



# Making better decisions about the risks of capital projects

**A handful of pragmatic tools can help managers decide which projects best fit their portfolio and risk tolerance.**

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Never is the fear factor higher for managers than when they are making strategic investment decisions on multibillion-dollar capital projects. With such high stakes, we've seen many managers prepare elaborate financial models to justify potential projects. But when it comes down to the final decision, especially when hard choices need to be made among multiple opportunities, they resort to less rigorous means—arbitrarily discounting estimates of expected returns, for example, or applying overly broad risk premiums.

There are more transparent ways to bring assessments of risk into investment decisions. In particular, we've found that some analytical tools commonly employed by oil and gas compa-

nies can be particularly useful for players in other capital-intensive industries, such as those investing in projects with long lead times or those investing in shorter-term projects that depend on the economic cycle. The result can be a more informed, data-driven discussion on a range of possible outcomes. Of course, even these tools are subject to assumptions that can be speculative. But the insights they provide still produce a more structured approach to making decisions and a better dialogue about the trade-offs.

Some of the tools that follow may be familiar to academics and even some practitioners. Many companies use a subset of them in an ad hoc fashion for particularly tricky decisions. The real

power comes from using them systematically, however, leading to better decisions from a more informed starting point: a fact-based depiction of how much a company’s current performance is at risk; a consistent assessment of each project’s risks and returns; how those projects compare; and how current and potential projects can be best combined into a single portfolio.

**Assess how much current performance is at risk**

Companies evaluating a new investment project sometimes rush headlong into an assessment of risks and returns of the project alone without fully understanding the sources and magnitude of the risks they already face. This isn’t surprising, perhaps, since managers naturally feel they know their own business. However, it does undermine their ability to understand the potential results of a new investment. Even a first-class evaluation

of a new project only goes so far if managers can’t compare it with the status quo or gauge the incremental risk impact.

Consider, for example, what happened when managers at one North American oil company were evaluating a new investment. When they quantified the company’s existing risk from commodity-price uncertainty, transport congestion, and regulatory developments, they realized their assumptions were overly optimistic about future cash flow in the new investment. In fact, in a range of possible outcomes, there was only a 5 percent chance that performance would meet their base-case projections. Moreover, once they mapped likely cash flows against capital requirements and dividends, managers were alarmed that they had only a 5 percent chance of meeting their capital needs before the project’s fourth year and on average wouldn’t meet them

Exhibit 1

**Overoptimistic assumptions of performance masked a high likelihood of falling short of cash.**

Projected cash flows vs. cash needs, \$ billion

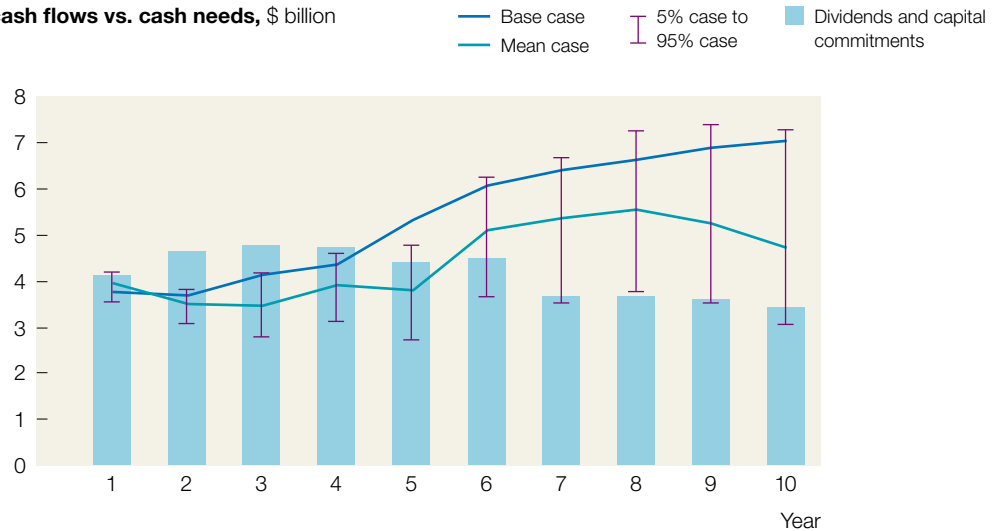
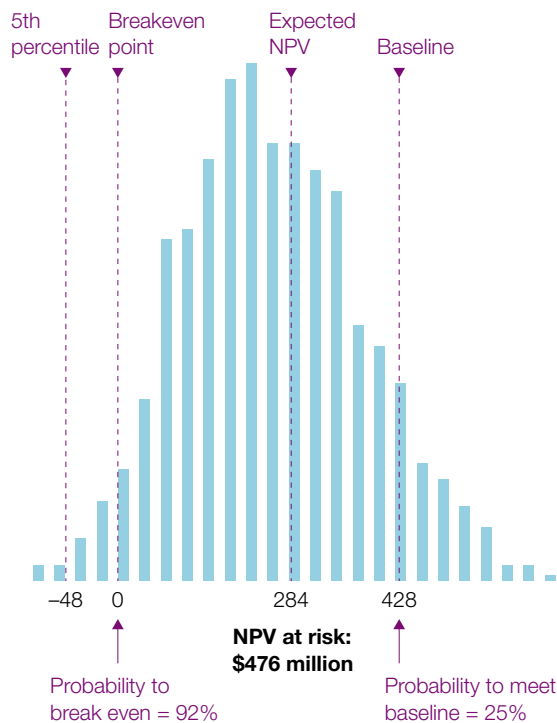


Exhibit 2

**Each project should be characterized in a simple overview of risk-based economics.**

**Net-present-value (NPV) distribution, \$ million**



**Key metrics**

	Baseline metrics	Risk-corrected metrics
Capital expenditure, \$ million	1,974	2,221
NPV, \$ million	428	284
Internal rate of return, %	18.5	16.8
Payback period, years	10	10.9
Return on capital	NPV/I, <sup>1</sup> %	33
	RAROC, <sup>2</sup> %	16

**Key decomposition**

Key risks	NPV at risk, \$ million
Capital-expenditure overrun	347
Crude price	310
Execution delay	35

<sup>1</sup> Ratio of NPV to investment.

<sup>2</sup> Risk-adjusted return on capital = (expected NPV)/(planned investment + NPV at risk).

until year six (Exhibit 1). Fortunately, managers were able to put the insight to good use; they modified their strategic plan to make it more resilient to risk.

**Evaluate each project consistently**

Once managers have a clear understanding of the risks of their current portfolio of businesses, they can drill down on risks in their proposed projects and eliminate the need—and the temptation—to adjust net present value (NPV) or risk premiums arbitrarily. What’s needed is a

more consistent approach to evaluating project economics and their risks, putting all potential projects on equal footing. The cornerstone for such an approach at one Middle Eastern oil company, for example, is a standardized template for project evaluation that features three main components: a project’s risk-return profile at a glance, shown as a probability distribution of project value; an overview of standardized summary metrics for risk and return; and an explicit description of the sources of risk (Exhibit 2). The project team specifies the basic economic drivers of the

project, but the central strategic-planning and risk departments prescribe consistent key assumptions, help to assess and challenge the risks identified, and generally ensure that the method underlying the analysis is robust.

This approach is pragmatic rather than mechanical. A corporate-finance purist might challenge the idea of a probability distribution of discounted cash flows and the extent to which a chosen discount rate accounts for the risk already, but in practice, simplicity and transparency win over. The project displayed in Exhibit 2 is one where the economics are clearly worse than in the original baseline proposal; indeed, this project is only 25 percent likely to meet that baseline. Nevertheless, it has more than a 90 percent chance of breaking even. And even after taking into account the potential need for additional investment after risks materialize, the project has attractive returns.

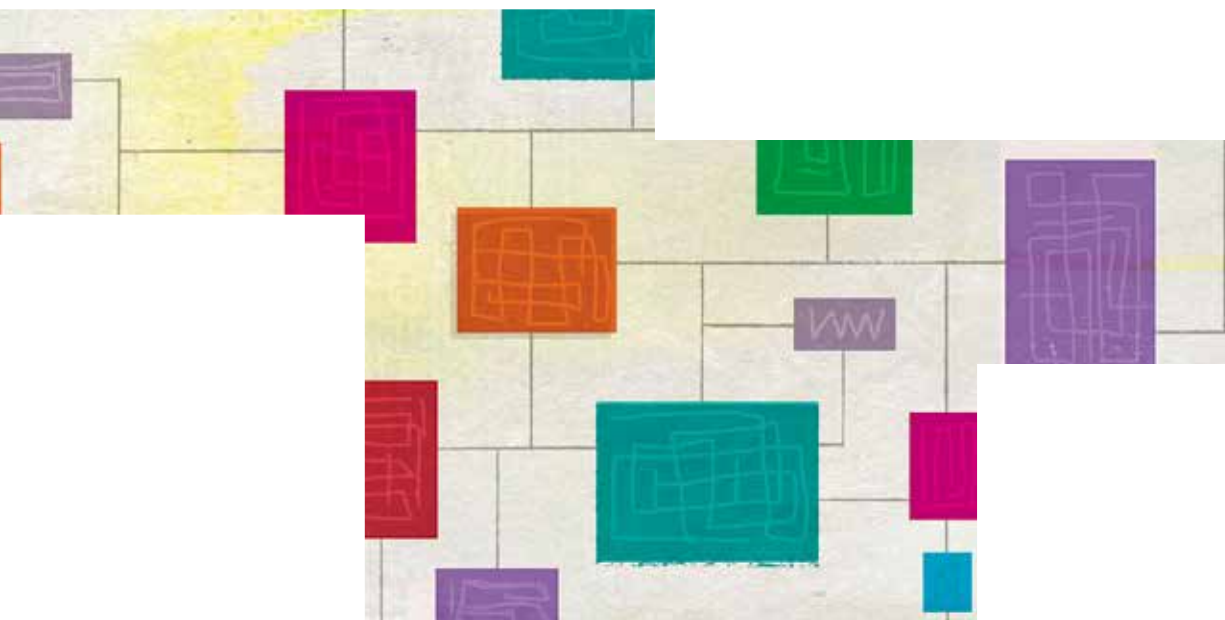
Making this extra information about the distribution of outcomes available shifts the dialogue from the typical go/no-go decision to a deeper

discussion about how to mitigate risk. In this case, it is clearly worth exploring, for example, how to reduce the likelihood of overruns in capital expenditures in order to shift the entire probability distribution to the right. This is likely considerably easier to achieve if started early.

### **Prioritize projects by risk-adjusted returns**

The reality in many industries, such as oil and gas, is that companies have a large number of medium-size projects, many of which are attractive on a stand-alone basis—but they have limited capital headroom to pursue them. It isn't enough to evaluate each project independently; they must evaluate each relative to the others, too.

It's not uncommon for managers to rank projects based on some estimate of profitability or ratio of NPV to investment. But since the challenge is to figure out which projects are most likely to meet expectations and which might require much more scarce capital than initially anticipated, a better approach is to evaluate them based on a risk-adjusted ratio instead. At one multinational downstream-focused oil company, managers



put this approach into practice by segmenting projects based on an assessment of risk-adjusted returns and then investing in new projects up to the limit imposed by the amount of capital available (Exhibit 3). The first couple of iterations of this process generated howls of protest. Project proponents repeatedly argued that their pet projects were strategic priorities—and that they urgently needed to go ahead without waiting until the system fixed all the other projects’ numbers.

The arguments receded as managers implemented the process. Projects that clearly failed to meet their cost of capital—the lowest cutoff for risk-adjusted returns—were speedily declined or sent back to the drawing board. Those that clearly

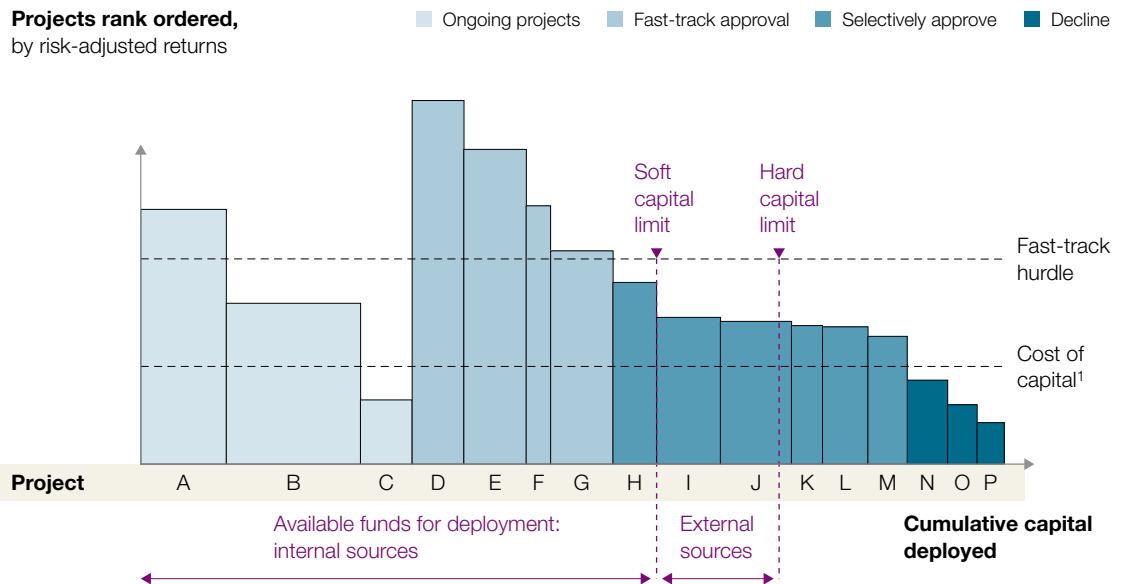
met an elevated hurdle rate were fast-tracked without waiting for the annual prioritization process. Projects in the middle, which would meet their cost of capital but did not exceed the elevated hurdle rate, were rank ordered by their risk-adjusted returns. For these projects, ad hoc discussion can shift the rank ordering slightly. But, more important, the exercise also quickly focuses attention on the handful of projects that require nuanced consideration. That allows managers to decide which ones they can move forward safely, taking into account their risk and the constraints of available capital.

**Determine the best overall portfolio**

The approach above works well for companies that seek to choose their investments from a large

Exhibit 3

**Rank order projects by risk-adjusted returns to identify which projects to fast-track and which to decline.**



<sup>1</sup> Weighted average cost of capital typically adjusted to eliminate double counting.

number of similar medium-size projects. But they may face opportunities quite different from their existing portfolio—or they must weigh and set project priorities for multiple strategies in different directions—sometimes even before they’ve identified specific projects. Usually this boils down to a choice between doubling down on the kinds of projects the company is already good at, even if doing so increases exposure to concentrated risk, and diversifying into an adjacent business. Managers at another Middle Eastern energy company, for example, had to decide whether to invest in more upstream projects, where they were currently focused, or further develop the company’s nascent downstream portfolio. Plotting the options in a risk-return graph allowed managers to visualize the trade-offs of different

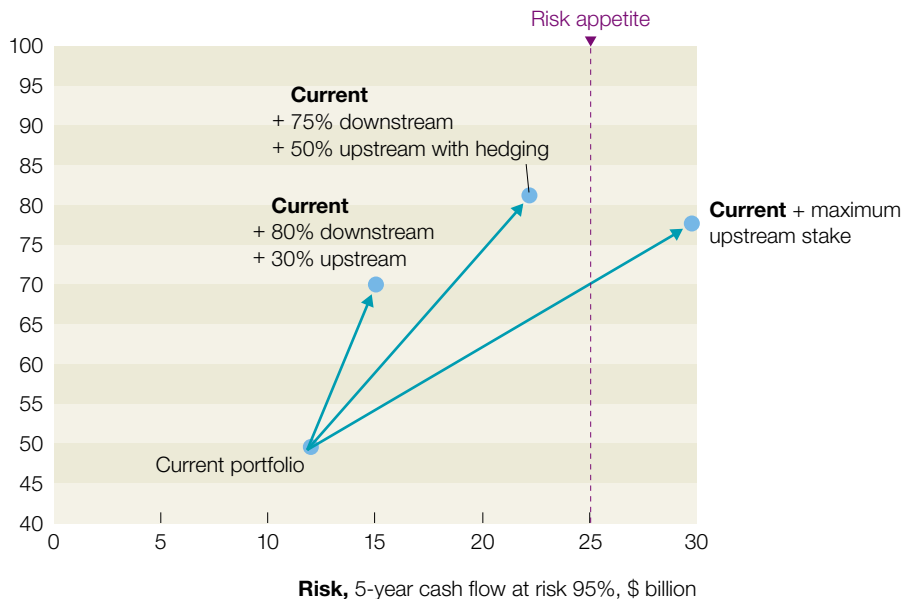
combinations of upstream and downstream portfolio moves (Exhibit 4).

In this case, doubling down on upstream investments would have generated a portfolio with too much risk. Emphasizing the downstream, with only a slight increase in upstream activity, improved on the status quo, but it left too much value on the table. Through the exercise, managers discovered that a moderate amount of commodity hedging to manage margin volatility would allow the company to combine a reduced upstream stake with a significant downstream one. The risks of the upstream and downstream investments were quite diversified—and thus the company was able to pursue a combined option with a more attractive risk-return profile than either option alone.

Exhibit 4

### Which set of strategic moves offers the best returns with the right balance of upstream and downstream risk?

Return, 5-year operating cash flow, \$ billion



The power of the approach lies in nudging a strategic portfolio decision in a better direction rather than analytically outsourcing portfolio construction. Managers in this case made no attempt, for example, to calculate efficient frontiers over a complex universe of portfolio choices. Oil companies that have tried such efforts have often given up in frustration when their algorithms suggested portfolio moves that were theoretically precise but unachievable in practice, given the likely response of counterparties and other stakeholders.

Managing risk (and return) in capital-project and portfolio decisions will always be a challenge. But with an expanded set of tools, it is possible to focus risk-return decisions and enrich decision making, launching a dialogue about how to proactively manage those risks that matter most in a more timely fashion. ○

