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## *Investment Decisions*



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## **Investment Project Analysis**

- Applicable to all capital projects regardless of the dollar value
- Provides effective and consistent evaluation of investment opportunities
- Determines the most financially attractive projects
- Critical to financial decision-making

## Investment Project Analysis

- The results of this evaluation process are dependent upon the validity and reliability of the assumptions used in the analysis.
- Therefore, it is critical that the assumptions be carefully and realistically formulated.

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## Other Considerations For Financial Decision Making

- Strategic implication of project
- Environmental implication
- Enhancement of the company's reputation

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## Investment Terminology

- The **principal** is the amount of money borrowed or invested.
- The **term of a loan** is the length of time or number of periods the loan is outstanding.
- The **rate of interest** is the % of the principal the borrower pays the lender per time period.

## Present Value

- Present value calculations find the amount at time zero, or the present value ( $PV_0$ ) today, that is equivalent to some future amount  $FV_n$ .
  - $PV_0 = FV_n / (1+i)^n$
- When  $i$  appears in the numerator, the interest rate is referred to as the **compound interest rate** or the growth rate.
- When  $i$  appears in the denominator, the interest rate is called the **discount rate**.

## Capital Investment Projects

- Capital budgeting is the process of planning for purchases of assets whose returns are expected to continue beyond one year.
  - Investments in assets to expand an existing product line or to enter a new line of business.
  - Replacement of an existing capital asset.
  - Expenditures for research and development.
  - Investments in permanent increases in inventory or receivables levels.
  - Investments in education and training.
  - Leasing decisions.

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## Cost of capital

- The company's *cost of capital* is the overall cost of funds, which are supplied to the company.
- The cost of capital is also called the investors' *required rate of return*, because it is the minimum rate of return, which must be earned on the capital invested in the company.
- Also called *hurdle rate*.

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## Risk and Return

- The **weighted cost of capital** is the discount rate used when computing the net present value of a project of average risk.
- The weighted cost of capital is based on the after-tax cost of capital where the cost of the next (marginal) sources of capital are weighted by the proportions of the capital components in the company's long-range target capital structure.
- The weights are equal to the proportion of each of the components in the target capital structure.

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## Risk and Return

- The general expression for calculating the weighted cost of capital,  $k_a$ , is:  
$$k_a = (\text{equity fraction}) \times (\text{cost of equity}) + (\text{debt fraction}) \times (\text{cost of debt})$$

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## Risk and Return

- The required return,  $k$ , on any security may be thought of as consisting of a risk-free rate of return plus a premium for the risk inherent in the security, or
  - Required return = Risk-Free return + Risk premium.

## Basic Principles

- Should invest in most profitable project first and continue accepting projects as long as the last project's  $RoR > k_a$ .
- Some practical problems are encountered when using this capital budgeting model.
  - All capital projects may not be known to the company at one time.
  - Changing markets, technology, and corporate strategies can make some current proposals obsolete and make new ones profitable.
  - Estimates of future costs and revenues can be made subject to varying degrees of uncertainty.

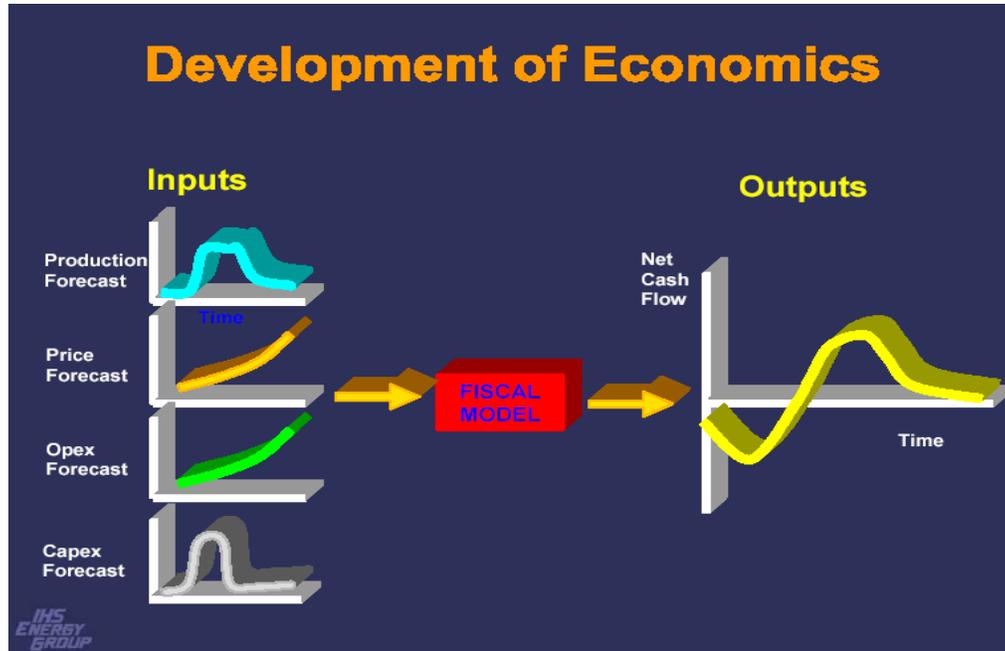
## Four steps of capital budgeting

1. Generating capital investment project proposals.
2. Estimating cash flows.
3. Evaluating alternatives and selecting projects to be implemented.
4. Reviewing or post-auditing prior investment decisions.

## Cash flow

- Net cash flow (NCF) is the foundation of all investment decisions.
  - Only cash can be used to acquire assets and to make profit distributions to investors.
  - Negative cash flows over an extended period of time reduce an organization's ability to satisfy its financial obligations.

## Net Cash Flow



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## Capital budgeting criteria - NPV

- The *net present value* (NPV) is the present value of a stream of future NCFs from a project minus the project's net investment.

$$NPV = \sum_{t=1}^n \frac{NCF_t}{(1+k)^t} - INV$$

- Accept project if  $NPV > 0$ , otherwise reject.

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## Capital budgeting criteria - NPV

- Limitations
  - A larger investment will normally have a larger present value. A ranking based simply on NPV would therefore tend to favor large investments over small investments.
  - NPV does not consider length of time to achieve that value.

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## Capital budgeting criteria - IRR

- The internal rate of return (IRR) is defined as the rate of discount that equates the present value of net cash flows of a project with the present value of the net investment.

$$\sum_{t=1}^n \frac{NCF_t}{(1+r)^t} = INV$$

- Accept project if  $r > k$ , otherwise reject.
- Limitation: favors projects with a quick payout or short-term in nature.

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## Capital budgeting criteria - PWI

- Present worth index (PWI) measures the relative attractiveness of projects per dollar of investment.
- The ratio of the present value of cash inflows to the present value of the cash outflows.
- Designed to address the limitation of NPV cited above.
- Limitations:
  - It is not a good indicator of the significance of a project.
  - It is dependent on cost of capital used. If cost of capital is over or underestimated could result in selection of wrong project.

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## Capital budgeting criteria - PWP

- Present worth payout (PWP) measures the time that the net investment will be at risk. The longer the payout period, the more chance for some unfavorable circumstance to occur.
- Limitation:
  - Disregards cash flows received after the payout period. It does not directly measure the value created by the project.
  - Is dependent on cost of capital used.

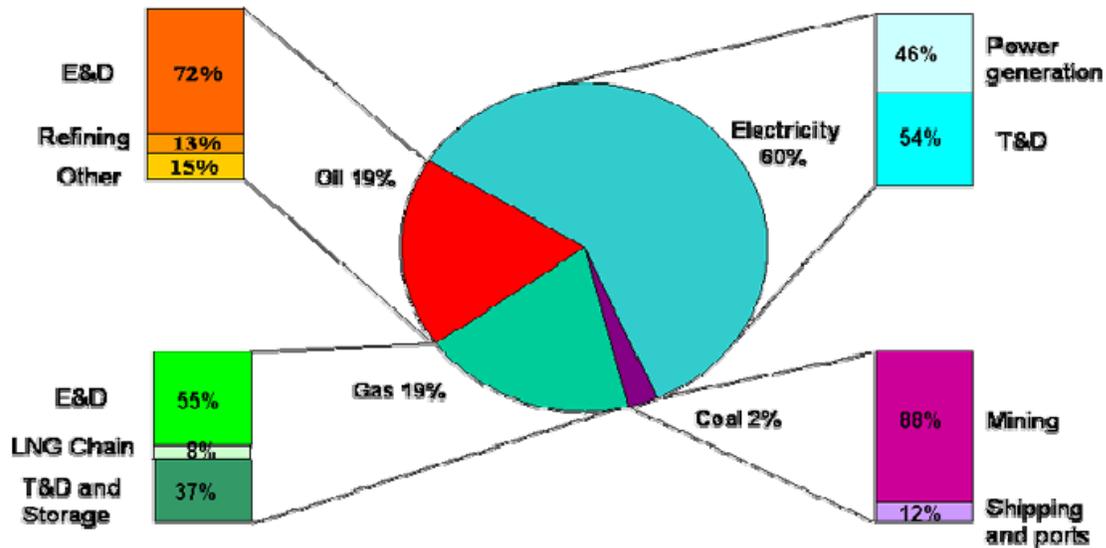
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## Energy Investment Considerations



## \$16 trillion Energy Investment Required Across the Energy Value Chains, 2001-2030



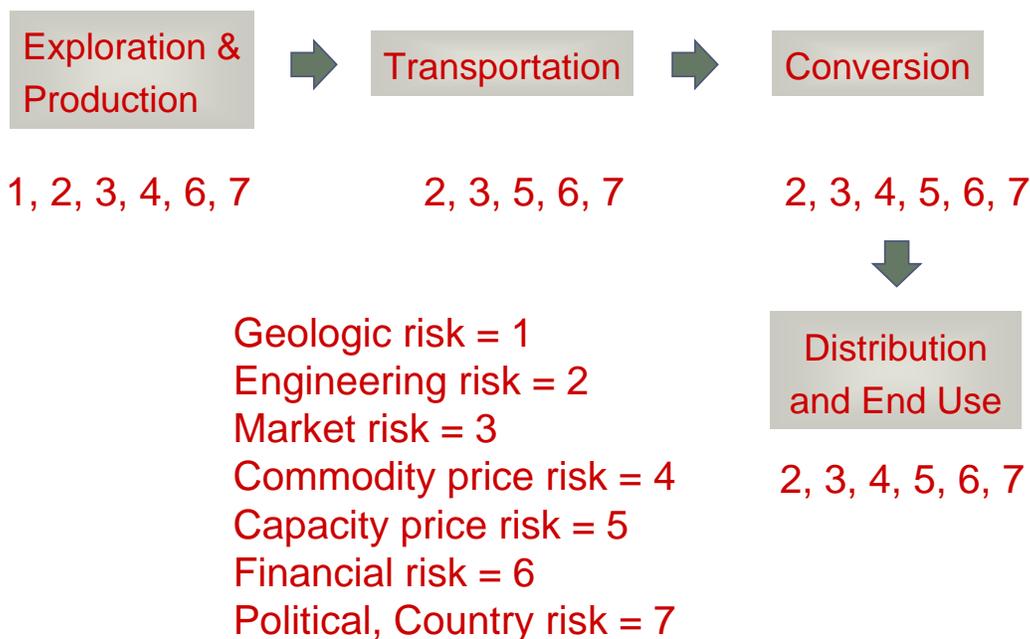
Source: IEA World Energy Investment Outlook 2003

## Issues

- Reduction in capital E&P spending as industry consolidates
- Reduced energy financing with fewer merchant risk managers
- Sovereign debt with fiscal scrutiny and liberalization
- Development assistance with budget and performance scrutiny in donor countries
- Incentives to attract capital

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## Energy Value Chain Investment Risks



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## State of Global Capital Markets

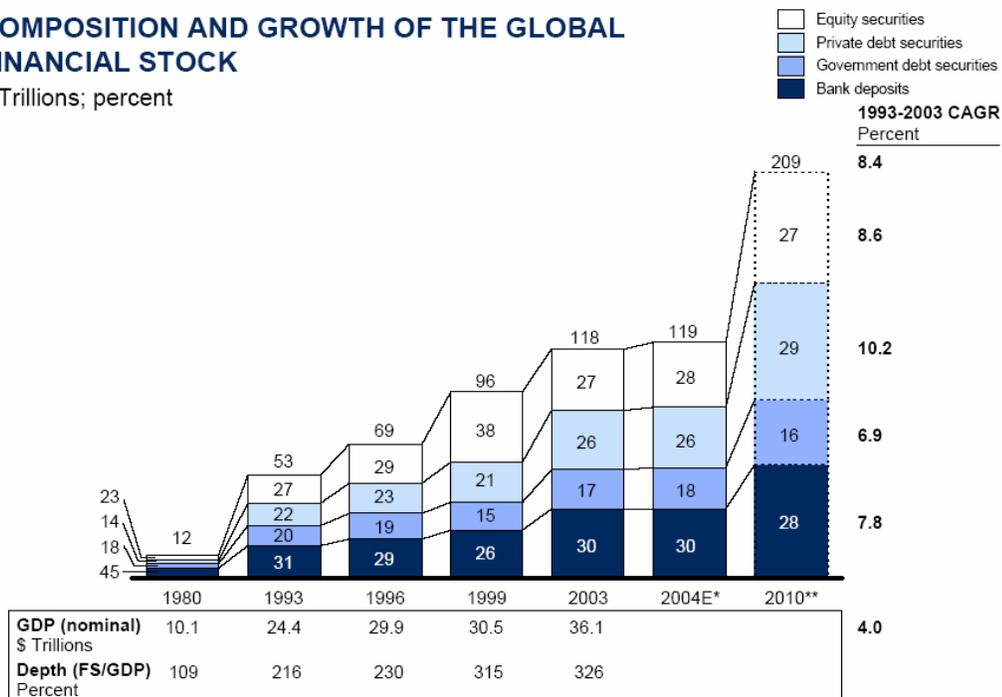
- Unprecedented breadth and strength.
- \$118 trillions of assets to \$200 trillion by 2010 if trends persist.
- Much of the growth comes from a rapid expansion of corporate and government debt
- Cross-border capital flows and foreign holdings of financial assets continue to grow rapidly

Source: *\$118 Trillion and Counting: Taking Stock of the World's Capital Markets*, McKinsey Global Institute, February 2005.

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### COMPOSITION AND GROWTH OF THE GLOBAL FINANCIAL STOCK

\$ Trillions; percent



\* Based on latest available data: September 2004 for equities, March/June 2004 for debt, June 2004 for bank deposits

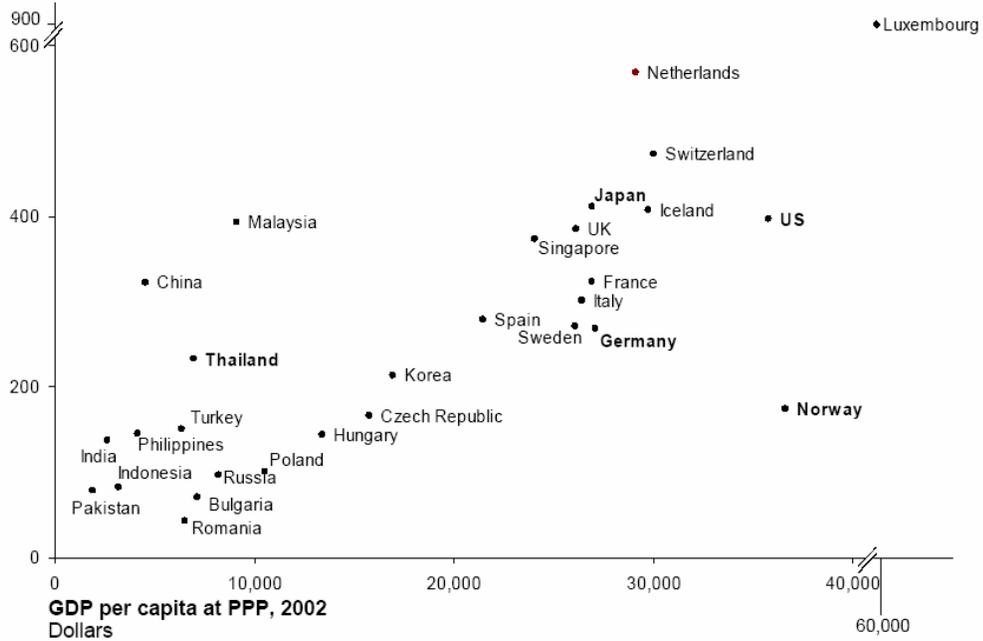
\*\* Extrapolation off of 2003 base, with components grown at 1993-2003 CAGRs

Note: 2004E shares do not add to 100% due to rounding error

Source: McKinsey Global Institute Global Financial Stock Database; World Federation of Stock Exchanges; Merrill Lynch; Global Insight

**WEAK LINK BETWEEN FINANCIAL DEPTH AND WEALTH**

2003 Financial stock  
Percent of GDP

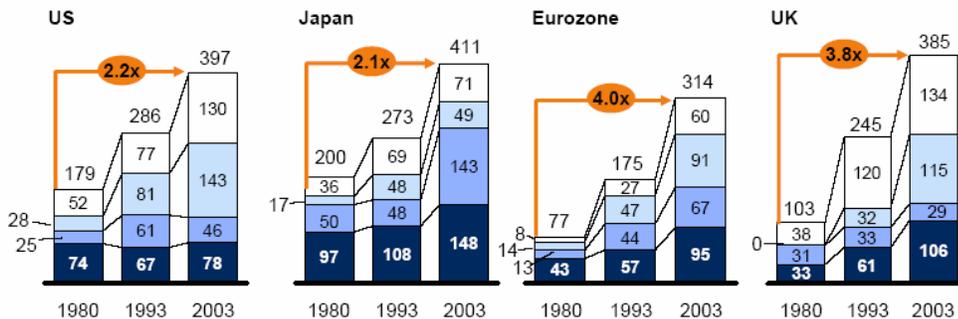


Source: McKinsey Global Institute Global Financial Stock Database; World Bank

**DIFFERENT DRIVERS OF FINANCIAL DEEPENING ACROSS MARKETS**

Financial stock expressed as percent of GDP

- Equity/GDP
- Private debt/GDP
- Government debt/GDP
- Bank deposits/GDP



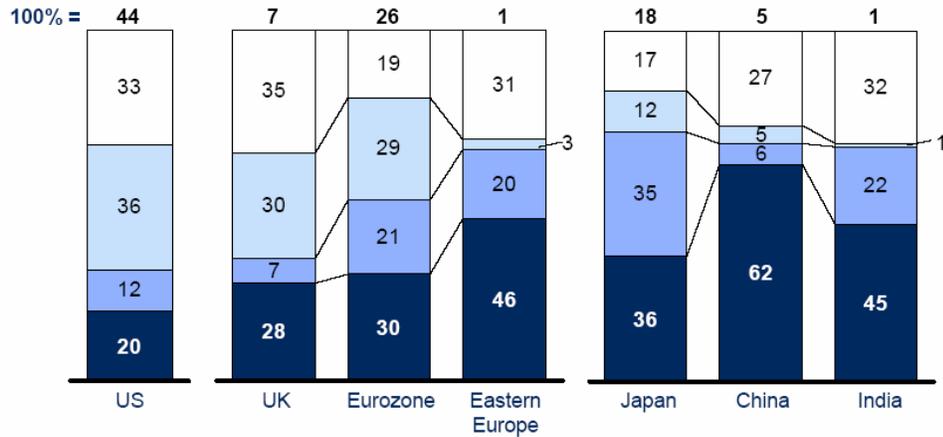
Financial depth ≠ healthier financial system.

For example, in Japan, government debt was responsible for deepening.

**COMPOSITION OF FINANCIAL STOCK, 2003—  
THREE REGIONAL STORIES**

\$ Trillions; percent

- Equity securities
- Private debt securities
- Government debt securities
- Bank deposits



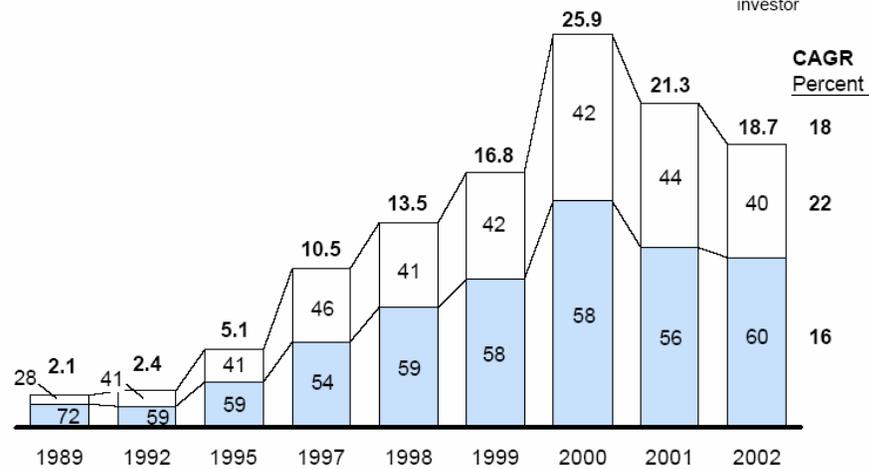
<b>Depth (FS/GDP)</b>	397	385	314	99	411	323	137
Percent							
<b>CAGR</b>	8.6	11.3	9.8	19.3	4.0	14.5	11.9
Percent							

Note: Some numbers do not add to 100% due to rounding error  
Source: McKinsey Global Institute Global Financial Stock Database; Global Insight

**CROSS-BORDER EQUITY INVESTMENTS, 1989–2002**

\$ Trillions; percent

- Purchase of foreign security on investors' local exchange
- Purchase of domestic security by a foreign investor



<b>Flows/world market cap</b>	18	22	29	45	50	47	80	77	80
Percent									

Source: CrossBorder Capital; S&P Emerging Markets Factbook



*Political and Business Risk*

*Electricity Case Study*



**Electricity Investment Indicators**

	Electrification			People without access	2001-2030 Investment
	Urban	Rural	Total		
North Africa	99.3%	79.9%	90.3%	28 million <sup>1</sup>	
Sub-Sahara	51.3%	7.5%	22.6%	509 million	
<b>Africa</b>	<b>63.1%</b>	<b>16.9%</b>	<b>34.3%</b>		<b>\$609 billion</b>
South Asia	68.2%	30.1%	40.8%	801 million	\$783 billion
Latin America	98.0%	51.5%	86.6%	56 million	\$744 billion
East Asia/China	98.5%	81.0%	86.9%	241 million <sup>2</sup>	\$2,712 billion <sup>3</sup>
Middle East	98.5%	76.6%	91.1%		\$258 billion
<b>Developing Countries</b>	<b>85.6%</b>	<b>51.1%</b>	<b>64.2%</b>		
<b>World</b>	<b>91.2%</b>	<b>56.9%</b>	<b>72.8%</b>	<b>1,635 million</b>	<b>\$5,106 billion</b>

Source: The IEA, *World Energy Outlook 2002* (Chapter 13) and *World Energy Investment Outlook 2003* (Chapter 7)

<sup>1</sup> includes parts of Middle East

<sup>2</sup> 18 million in China

<sup>3</sup> \$1,913 billion is for China alone

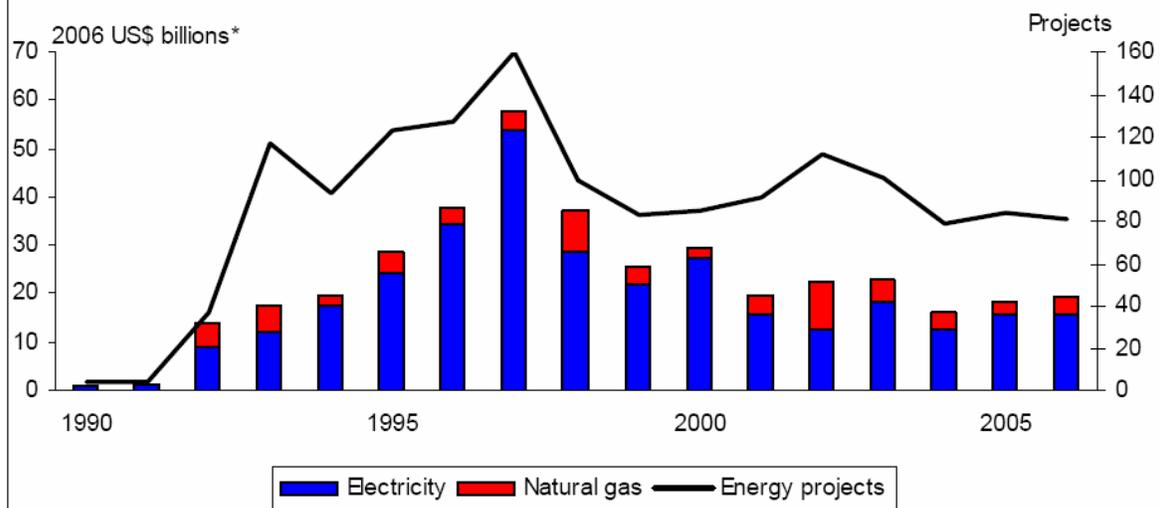
## Will \$ flow to where it is needed?\*

- Half of the investors (~50 companies) are less interested in developing country power sectors as compared to the 1990s
- Several priorities for governments:
  - Ensure adequate cash flow (adequate tariff levels and collection)
  - Maintain stability and enforceability of laws and contracts
  - Improve responsiveness to investors' needs
  - Minimize government interference (with operations and management in particular)

\* *What International Investors Look for When Investing in Developing Countries: Results from a Survey of International Investors in the Power Sector, Energy and Mining Sector*  
Board Discussion Paper No. 6, The World Bank Group, May 2003.

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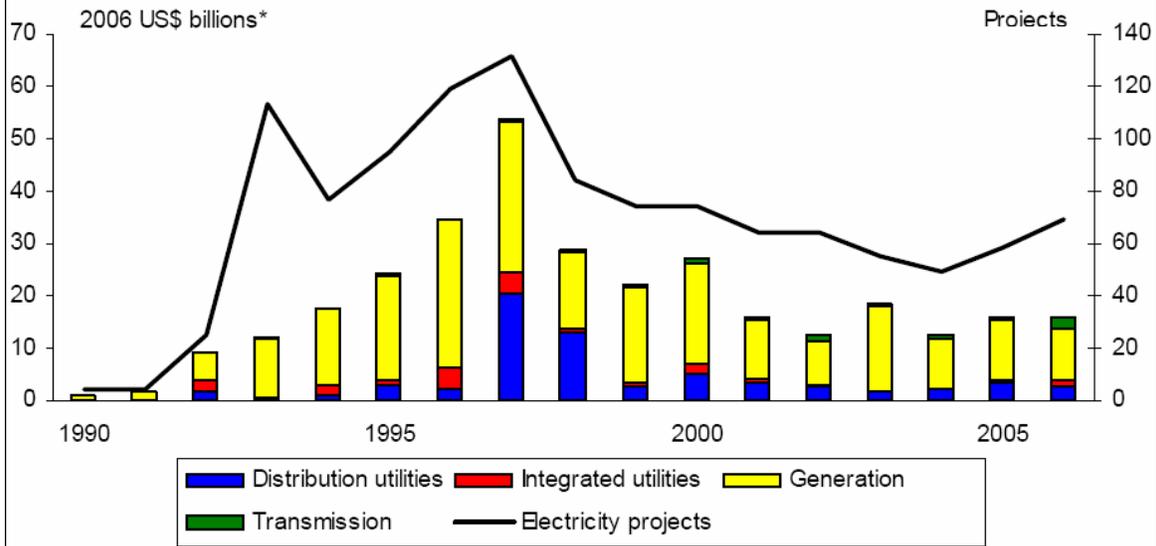
**Figure 1 Investment commitments to energy projects with private participation in developing countries by subsector, 1990-2006**



Source: World Bank and PPIAF, PPI Project Database.

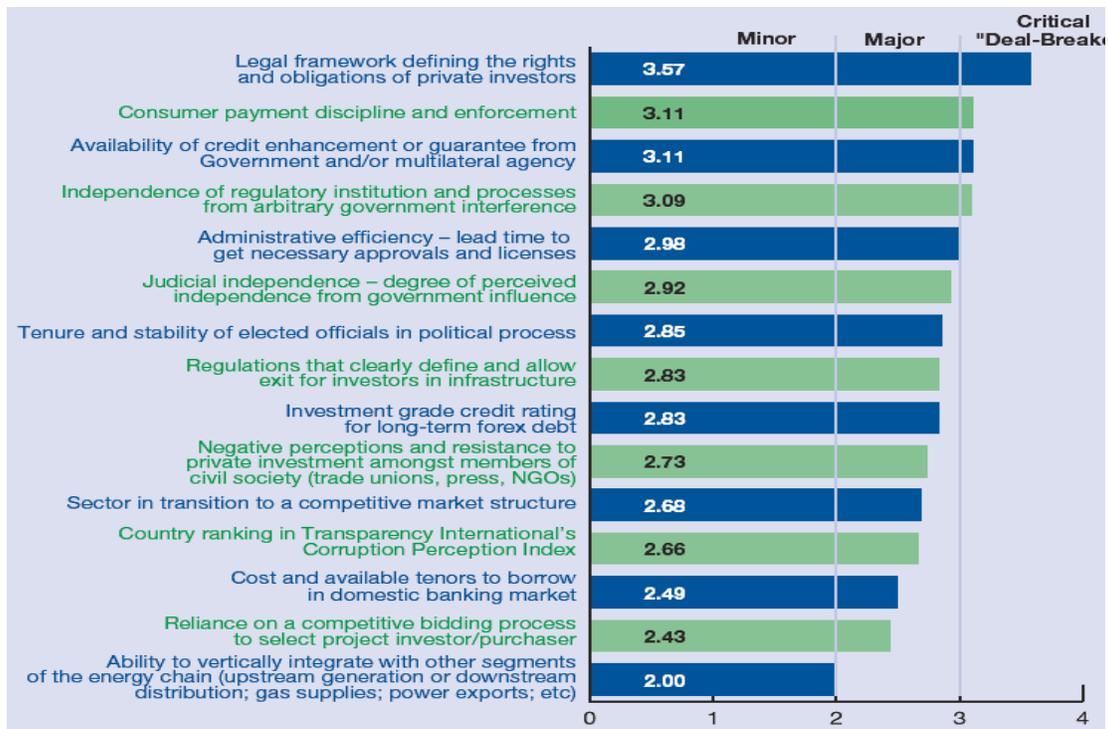
\* Adjusted by the 2006 US CPI.

**Figure 2 Investment commitments to electricity projects with private participation in developing countries by segment, 1990-2006**



Source: World Bank and PPIAF, PPI Project Database.

\* Adjusted by the 2006 US CPI.



Source: World Bank survey

## What Accounts for Best Projects?

- adequacy of retail prices and collection discipline to meet cash flow needs,
- ability to exercise effective operational and management control of the project,
- government meeting all commitments of state-enterprise performance and exchange conversion,
- enforcement of laws and contracts (e.g., disconnections, payment by counter-parties, etc.),
- availability of limited recourse financing,
- non-arbitrary adjudication of tariff adjustments and dispute resolution,

*Source: World Bank survey*

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## Key Success Factors\*

- Political leadership to drive through sector reforms and project agreements;
- Good and tested project design balancing the risks and returns to the Government and private sponsor/lender;
- Good and tested market design, most success cases in vertically integrated and single buyer markets;
- Domestic capital role substantial from strategic and banking sector sources and potential to generate self-financing;
- Greenfield generation: (a) MDB support, (b) constrained power expansion;
- Existing distribution: (a) prior improved collections & tariff levels, (b) public participation.

*\*Results from a DT Emerging Markets Group study on successful cases*

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## *Project Finance: Vehicle for Risk Management*

*Based on Material Originally Presented  
by Senake Gajameragedara and Ed  
Bommer*



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## **Project Finance - Issues**

- Why use it?
- What makes it different?
- What are the benefits?
- How are they evaluated?

## Project Finance

- Project Finance is usually based on a single special-purpose company's (asset's) cash flow
  - Projects can meet all of their obligations without reliance on corporate or parental guarantees.
  - The development's assets, rights and interests are usually held as collateral security - non-recourse
  - Project contracts play a central role – “contract-based financial engineering”
  - Assets financed are capital intensive, have long lives, high capital cost relative to revenues making capital cost important.

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## Project Finance Overview

- Definition
- Phases
  - Commercial Operation Date
  - Financial Close
  - Plant Retirement
- Types of Contracts
  - EPC Contract/Turnkey Construction Contract
  - Off-take/Sales Contracts
  - Concession Agreement
  - Liquidated Damages
- Debt Provisions
  - Non-Recourse
  - Waterfall
  - Debt Service Reserve
  - Cash Lock-ups
  - Cash Flow Sweeps

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## Project Finance and Cash Flow

- Project financing is a financing of a particular economic unit where a lender is initially satisfied to look to the cash flow as the source of repayment of the loan and the assets as the collateral of the loan.
- Cash flow is the key issue.
  - How much cash flow is generated?
  - Who gets the cash flow?
  - What are the priorities each party has to the cash flow.
- Unlike other methods of financing, project finance affects the project's development and contractual arrangements.
- Modeling and contracts are two features of project finance that make it unique in its ability to measure and isolate risk.

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## Project Finance and Risk

- Project finance analysis to a large degree involves identifying, allocating and mitigating risk.
- Risk is always borne. Successful project finance lets those capable of assuming risks reap the corresponding rewards.

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## Project Finance Characteristics

- Ring Fenced Project
  - Usually an new project.
  - Legally and economically self-contained; the only business is the project.
  - Project is not exposed to risks outside and project cannot rely on financial support if things go wrong.
  - High ratio of debt to capital and long debt term.
  - No guarantees other than the cash flow after the project begins operation.
  - Lenders rely on the cash flow of the project, rather than the value of the assets or the ability to re-finance.
  - The project has a definite life.

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## Project Finance has evolved

- Independent power projects once dominated PF debt
- Projects now incorporate commodity price risk into the picture instead of requiring fixed-price contracts.
- Some projects do not even require:
  - off-take contracts
  - supply contracts

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## Typical Project Finance Terminology

- Developers
- Sponsors
- Contractors
- Special Purpose Vehicle (SPV)
- EPC Contract
- Product Off-takers
- Debt Service Reserve Account
- Debt Service Cover
- Cash Flow Waterfall
- Concession Agreements
- Export Credit Agencies and International Funding Agencies

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## Project Finance and Risk

- A key aspect of project finance is the management of risk amongst parties.
  - The risk management is governed by numerous contracts including the loan agreement.
  - Risk can be allocated to parties who are best able to accept it and have an incentive to control it.
  - Risks are explicitly addressed and affect the gearing or leveraging of the project
  - Conflict of interest between role as sponsor and contractor must be identified.

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## Project Finance

- An Example of What is not Project Finance
  - Bank provides a loan associated with building a specific project, but the firm that is building the project has many assets and a diversified revenue stream

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## Project Finance

- An Example of What is Project Finance
  - Bank finances a SPV that will build and operate a project
  - SPV has off-take contract with an end-user
  - Length of contract covers the loan, which amortizes over the life of the contract
  - If the contract is terminated, the end-user is required to purchase the assets at a price related to the value of the underlying contract
  - Could have construction risk and/or operational/technology risk and/or market/price risk

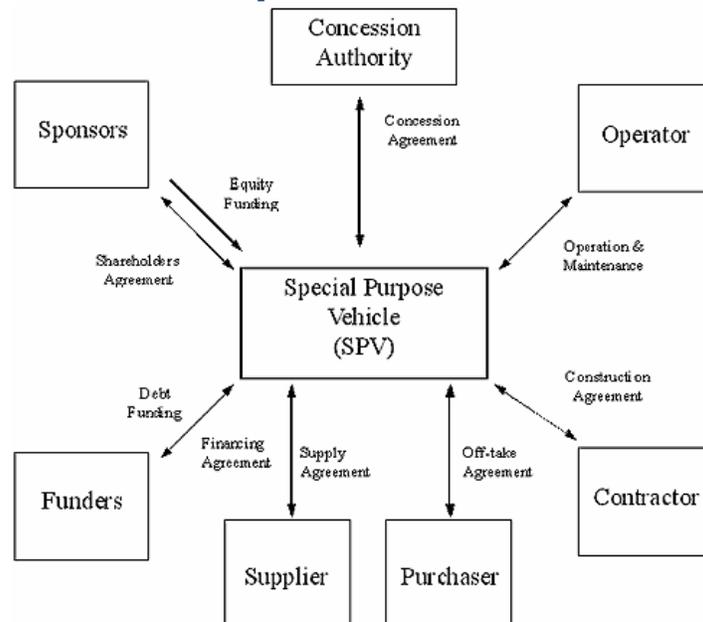
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## Project Finance: Corporate Structure and Contract Overview



## Diagram of Project Finance and Special Purpose Vehicle



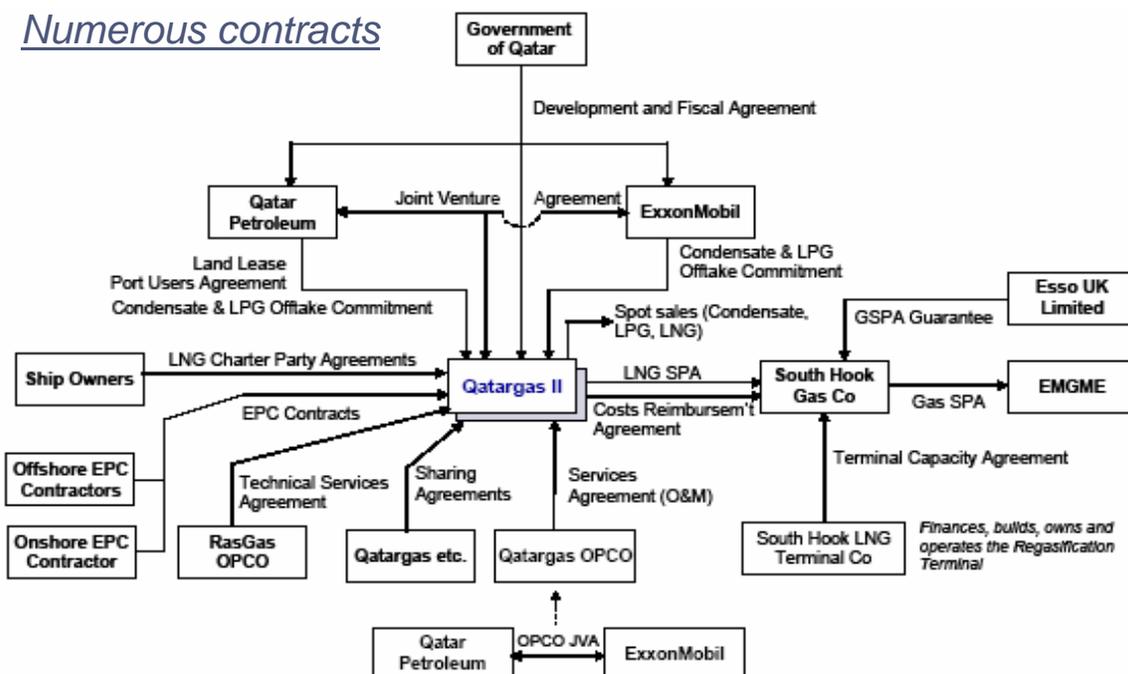
## Qatargas II LNG Project

- Joint Venture between Qatar Petroleum (70%) and ExxonMobil (30%)
- World-scale and multi-product
- \$9.3 billion two-train financing with Train I targeting the UK gas market
  - Debt: \$6.5 billion; Equity: \$2.8 billion
- Output (Two-Trains):
  - 15.6 MTPA of LNG (approx. 12% of current global production)
  - 6 MMTA of Condensates
  - 1.7 MMTA of LPG

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## Qatargas II LNG Project (contd.)

### Numerous contracts



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## Qatargas II LNG Project (contd.)

- Due to integrated nature of the project, credit analysis needs to consider entire LNG supply chain
  - Upstream development and liquefaction: QP & ExxonMobil are sponsors (project also relies on certain shared facilities)
  - Shipping: Charter Agreements (8 Large LNG vessels per train, financed separately)
  - Regasification Terminal (South Hook, Wales, UK): QP (70%), ExxonMobil (30%) with £600 million in debt financing (including £180 million in ExxonMobil sponsor loan)
  - Gas Offtaker: ExxonMobil Gas Marketing Europe (EMGME)
    - Volume commitment; price risk to Project
  - Condensate & LPG marketing
    - Volume commitment; price risk to Project

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## Qatargas II: Debt Financing

- Highly Successful: Despite complexity and size of the project, financing was arranged in one year and resulted in attractive pricing and generous tenors
- Commercial Bank Facility
  - \$3.6 billion, 15 years
  - Pricing: 50 bp (yrs 1-5) rising to 125 bp (yrs 13-15)
- Islamic Facility
  - \$530 million, 15 years
  - Structured to mimic Bank Facility
- ECA-Guaranteed Facilities
  - \$805 million, 16.5 yrs (SACE: \$400 million at 21bp, US Ex-Im: \$405 million at 2 bp)
- ExxonMobil Sponsor Loan
  - \$1.9 billion (as mirror facilities)

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## Qatargas II LNG Project (contd.)

- Cashflow Waterfall
  - Project Revenue net of regasification, UK system entry, and marketing costs
    - Less: Qatari Royalties
    - Less: Shipping Costs and Upstream/Liquefaction O&M Expenses
    - Less: Qatari Corporate Income Taxes
    - Plus: Deferral of Bank/Islamic Debt Service (if any)
  - Cash Flow Available for Senior Debt Service
    - Less: Senior Debt Service
    - Less: Funding of Debt Service Reserve Account
  - Cashflow available for Equity (transferred to Offshore Borrower Distribution Account) can be released to Sponsors if certain criteria are met (e.g., DSCR needs to be higher than an agreed upon level)

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## Qatargas II: Allocation of Key Risks

- UK gas price risk borne by project and, therefore, its lenders
- Volume risk passed through to EMGME via a 25-year offtake agreement backed by ExxonMobil credit support
- Development and construction risks associated with the liquefaction plant and new downstream infrastructure (ships and regasification terminal) transferred to project sponsors through a financial completion test
  - Provisions of the completion test include liquefaction, shipping and regasification (at the South Hook terminal) of a defined LNG cargo
- Project has option to borrow under defined scenarios and parameters (e.g., for expansion purposes)

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