is the ***government share in total project benefits***:

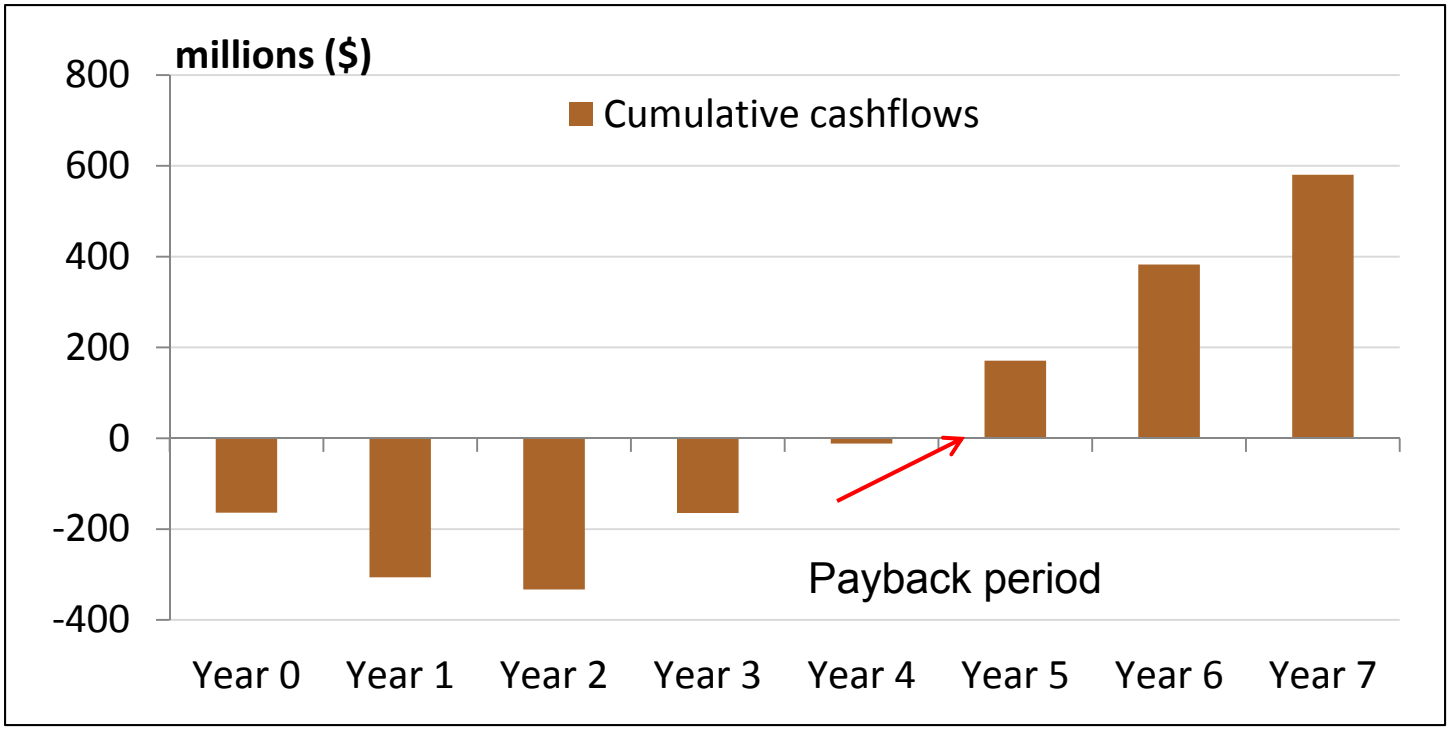
$$\frac{\textit{Government revenues}}{\textit{(revenues – operating costs)}}$$



- Calculated over the full life of the project and at different discount rates.

Payback Period

- In a EI project, the payback period occurs when the cumulative cash inflows from production are sufficient to recover the cumulative exploration, development and operating costs.
- Other things equal, an investor prefers a short payback period.



THE IMF FARI MODEL

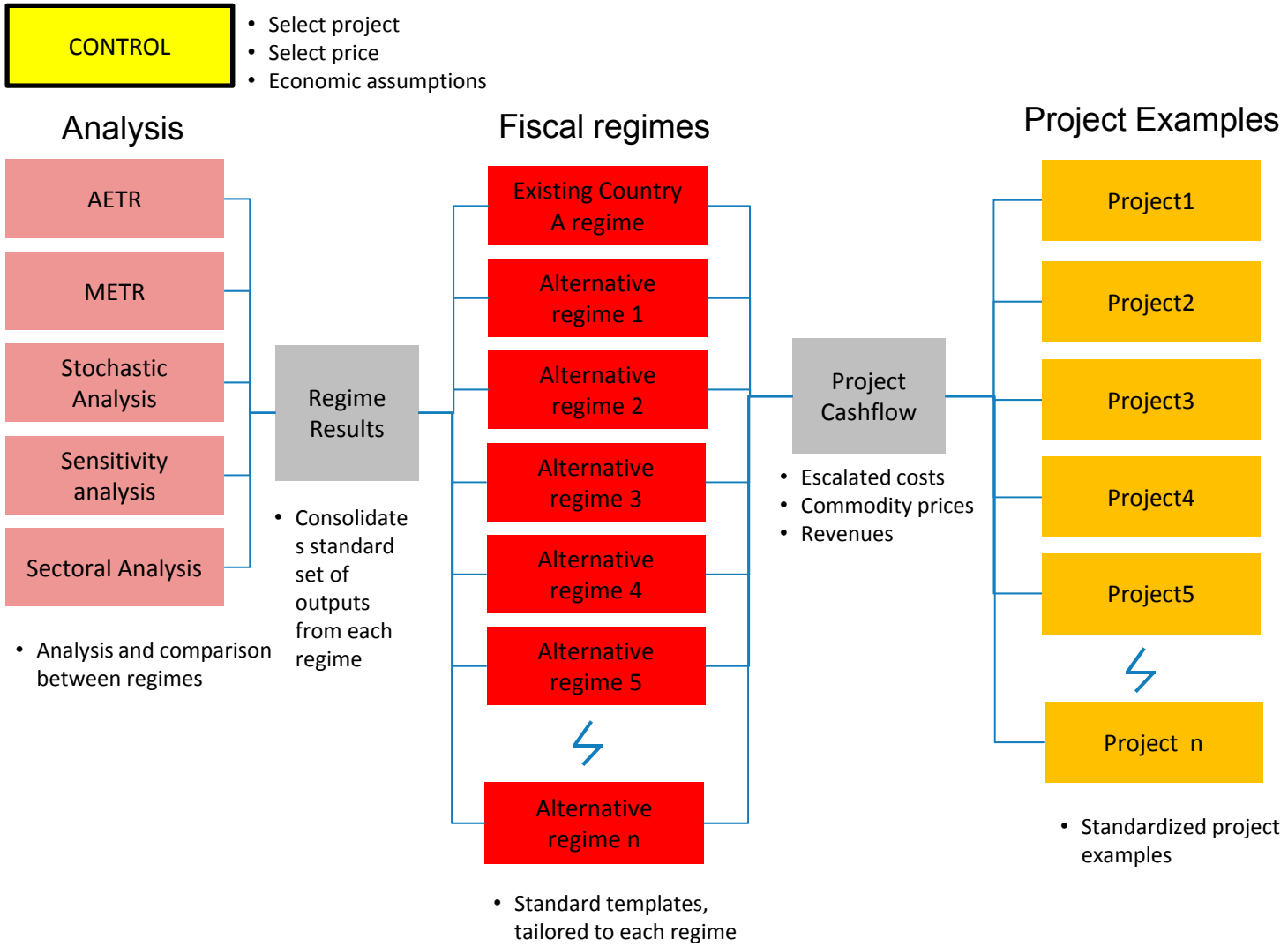
What is FARI?

- FARI stands for Fiscal Analysis of Resource Industries
- Excel-based, discounted cash flow model structure
- Standard suite of analytical routines and outputs, with flexibility to handle diversity in fiscal regimes
- Logical flow (inputs -> workings -> outputs)
- Main calculations on single sheet
- Project-based

FARI's Main Uses

1. Fiscal regime design
   - Can be used to evaluate potential fiscal terms, 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 and integration with macro framework
3. Revenue administration
   - Comparing actual, realized revenues with model results

FARI: Model Structure



FARI: Inputs

- Fiscal terms applicable to the project
  - Rates and specific mechanisms
- Project-level information
  - Production profile
  - Costs with exploration, development, production and decommissioning
- Price assumptions
  - WEO forecast
  - Constant real prices
  - Stochastic simulations
- Other economic assumptions
  - Inflation and interest rates

FARI: Model Calculations

- Project NCF before tax

  Pre-tax project NCF = gross revenue less transportation less all exploration, capital, and operating, and decommissioning costs

- Fiscal payments
  - Royalty – e.g percent gross sales value
  - CIT – if applicable (or calculated notionally)
  - Cost oil – limit on costs deduction from gross revenue
  - Profit oil – mechanisms splitting revenue/oil between investor and government after cost oil is deducted
  - DWT – tax on dividend payments abroad
  - Additional profits tax
- Cash flows reconciliation

  Pre-tax project NCF = government revenue + lender NCF + equity investor NCF

FARI: Output

- Time profile of government revenue from the project
  - with breakdown by tax instrument

- Key Indicators
  - AETR
  - METR
  - Progressivity
  - Investor payback
  - Investor post-tax return

MINING FISCAL REGIME ANALYSIS USING THE IMF FARI MODEL

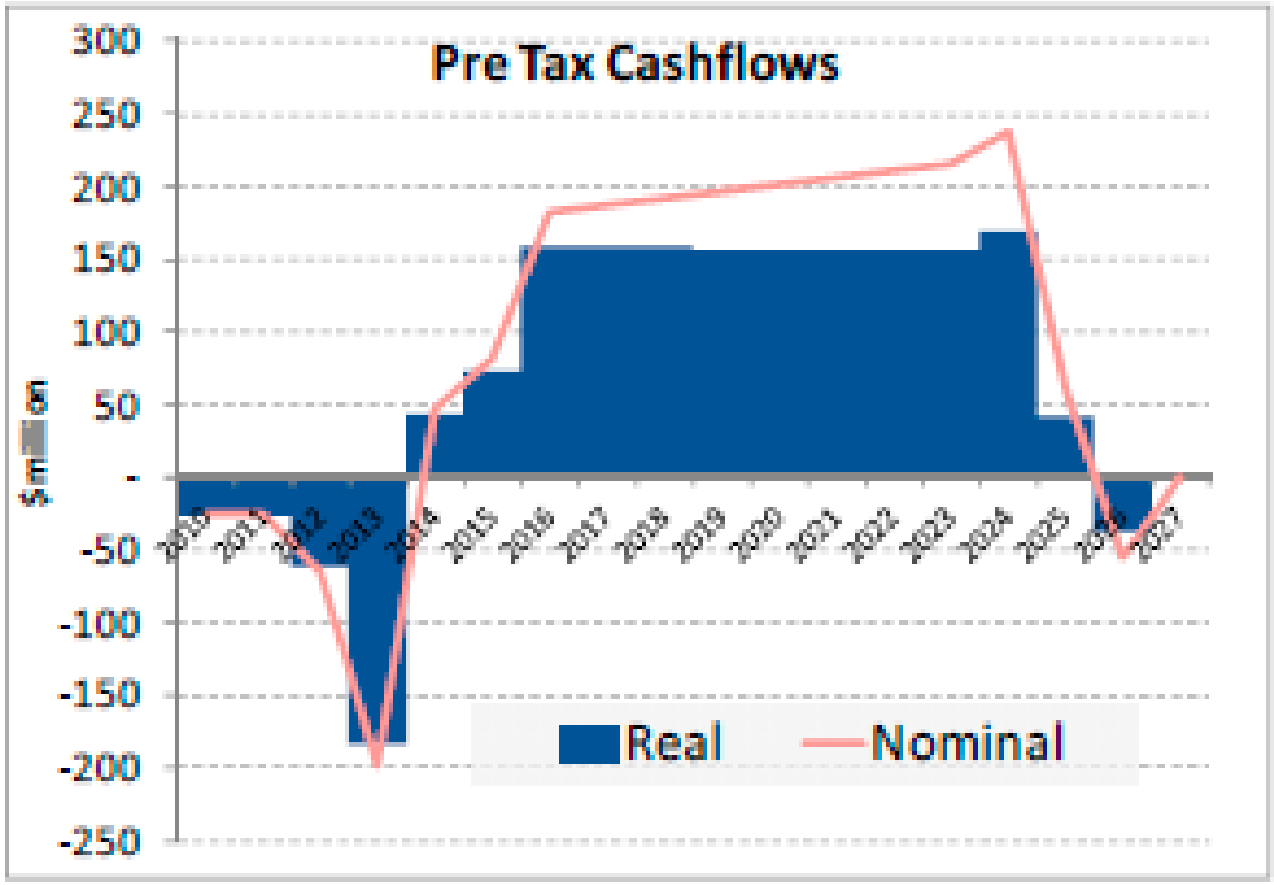
Project Statistics

Project statistics[1]

Total production	2 MM oz over 12 years	
Project costs	$MM	$Oz
Exploration	50	25
Capex	348	174
Opex	789	395
TC/RC	115	58
Decomm	37	18
	1,339	670
Pre-tax IRR at ConstReal $1300 Oz	30%	

[1] Assumes the project exports a gold concentrate that requires smelting outside the host country.

Pre-Tax Cashflows



Regimes Modeled

- Corporate Income Tax (Fixed Rate)
- Fixed Royalty
- Progressive Royalty
- Variable Income Tax
- Windfall Profits Tax
- Full Government Participation
- Unpaid Government Participation
- Additional Tax After Uplift
- Mineral Resource Rent Tax (Australia-Style)
- Henry Proposal(Australia)
- Resource Rent Tax (cashflow basis)
- Resource Rent Tax (ACC)

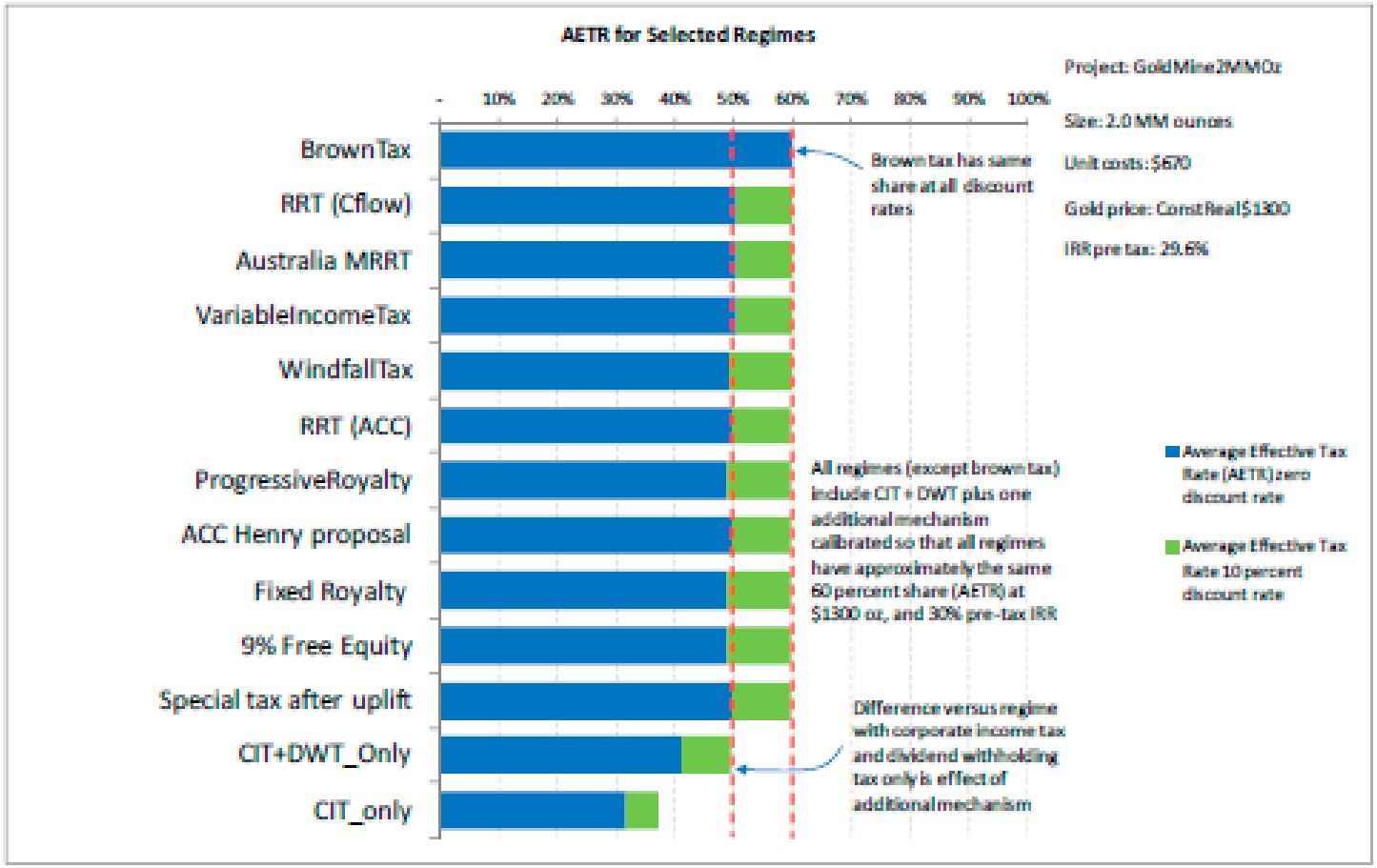
Regimes Modeled

Full government participation (Brown Tax)/1	
Share of equity, from signature of license	60%
Resource Rent Tax (cashflow basis) /2	
Resource rent tax	16.0%
Return threshold	12.5%
Basis	PreTax
Windfall Profits Tax /3	
Windfall tax rate	16.0%
Gold price trigger	$1,000
Trigger escalated	no
Variable Income Tax /4	
Minimum income tax	25%
Maximum income tax	49%
Corporate Income Tax (assumed for all regimes)	
Corporate Income Tax	30%
Depreciation of development costs (yrs)	5
Depreciation of replacement capital	4
Dividend Withholding tax	10%
Assumed debt/equity	0%

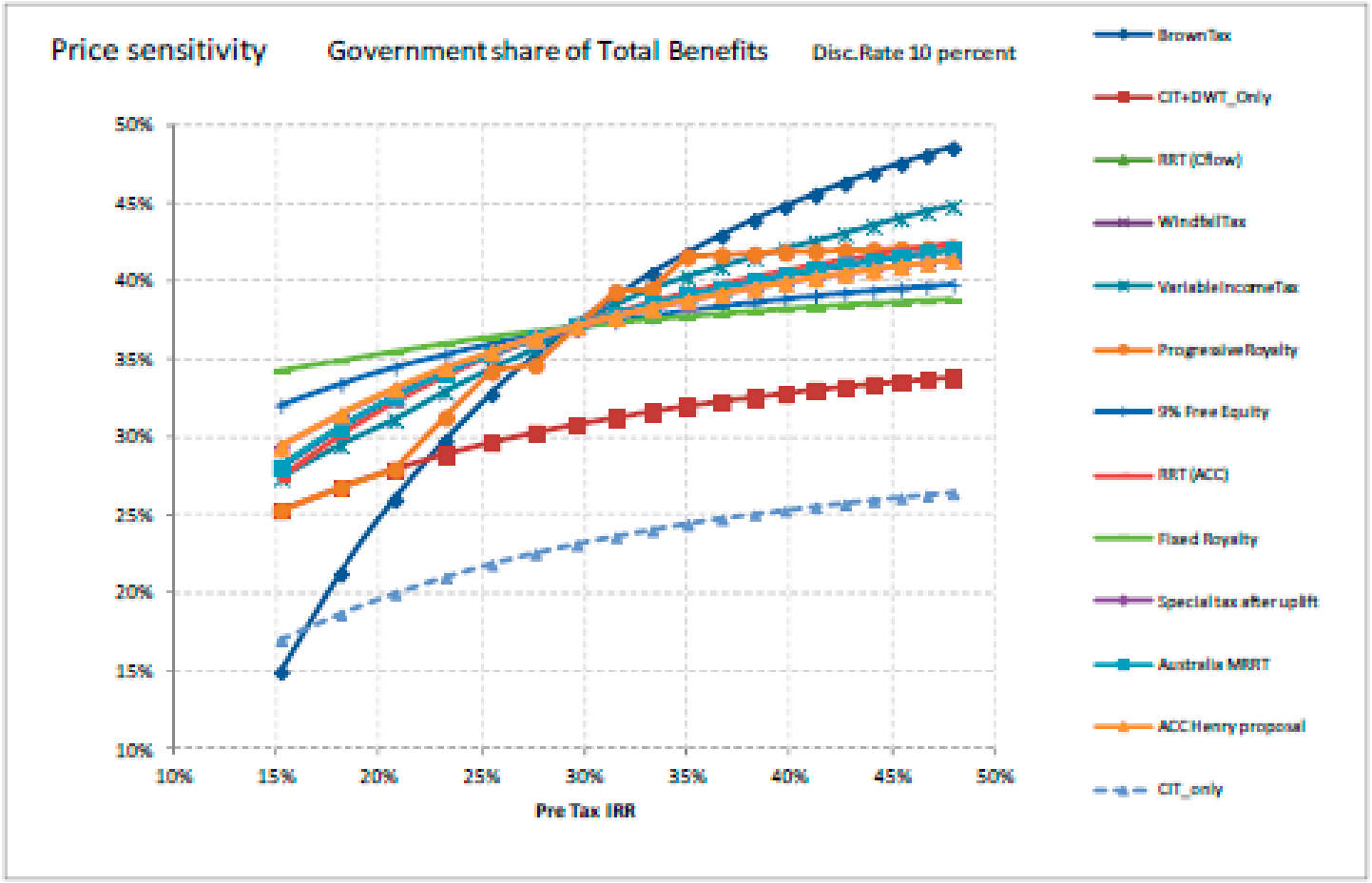
Source: IMF staff assumptions.

Fixed Royalty	
Royalty rate	6%
Progressive Royalty /5	
6 tier Additional royalty min/max	2.0% / 10.0%
Price band lowest / highest royalty	$1050 / $1450
Price bands escalated	yes
Free equity (share of dividends)	9.0%
Resource Rent Tax (ACC) /6	
RRT rate	12%
Add-back interest	no
Uplift on undepreciated capital base	12.5%
Payout of losses at end of life	yes
Additional tax after uplift	
Tax rate	10.0%
One-time uplift on development capital	40.0%
Add-back interest	no
ACC Henry Proposal /7	
RSPT rate	14.0%
Uplift rate	5.6%
Losses paid out at end of life	yes
Australia-style MRRT /8	16.0%
Uplift rate	12.6%
Losses paid out at end of life	no

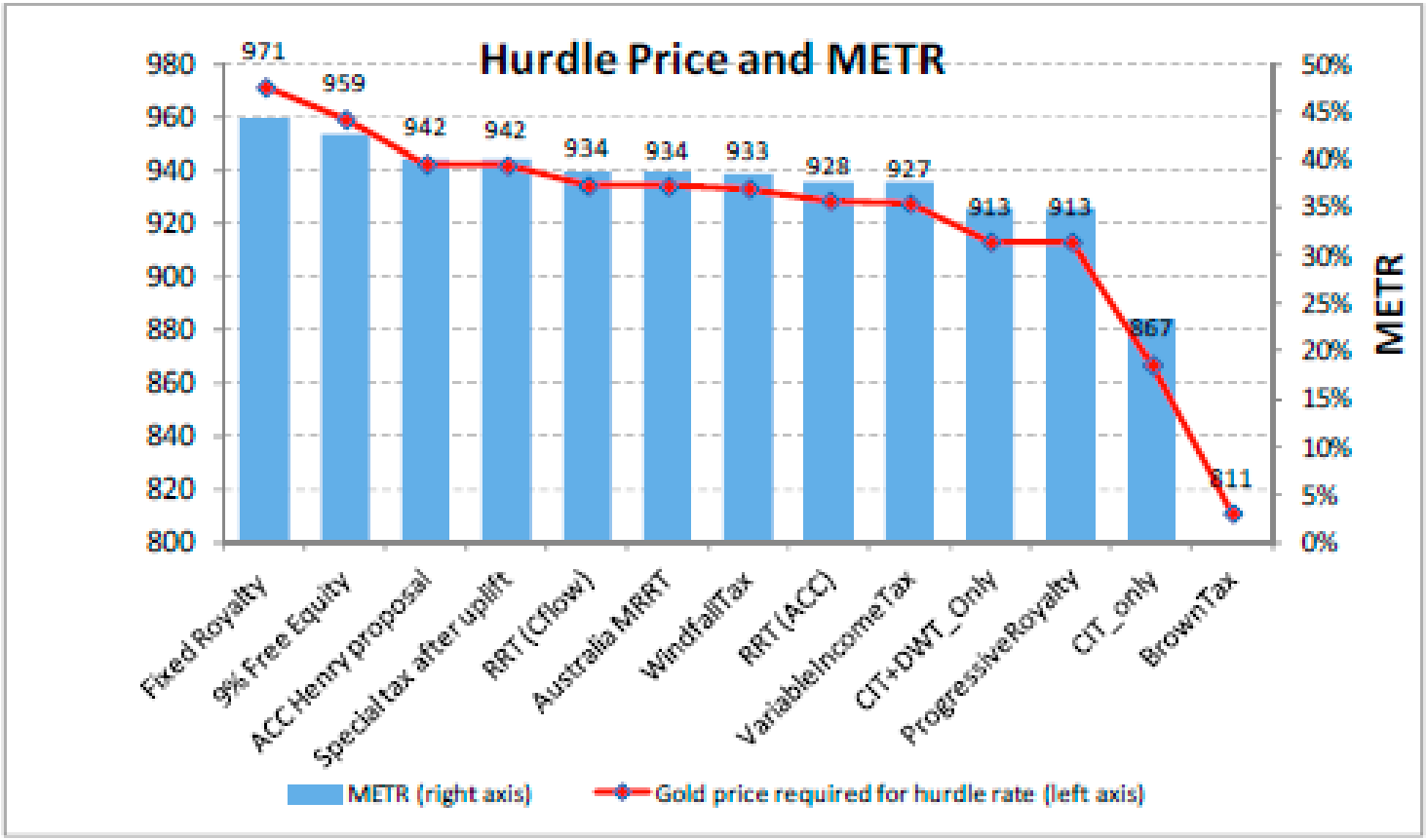
Regimes are calibrated to result in the same AETR at $1,300 per ounce gold price



But respond differently to gold price changes



And have varied impacts on marginal projects



Thank you!