

Firms' Investment Decisions and Interest Rates

Kevin Lane and Tom Rosewall*

Firms typically evaluate investment opportunities by calculating expected rates of return and the payback period (the time taken to recoup the capital outlay). Liaison and survey evidence indicate that Australian firms tend to require expected returns on capital expenditure to exceed high 'hurdle rates' of return that are often well above the cost of capital and do not change very often. In addition, many firms require the investment outlay to be recouped within a few years, requiring even greater implied rates of return. As a consequence, the capital expenditure decisions of many Australian firms are not directly sensitive to changes in interest rates. Furthermore, although both the hurdle rate of return and the payback period offer an objective decision rule on which to base expenditure decisions, the overall decision process is often highly subjective, so that 'animal spirits' can play a significant role.

Introduction

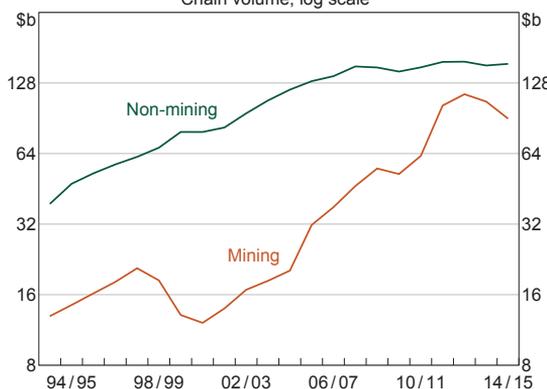
In real terms, non-mining business investment in Australia has been little changed for several years (Graph 1). In nominal terms, it is at a low level as a share of GDP compared with its history. Relatively low levels of investment outside of the resources sector was one of the ways in which the Australian economy accommodated the unprecedented boom in commodity prices and the associated strong increase in mining investment over much of the past decade. Mining investment peaked in mid 2012 and although there has been modest growth of economic activity in the non-mining sector in recent years, non-mining business investment has remained subdued. Many other advanced economies have also experienced sustained weakness in business investment since the late 2000s.

Several reasons have been put forward to explain the ongoing weakness in business investment both here and abroad, including weak demand, heightened uncertainty and low business confidence.¹ These

* The authors are from Economic Analysis Department.

1 See Kent (2014) for a discussion of the possible constraints on non-mining business investment in Australia and IMF (2015) for a discussion of subdued private investment activity across advanced economies more generally.

Graph 1
Private Business Investment
Chain volume, log scale*



* Reference year is 2012/13; RBA estimates for 2014/15 as at May 2015 *Statement on Monetary Policy*

Sources: ABS; RBA

themes also feature in discussions about firms' investment intentions with contacts in the Bank's business liaison program.² Moreover, many contacts

2 The Reserve Bank business liaison team conducts around 70–80 discussions with contacts on a monthly basis. Discussions with individual firms occur around every 6 to 12 months, with Bank staff usually meeting the chief executive officer, chief financial officer and/or operations manager. Liaison meetings are held with firms of all sizes, although most discussions are with mid-sized and large firms where conditions are somewhat more likely to reflect economy-wide trends rather than firm-specific factors. For more information, see RBA (2014).

have reported that low interest rates do not *directly* encourage investment. In contrast, economic theory suggests that the rate of interest affects the cost of capital and should influence investment decisions directly, based on standard methods used to evaluate investment opportunities.

Detailed discussions with business liaison contacts reveal why lower interest rates might not have any direct effect on investment, even at the margin. Contacts indicate that required rates of return on capital expenditure, also referred to as 'hurdle rates', are often several percentage points above the cost of capital. More importantly, contacts note that the hurdle rate is often held constant through time, rather than being adjusted in line with the cost of capital. Regardless of whether changes in interest rates have a *direct* effect on investment decisions, interest rates will still have a powerful *indirect* influence on firms' investment decisions through other channels, including their effect on aggregate demand.

The Investment Decision

The appraisal process for capital expenditure usually varies according to the objective of the investment opportunity. Some capital expenditure may be approved without the use of quantitative criteria, particularly if it relates to maintenance, reducing pollution, improving safety or security, or complying with regulations. But, in general, discretionary capital expenditure is subject to quantitative evaluation, with the level of scrutiny determined by the size of the investment, its perceived riskiness and managers' attitudes towards risk. Typical evaluation methods used include discounted cash flow (DCF) analysis and the payback period. Both methods need an assessment of future cash flows that will be generated by the investment. This requires a range of inputs (e.g. projected sales, operating costs, taxes, etc), many of which are uncertain. Businesses typically use the most likely cash flows in each period, though the expected value of cash flow, calculated as a probability weighted average, is also used.

Discounted cash flow analysis

DCF analysis is a standard method recommended by finance theory to evaluate investment opportunities. The method proposes that the investment decision should be made with reference to the estimated net present value (*NPV*) of the opportunity, which is the sum of all cash flows (*CF_t*) resulting from the investment, discounted using the firm's chosen discount rate (*i*):

$$NPV = \sum_{t=0}^N \frac{CF_t}{(1+i)^t} \quad (1)$$

In the simplest case, the firm should invest if the *NPV* is positive for the chosen discount rate; put differently, the project should be approved if the internal rate of return of the project is above this specific discount rate.³ Because it provides a natural threshold to accept or reject investment decisions, the discount rate used in DCF analysis is often called the 'hurdle rate'.

Theory suggests that the hurdle rate for a typical investment should be set with some reference to the firm's weighted average cost of capital (*WACC*), which includes the cost of both debt and equity. For example, the level of the hurdle rate may be greater than the *WACC* if the potential investment has greater non-diversifiable risk than the overall operations of the firm. The extent of such a gap will also depend on the extent to which managers and shareholders are averse to risk. Changes in interest rates influence the cost of debt and, under reasonable assumptions, the cost of equity, and so should influence the hurdle rate.

Payback period

Firms may also evaluate investment decisions using the payback period, which is simply the number

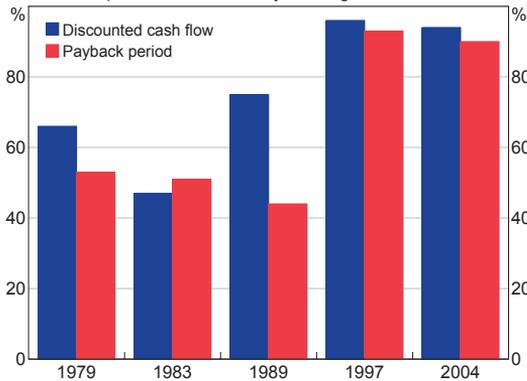
³ In practice, firms often have the option to defer investments to learn more about the economic environment. The ability to wait can be valuable because it may allow firms to avoid loss-making investments. In this case, the simple *NPV* decision rule does not apply: the firm should invest only when doing so provides returns in excess of the sum of the outlay plus forgoing the option value of waiting. This line of reasoning calls for the use of real options analysis; see Dixit and Pindyck (1994).

of years it would take for the capital outlay to be returned by the cash flows generated by the project. Although the payback period is intuitive and easy to communicate, it does not take into account the time value of money and ignores cash flows beyond the chosen cut-off date.

Evidence from Australian Firms

A typical firm in the Bank's liaison program evaluates discretionary capital expenditure by using DCF analysis, and also by considering the payback period as a supporting consideration. This is in line with the evidence from other advanced economies such as the United States and the United Kingdom (see below) and is also in line with earlier survey evidence for Australia. For instance, a survey of Australian firms conducted by academics in 2004 also found that the vast majority of firms used both methods, which, according to other surveys, had become more popular over the preceding decades (Graph 2).

Graph 2
Capital Budgeting at Australian Firms
 Proportion of firms surveyed using each method



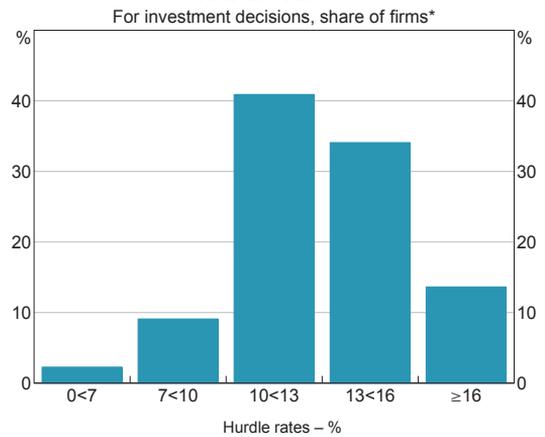
Sources: Freeman and Hobbes (1991); Kester *et al* (1999); Lilleyman (1984); McMahon (1981); Truong, Partington and Peat (2008)

Discounted cash flow analysis

Liaison contacts indicate that the hurdle rates used to evaluate business investment opportunities are often several percentage points above the WACC. Hurdle rates of around 15 per cent are quite common, though the range of rates reported is relatively wide, from a little less than 10 per cent up to 30 per cent.

These observations are broadly in line with recent evidence from the Deloitte CFO Survey, which found that nearly 90 per cent of the Australian corporations that responded used hurdle rates exceeding 10 per cent, and around half of the corporations used a hurdle rate exceeding 13 per cent (Deloitte 2014; Graph 3). Liaison contacts reason that the hurdle rate is often set above the cost of capital to account for uncertainty about the cash flow projections. Contacts also note that there is likely to be an optimism bias in these cash flow projections. As a result, setting a hurdle rate above the cost of capital is likely to improve the chances that investments add value to the firm on a risk-adjusted basis.⁴

Graph 3
Hurdle Rates

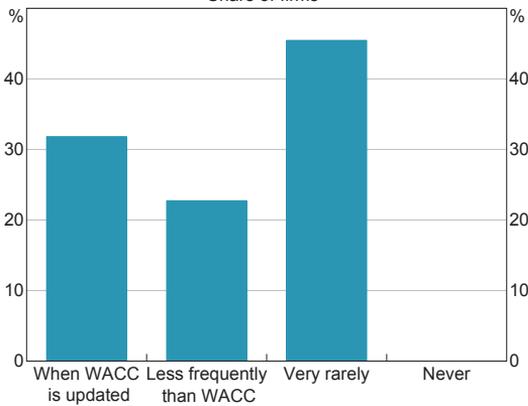


* Excluding firms that do not use a hurdle rate
 Sources: Deloitte CFO Survey; RBA

Many liaison contacts also report that hurdle rates are not changed very often and in some instances have not been altered for at least several years. These observations are also reflected in the recent survey by Deloitte; two-thirds of corporations indicated their hurdle rate was updated less frequently than their formal review of the WACC, and nearly half reported the level of their hurdle rate was changed 'very rarely' (Graph 4). For these firms, changes in

4 Adjusting for risk by using a higher discount rate rather than by probability weighting the cash flows introduces a bias against longer-term projects, since the present value of a longer-dated cash flow is more sensitive to changes in the discount rate.

Graph 4
Frequency of Hurdle Rate Changes
 Share of firms*



* Excluding firms that do not use a hurdle rate
 Sources: Deloitte CFO Survey; RBA

interest rates do not flow through to hurdle rates; rather, the margin between the WACC and the hurdle rate changes. One-third of firms said they update their hurdle rate when they review their WACC, which is possibly on a quarterly or annual basis; other contacts in the liaison program have also noted the WACC used in investment decisions is similarly reviewed infrequently.

Liaison contacts have provided several reasons why the hurdle rate may not be sensitive to the cost of capital. A common observation is that the true cost of equity, and therefore the overall cost of capital, cannot be observed.⁵ Managers have also noted that changes in the observed cost of debt owing to changes in interest rates are likely to be temporary, and so they are reluctant to react to developments that may soon be unwound. A few business contacts have argued that keeping the hurdle rate constant acts as an automatic time-varying risk adjustment: interest rates tend to be low when uncertainty is high, so the gap between the hurdle rate and the cost of

capital should be higher (and vice versa). There are two additional reasons why the net present value is not particularly sensitive to unit changes in the hurdle rate. First, a unit change in the hurdle rate will have less effect on the net present value when that rate is set well above the cost of capital. Second, firms often ignore cash flows that are some distance in the future (say, beyond five years), and the present values of these later cash flows are more interest sensitive.

For some firms, moving the hurdle rate by a percentage point or more would be immaterial to the decision process, since accepted investments tend to have much higher returns. Many contacts report that projects with a rate of return above the hurdle rate were often rejected anyway. This may be because the payback period was too long or because of other considerations (see below). These reasons suggest that managers might value the option to defer an investment until its expected net present value is greater. In the absence of more sophisticated analysis, using a hurdle rate in excess of the WACC may be a reasonable approach to account for this option value of waiting (McDonald 2000).

Discussions with managers have shown that there are several reasons why small changes in the cost of capital may not warrant changes in a firm's hurdle rate. Some managers indicate that changes to the hurdle rate may send the wrong message to staff proposing projects about the overall risk tolerance of the firm. Others indicate that changes in the hurdle rate require board approval, which introduces stickiness. However, in many instances it appears that firms are using hurdle rates that have not changed in a long time, set at a time when nominal long-term interest rates were far higher than they are today. Whether explicit or not, such behaviour is consistent with a reduced appetite for risk or the possibility that risks have increased.

Payback period

The payback period is used extensively by firms in Australia. In liaison, the most common payback period reported by contacts is three years, though

5 In general, managers of listed firms appear to use the capital asset pricing model (CAPM) as their primary measure of the cost of equity. Similar results have been found for US and European firms (Graham and Harvey 2001; Brounen, de Jong and Koedijk 2004). As several liaison contacts have noted, the cost of equity implied by CAPM will be sensitive to the estimation sample period and method. In addition, other measures of the cost of equity could provide different results.

not all contacts that use the method use a fixed value. Some firms have reported a period of less than three years for at least some types of capital expenditure, including target periods of 12 months, implying very high required rates of return for a given capital outlay. In some cases, firms have reduced their maximum payback period in recent years. Contacts often report using the payback period in conjunction with DCF analysis and smaller firms sometimes rely on the payback method exclusively.

Liaison contacts cite various reasons for using the payback period, despite its theoretical shortcomings, in addition to DCF analysis:

- Firms place a premium on recouping cash. In liaison, this reason has been used by both financially constrained and unconstrained firms. For example, strongly performing firms have explained that they use the payback period to help ensure that they retain their high credit rating.⁶
- There is greater uncertainty around cash flows that are further into the future.⁷
- The cash flow forecasts used by project proponents in DCF analysis are often considered to be optimistic by their managers. In effect, the payback period adds another buffer to the hurdle rate to increase the likelihood that investment projects generate a return in excess of the cost of capital.
- There are more projects with expected returns exceeding the notional hurdle rate than the firm wishes to pursue. Firms view the payback period as an efficient method to screen projects, especially when the ultimate decision-maker in the firm has less information than those proposing the project.

6 In a large-scale survey of US chief financial officers, Graham and Harvey (2001) found the firm's credit ratings to be a chief concern. Graham and Harvey also found no evidence that use of the payback period was related to a firm's financial position or performance.

7 Although, under DCF analysis, greater uncertainty around cash flows that are further into the future is accounted for, at least in part, by the greater effect of discounting on these cash flows.

Other considerations

It is clear from discussions with managers that the overall investment decision process is often highly subjective, introducing a role for 'animal spirits' or 'gut feeling' to have an important effect on capital expenditure decisions. This is not surprising, given that future cash flows generated for the quantitative criteria discussed are often difficult to forecast and hence rely on subjective input from project proponents. However, many contacts have reported that projects satisfying quantitative criteria have been rejected anyway because of other constraints, including strategic considerations, heightened risk aversion, a restricted capital budget imposed by higher levels of management or the global parent company, limited resources to deploy projects or shareholder perceptions.

Evidence from Other Advanced Economies

The available evidence suggests that firms in other advanced economies undertake investment decisions using similar criteria employed by Australian firms. Surveys have found that firms in the United States and Europe tend to evaluate proposed investments using discounted cash flow techniques, which have become more popular over the past few decades, and the payback period.⁸

Studies of firms overseas have found that they also use hurdle rates that are above their cost of capital. Jagannathan, Meier and Tarhan (2011) surveyed firms in the United States in 2003 and found that a typical firm used a hurdle rate several percentage points above its WACC. Brunzell, Liljebloom and Vaihekoski (2013) found a similar result for Nordic firms. Similarly, firms in other countries also appear to use hurdle rates that are not sensitive to the cost

8 See Graham and Harvey (2001) for a discussion of North American firms and Brounen *et al* (2004) for a study of European firms.

of capital.⁹ Sharpe and Suarez (2013) drew on several surveys to conclude that the average hurdle rate of US firms has not changed since the mid 1980s, even though there has been a marked decline in long-term nominal interest rates over the past three decades.

Several surveys have confirmed that the payback period remains popular among firms in other advanced economies. As in Australia, a payback period of around three years is common for firms in the United States and the United Kingdom (Lefley 1996).

Implications for Business Investment

Analysis of the investment decision process helps to explain the subdued growth of non-mining business investment. First, there is some evidence of a tightening in investment criteria since the global financial crisis. For example, some firms have reduced their maximum payback period, suggesting implied discount rates for investment decisions may have increased even as long-term interest rates declined. Second, identifying investment opportunities with returns exceeding the typical hurdle rate of around 15 per cent may be difficult for many firms given their expectations for the growth of their sales.

It is clear from discussions with liaison contacts that the overall decision process is highly subjective, which in turn allows 'animal spirits' to play a role. As noted, firms frequently reject investment decisions that satisfy self-imposed quantitative criteria on other grounds, such as concerns about the economic outlook, the availability of capital within the company, or shareholders' preferences. Some managers have noted that they have taken a more cautious approach to capital expenditure since the financial crisis, either because there is more uncertainty about the future or they are more averse

to taking risks. As a consequence, firms with a range of opportunities may only be willing to pursue the most profitable projects in the current economic environment.

Although changes in interest rates may not have a *direct* effect on investment decisions for many firms, interest rates will still have a powerful *indirect* influence on firms' investment decisions. For example, a reduction in interest rates may improve firms' cash flows through reductions in interest payments, freeing up cash for other purposes. More broadly, interest rates affect economic activity via a number of channels, including the saving and spending behaviour of households, the supply of credit, asset prices and the exchange rate, all of which affect the level of aggregate demand.

Conclusion

Contacts in the Bank's business liaison program have reported a range of reasons for the subdued level of non-mining investment, though they typically state that low interest rates do not by themselves encourage investment. Detailed discussions with managers and survey evidence indicate that the lack of direct interest rate sensitivity partly arises because Australian firms typically use effective discount rates that are high and sticky to evaluate capital expenditure opportunities. This reflects the use of hurdle rates that are considerably higher than the weighted average cost of capital and are adjusted infrequently, or a requirement that any outlay must be expected to be recouped within a few years. ❖

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⁹ The phenomenon of firms using very high hurdle rates was noted even earlier by Shackle (1946), following a series of interviews with business managers conducted by the Oxford Economists' Research Group: see Besomi (1998).

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