Mandatory management forecasts and lender expectations management

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Abstract: The objective of this study is to broaden the existing literature on management forecasts by examining how managers respond in terms of forecast characteristics once they are subject to debt monitoring after project finance (PF) approval. Examining a large sample of mandatory management forecasts of quarterly expenditure disclosed by early stage mining companies, we find PF approval results in managers increasing overestimates of cash outflows or creating 'budget slack'. This is consistent with forecasts serving to manage expectations of lenders, signalling lower risk of cost-overruns during the mine development and construction phase.

Keywords: Mandatory management forecasts, project finance, expectations management

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1. Introduction

Prior literature suggests expectations management is a primary motive for management forecasts (Cotter, Tuna and Wysocki, 2006; Kato, Skinner and Kunimura, 2009). These studies consider management forecasts used as a tool to manage the expectations of analysts and investors. The objective of this study is to broaden the existing literature on management forecasts by examining how managers forecast characteristics change in order to manage lender expectations. To small mining companies without internal sources of finance, debt finance and ongoing support of the lender is critical to developing high-risk projects, without which project development, production and cash flow generation are not possible. To this extent, managers of small companies have added incentives to manage (meet) expectations of project financiers and to manage forecasts accordingly.

There is a paucity of research on the impact of leverage and more specifically the introduction of lender monitoring on management forecasts, but prior studies suggest that greater leverage should improve forecast accuracy owing to monitoring benefits (Hutton, Lee and Shu, 2012). However, Hutton *et al*. (2012) suggest that managers in high information asymmetry settings (where managers have an information advantage) may choose to issue less accurate forecasts where they have incentives to do so (*p*. 1,218). We argue the receipt of Project Finance (PF) approval changes managers' incentives in terms of both forecast accuracy and bias such that managers are motivated to meet the expectations of the new lender. It is likely that the new lender is the target of this expectations management due to the limited analyst coverage of small mining companies (Brown, Feigin and Ferguson, 2014) and high information asymmetry present in firms previously all equity financed (Grossman and Hart, 1982).

Our study is motivated by the lack of prior research on the effects of introducing debt finance into the capital structure of small firms and implications for forecast characteristics. We draw a

distinction between incentives of managers in large firms to manage expectations of analysts and investors subject to prior study (Hutton, Lee, Shu, 2012; Cotter, Tuna and Wysocki, 2006; Kato, Skinner and Kunimura, 2009) and those incentives of managers of small firms without a credit history obtaining PF approval (Diamond, 1991). Accordingly, we might expect different forecast characteristics in this alternative setting. We consider two research questions. Firstly, we examine how PF approval impacts mandatory cash flow forecast accuracy and bias. Secondly, we consider the likely duration of these effects.[1]

To examine these questions, we use a large sample of mandatory management forecasts of expected future cash outflows related to operating activities payments disclosed by early-stage (pre-production) mining firms known as Mining Exploration Entities (MEEs) in Australia.[2] Notably, managers of MEEs are required to forecast only cash outflows related to operating activities given their pre-production status. Although cash flow forecasts are a critical component of successful investing (Goodman *et al*., 2013), they are not typically directly observable by external stakeholders. Our setting is unique in that there are mandatory quarterly forecasts of operating cash flows. Prior research has found it challenging to disentangle voluntary disclosure choices and management forecast quality due to self-selection effects associated with managers voluntarily providing earnings forecasts (*e.g.*, Lennox and Park, 2006; Bamber *et al*., 2010; Goodman *et al*., 2013; Lennox *et al*., 2011). The presence of mandatory management forecasts of cash flows, however, allows us to consider forecast quality without potential concerns caused by choice to provide management forecasts.

[1] In a prior working paper version, Hutton et al. 2012 suggest that such incentives may play a more important role in short term forecasts, as opposed to long-horizon forecasts. Our study considers short term forecasts

[2] In this study, payment, cash payment, cash outflow, and cash expenditure are used interchangeably.

We hypothesize that MEEs obtaining PF coincides with the beginning of the mine construction phase, where cost-overruns can be fatal, with frequent examples of failed projects (BMO *et al.*, 2014).[3] Accordingly, we argue that to manage expectations of the lender, managers will follow the old maxim 'under-promise, over-deliver' (Arnold 1986). In practical terms, this suggests managers have incentives to bias forecasts towards providing overestimates of cash outflows (under-promise) for which they can later meet (over-deliver). We further predict that since PF is typically provided in tranches (similar to venture capital funding rounds, e.g., Sahlman, 1990, Gompers and Lerner, 1999), managers' incentives to overestimate will be confined to the period where debt drawdown occurs. This is because managers must meet project development and construction milestones in order to secure a drawdown of further loan tranches to enable project completion and the commencement of cash flow generation in the production phase (Litvak, 2004).[4] Accordingly, we suggest a time period where managing the expectations of the lender is more likely. The possibility that managers may prefer less accurate short-term forecasts should they be incentivized to do so is consistent with suggestions in Hutton *et al.*, (2012).

Using a sample of in excess of 24,000 Appendix 5B filings over the period from July 1996 to 2014, we find that post-PF approval, manager's exhibit increased the propensity to create budget slack (forecast overestimates) while the level of underestimation remains unchanged. Additionally, in terms of duration of this effect, we find that budget slack is most pronounced in the 12 month period following PF approval, a period corresponding with project debt tranche drawdown and construction activity, suggesting that management are most concerned about managing lender

[3] See, for example, the history of the Bulong Nickel Project.

[4] The MEE setting features lower analyst following that may provide managers different incentives concerning their forecasts (Jiang, 2008). Second, pre-production MEEs have high information asymmetry in an industry featuring significant levels of project failure. Also, Australia is a low litigation environment, and there are no plaints of misleading forecasts by MEEs suggesting low potential legal constraints (Baginski, Hassell, and Kimbrough, 2002).

expectations where further debt tranches are yet to be drawn down (the lender retains discretion as to whether this is possible) to enable project construction completion. These results are robust to controlling for selection effects using a propensity score matching approach. These findings shed light on how managers respond in terms of forecast characteristics once they are subject to debt monitoring (*e.g.*, Daley and Vigeland, 1983; Demerjian and Owens, 2016). We interpret this as evidence consistent with the use of forecasts to manage lender expectations and mitigate concerns of cost overruns (Cotter, Tuna and Wysocki, 2006; Kato, Skinner and Kunimura, 2009).

Our setting has a number of other interesting features. Debt finance in the US includes public and private sources. In Australia, however, there is no material public debt market, meaning the main source of debt finance available to most mining projects is private debt.[5] Further, our setting features the mandated disclosure of point, rather than range forecast estimates. This contrasts with prior US literature, which features a dominance of range estimates compared to point estimates (Hutton, Lee and Shu, 2012). Lastly, we examine a setting featuring the existence of management cost forecasts by small firms. This contrasts the prior literature which has a large firm focus and is important owing to the suggestion that in settings where managers have a dominant information set (high information asymmetry), may be incentivized to forecast differently to large firms (Hutton, Lee and Shu, 2012). Further, prior literature has focused on earnings forecasts, whilst in this study, we focus on management forecasts of cash outflows.

The remainder of this paper is organized as follows. Section 2 reviews the background and develops the hypothesis. Section 3 contains the research design, while Section 4 contains the results. Section 5 concludes.

2. Background and hypothesis

[5] A small number of much larger global mining firms are able to access debt markets in the US or Europe, e.g., BHP.

According to BDO, the number of MEE's listed on the ASX as of June 2018 is 705.[6] Excluding foreign listings, the number of ASX listed companies as at June 30th, 2018 was 2012.[7] Thus MEEs typically comprise around 35% of total ASX listed entities. More broadly, the minerals industry accounts for over half of Australia's export earnings. The objectives of MEEs are both homogeneous and straightforward. MEEs raise money through IPO's or SEOs, and after listing (or raising seasoned equity) spend money on exploration activity to make economic resource discoveries. They have simple structures typically with a board of 3-4 persons, which will include a technical director (geologist). Usually, apart from a company secretary, they will have no other employees. MEEs are not equity carve-outs, nor are they subsidiaries of larger mining companies. MEEs typically survive by issuing common or ordinary equity to shareholders (there is no preferred equity issued in this setting). Occasionally, MEEs will issue options over ordinary shares which trade alongside the fully paid shares on the ASX. Investors are typically speculators who are attracted to the high payoffs associated with any discovery and subsequent mine development. The ASX requires MEEs with no product sales to file a quarterly cash flow report called an "Appendix 5B" (an example of an Appendix 5B is provided in Appendix II). These filings are required since January 18th, 1996, and have the objective of assisting the market in understanding the extent to which the entity is achieving its goals by disclosing information about expenditures and cash flow (ASX, 2002, para.7). Guidance Note 31 of the ASX listing rules states that MEEs are classified as such since their '*main business activity is expending funds on mineral exploration and evaluation and have minimal product revenues.*' The Guidance Note defines a 'material mining project' as one in which a listed entity or subsidiary has an economic interest (whether

[6] 'Beneath the Surface Junior Mining Outlook'; BDO Edition 6, November 2018.
[7] ASX Market Statistics. https://www.asx.com.au/about/historical-market-statistics.htm#No%20of%20Companies (Link accessed 20190527).

alone or jointly with others), where that interest is, or is likely to be, material in the context of the overall business operations or financial results of the entity and subsidiaries (on a consolidated basis).[8]

5Bs are required to be filed periodically until an MEE enters production and after that applies to the ASX for permission to file only quarterly activities reports.[9] Under ASX Listing Rule 5.5, Appendix 5Bs must be filed within one month of the end of each quarter (March, June, September, and December). These filings apply to companies defined as MEEs by the ASX as distinct from Mining Producing Entities (ASX Listing Rules, Chapter 19). Thus, 5B filings for MEEs and the forecasts of cash expenditure contained therein are mandatory under ASX listing rules for liquidity risk assessment purposes.[10]

A unique feature of the PF approvals in Australia is a precise time-stamp given to announcements along with a price-sensitive flag under the ASX's continuous disclosure requirements. The price-sensitive flag is due to the materiality of PF approvals for MEEs. The announcements nearly always contain the lender identity, and PF approvals are associated with positive market reactions (Ferguson, Grosse and Lam, 2018). Despite the high-risk nature of

[8] A similar rule applies to non-mining research and development (R&D) companies admitted based on 'commitments test' on or after 1st September 1999 such as pharmaceuticals and biotech firms that are required to file additional cash flow disclosure in the form of the Appendix 4C (4Cs). However, R&D firms are only required to file 4Cs for eight quarters after admission to the official list in order to disclose whether cash raised in an IPO has been spent in a manner consistent with the companies' business objectives (ASX Listing Rule 4.10.19). The 4Cs can be contrasted with 5Bs disclosed by MEEs since 4Cs do not require disclosure of forecasts of cash outflows. Thus, we examine only 5Bs that are required since 7/1/1996 and are not constrained by a 2-year disclosure period limit. MEEs are viewed by the Australian Stock Exchange (ASX) as being high risk and consequently are required to produce additional mandatory management expenditure forecasts (5Bs) as part of their quarterly reporting requirements. Unlike prior studies of mandatory forecasts (where the forecasts are not in the strictest sense mandatory; *e.g.*, Kato *et al.*, 2009), operating cash flow forecasts in MEEs are fully mandated by the ASX, are produced quarterly.

[9] When an MEE progresses to seeking PF, it is common for MEE's to spin off or dispose of non-development project-related exploration interests effectively becoming 'single project.' A good example is the recent spin-off of Ardea Resources by Heron Resources before the PF's of the Woodlawn Zinc-Copper Project in New South Wales. Ardea Resources primarily contained Heron Resources Western Australian nickel exploration interests.

[10] See "estimated or forecast cash payments" in Section 1.5, page 3, of Appendix II and "actual cash flow" in Section 1.2, page 1.

mining projects, good projects can generate substantial profit margins for MEEs. Occasionally, lenders take equity positions in MEEs they finance, which, unlike in the US, is legal in Australia. This is especially common for mezzanine, seed or bridge loans, which are provided before the main PF.[11] Further, project sponsors may obtain PF from non-bank sources such as dedicated mining investment funds, joint venture participants (larger mining companies), export credit agencies, or off-take counterparties.[12] PF loans are subject to loan covenants and are secured loans collateralized by all project assets (Gatti *et al*., 2013). The PF lender's incentive to monitor the MEE is operationalized through contractual devices such as covenants and collateral similar to those provisions in commercial bank lending (Rajan and Winton, 1995). Further, the structure of PF loan drawdowns typically occurs at the lender's discretion, with the drawdown of subsequent debt tranches (undrawn facilities) subject to stringent performance hurdles. One limitation of this study is that covenants are not observable. Thus, in the case of covenants, their implications may differ from general loan covenants explored in the literature given the very specific nature of the assets, the scope for opportunistic behavior and the concentrated nature of economic and financial risk inherent in PF arrangements (Dailami, and Hauswald, 2003).[13]

Another feature of the US debt finance setting is the presence of a sizeable portion of the information-sensitive debt (publicly traded corporate bonds). In Australia, however, there is no

[11] These much smaller facilities are routinely provided to fund the completion of bankable feasibility studies or pilot process plant construction, for example.

[12] Non-bank sources of project loans are discussed further in Ferguson, Grosse and Lam (2019).

[13] Mines in Australia are rarely financed through public debt markets as there is no information sensitive (public) debt market in Australia (one exception is Fortescue Metals financing of its Cloud Break Iron Ore project located in Western Australia, where Fortescue tapped the US public debt market - Refer to FMG ASX announcement dated 14/08/2006). Instead, the vast majority of PF occurs through private debt arrangements. MEEs are at high risk with mining projects exhibiting many high profile failures. For example, the Bulong Nickel project located in Western Australia, which 'defaulted on its senior secured notes when its new pressure acid leach technology did not work as expected' (Esty 2002, p.75). Further, capital investment projects are notoriously high risk with suggestions that '*50% by my estimate encounter big setbacks*' and '*where it is possible worst-case forecasts are almost always too optimistic*' (Arnold, 1986). Thus, in this high information asymmetry setting, management reputation and credibility are likely to be important to lenders (Diamond, 1991).

active corporate bond market, meaning the primary source of debt finance available to most mining projects is private debt.[14]

The relation between financing and forecast bias

Prior literature has shown that management forecasts are an important channel managers use to convey information to equity (Lennox and Park, 2006; Skinner, 1994; Land and Lundholm, 2000; Cheng and Lo, 2006) and debt holders (Shivakumar *et al.*, 2001; Jiang, 2008; Chin *et al*., 2018; Bourveau *et al*., 2018). Other literature examines the reasons for management earnings forecasts, arguing that expectations management is a primary motivation (Cotter, Tuna and Wysocki, 2006; Kato, Skinner and Kunimura, 2009). This study draws on prior literature suggesting the important role of expectations management in motivating management forecasts by examining a different setting, featuring the existence of small firms obtaining PF approvals. These firms lack credit history (Diamond, 1991) and exist in an information environment that features low levels of analyst coverage (Brown, Feigin and Ferguson, 2014). Given these attributes of the setting, we argue that managers will be primarily interested in fulfilling the expectations and the new lender, who's primary concern is cost-overruns and project failure.

Construction cost overruns occur where the actual costs of developing the project exceed forecast capex and budget projections, resulting in the need to obtain additional funds to bring the project into production and thus the cash generation phase. Forecast project capital costs are well understood by the market from prior forecasts of capex appearing in feasibility studies. Cost overruns in the construction phase can be fatal in MEEs (BMO *et al.*, 2014), potentially constituting an event of default and allowing the bank to terminate the facility agreement making the existing financing due and payable (usually resulting in bankruptcy for MEEs). Consequently,

[14] A small number of much larger global mining firms can access debt markets in the US or Europe, *e.g.*, BHP, Anaconda Nickel.

we argue managers of MEEs have incentives to overestimate forecast expenditures during the construction phase to reassure the new lender and the equity market that cost-overruns are not an issue for the project. Such signaling from managers is likely to be of added importance given the significant adverse selection and moral hazard problems lenders and investors face in this sector (Akerlof 1978).[15]

Prior to production commencement, MEE's generate no internal funds, with banks providing loans to firms with by and large no prior credit history (Diamond, 1991). [16,17] Arguments that managers are incentivized to issue cost forecast overestimates to avoid cost-overruns are consistent with assertions in Hutton *et al*. (2012). They suggest that managers in high information asymmetry settings (where managers have an information advantage) may choose to issue less accurate forecasts where they have incentives to do so (*p*. 1,218). Consistent with this argument, we suggest this different setting is one where different forecast characteristics may result and pose the following hypothesis in relation to managers incentives to overestimate future cash outflows after obtaining PF as follows:

H1: Management forecasts will overestimate forecast cash payments related to operating activities after PF is obtained.

Financing and the timing of forecast bias

[15] The PF is associated with higher market value and is explored by Ferguson, Grosse and Lam (2019).

[16] Another source of information on project construction is through the quarterly report of activities, where the progress of project development are qualitatively described. However, the Appendix 5Bs are the only source of quantitative assurance of progress on project development, which given the high level of information asymmetry, is likely to be of added importance to both equity and debt market participants.

[17] The role of intermediaries who finance early-stage firms and the ex-ante due diligence and monitoring activities associated with the financing provided has been examined in venture capitalists (Chan, 1983), commercial banks (Diamond, 1991) and private placement investors (Hertzel and Smith, 1993). These studies have shown how these investments are possible to be accomplished in settings with substantial information asymmetry. Lastly, Ali et al., (2018) suggest that that firms use capital expenditure forecasts as a commitment mechanism to reduce contracting costs with creditors.

Our second hypothesis relates to the timing of overestimates. Consistent with prior discussion, PF approval for MEEs marks the beginning of the project development phase for MEEs possessing other statutory approvals that are then able to commence mine construction activities.[18] Like venture capital funding rounds, PF debt tranches are typically staged investments, where the lender makes available subsequent debt tranches to the borrower, conditional upon certain performance hurdles being achieved (Sahlman, 1990, Gompers and Lerner, 1999). Prior theoretical signaling literature identifies staged investment alternatives in the financing small of firms (Litvak, 2004, Kim and Wagman, 2016). They identify the negative signaling risks associated with an investor or venture capitalist (in this case a lender) not choosing to make a subsequent investment.

Similar to other research and development focused firms, MEEs are highly dependent on meeting each hurdle concerning individual debt tranches to enable construction to continue to completion. Thus, we argue the period of overestimation will coincide with the time between PF approval and final tranche drawdown. We estimate this period coincides with construction timelines, being approximately 12 months following PF approval. Thus we pose our second hypothesis:

H2: Management forecasts will overestimate forecast cash payments related to operating activities in the first year after the loan.

3. Research Design

3.1 Model specification

To examine H1, we estimate the following regression:

[18] Another factor that may also influence forecasts is covenants. However, one limitation in our study is that covenants are not observable, and its implications may differ from general loans primarily explored in the literature given the very specific nature of the assets, the scope for opportunistic behavior and the concentrated nature of economic and financial risk inherent in project finance (Dailami, and Hauswald, 2003).

$$SigForecastError_{i,t} = \alpha_t + b_1 TREAT_{i,t} + b_2 TREAT_t \; x \; POST_{i,t} + b_k \sum_{i=1}^{i=n} Forecast\_Controls_{i,(t-1)} + b_k \sum_{i=1}^{i=n} Firm\_Controls_{i,(t-1)} + b_k \sum_{i=1}^{i=n} Performance\_Controls_{i,(t-1)} + b_k \sum_{i=1}^{i=n} Other\_Controls_{i,(t-1)} + \varepsilon \quad (1)$$

Where the interaction *POST x TREAT* is the main variable of interest. *TREAT* represents a dichotomous variable equal to 1 if the firm belongs to the treatment group of MEEs that eventually receive PF during the sample period and *POST* represents a dichotomous variable equal to 1 if the quarter *t* issuing the cash flow forecast occurs after receiving a PF approval and 0 otherwise. The interaction *POST x TREAT* test allows us to examine if the overall forecast precision changes after receiving *TREAT* and controls for the group difference between firms receiving PF and those that do not. Total forecast cash flow includes the aggregate (or sum) of the forecast for exploration and evaluation payments, development payments, production payments, and administration payments.[19] *SigForecastError* is estimated cash outflows (*Estimated*) for quarter *t* minus realized payments for quarter *t* (*Actual*), deflated by lagged market value (*Size*) (see Appendix II for forecast cash payments on section 1.5, page 3, and actual cash flow spent in section 1.2, page 1). We repeat the same analysis after splitting the dependent variable between forecasts of cash payments characterized by overestimates (positive bias) and underestimates (negative bias). This permits us to test the asymmetric impact of PF on management forecasts after partitioning overestimates and underestimates. Consistent with Hypothesis I we expect the forecast error after PF debt financing will be biased towards cash outflow forecast overestimates. In contrast, we expect no change in cash outflow forecast underestimates after PF. To support our hypothesis, we also examine the probability of issuing overestimates or underestimates after PF. We expect to find a higher probability to issue overestimates after PF approval. To mitigate risks of self-

[19] Management cash flow forecasts of production expenditure and administration expenditures are included in Appendix 5Bs after 2010. Thus, our measure of forecast bias only includes exploration and evaluation expenditure, and development expenditure up to the end of calendar 2009.

selection bias associated with the characteristic of firms receiving PF, tests are re-run restricting the sample only to firms receiving PF, and by using a propensity score matching approach.

To examine Hypothesis II (H2), we run the following regression:

$$SigForecastError_{i,t} = b_0 + b_k\sum_{k=1}^{k=4} Y(k)Before\_loan + b_k\sum_{k=1}^{k=4} Y(k)After\_Loan + b_k\sum_{i=1}^{i=n} Forecast\_Controls_{i,(t-1)} + b_k\sum_{i=1}^{i=n} Firm\_Controls_{i,(t-1)} + b_k\sum_{i=1}^{i=n} Performance\_Controls_{i,(t-1)} + b_k\sum_{i=1}^{i=n} Other\_Controls_{i,(t-1)} + \varepsilon \quad (2)$$

To test H2, we rerun the regression in the first hypothesis after adding dummies of the firm-years around the first loan. This is done by adding four dummies indicating each one of the four years before the loan (*Y4_Before_Loan, Y3_Before_Loan, Y2_Before_Loan,* and *Y1_Before_Loan*) and for each one of the five years after the loan (*Y1_After_Loan, Y2_After_Loan, Y3_After_Loan, and Y4_After_Loan*). We expect the overestimation bias to be higher in the first year after the loan (*Y1_After_Loan*). To examine H2, we examine whether management forecasts increase overestimates during the high-risk project construction phase. For this test, we rerun Eq. (2) after substituting the dependent variable by the yearly dispersion (standard deviation) of *SigForecastError* as a measure of uncertainty on the assessment of forecast credibility. We repeat the test to all the components involved in the estimation (*e.g.*, *actual cost*, estimation, overestimation, and underestimation). We expect the first year after PF approval (*Y1_After_Loan*) will have a significant and positive association with the standard deviation (dispersion) of forecast error and its components. We further discuss the validity of our measure of uncertainty by running a time-series to examine the decrease in the autocorrelation between overestimation bias driven by larger *actual cost* dispersion.

Control variables are based on prior studies investigating management forecasts and other literature examining MEEs (*e.g.*, Kato, Skinner and Kunimura, 2009; Ferguson and Pündrich, 2015). Apart from controlling for lagged forecast error, we include control variables categorized

into three groups: forecast characteristics (*Forecast_Controls*), firm controls (*Firm_Controls*), and firm performance (*Perfomance_Controls*). *Forecast_Controls* control for the autocorrelation forecast bias by including lagged forecast bias ($SigForecastError_{(t-1)}$). We include such lag controls because prior research (Kato *et al*., 2009) has found that forecast error is autocorrelated. We also include the number of pages accompanying the 5B to control for standalone Appendix 5Bs or 5Bs appended to quarterly activities reports.

Firm-level control variables (*Firm_Controls*) include firm size (*Size*) calculated as the 60-days average market value in a distance of 2-months before the announcement. We include a control variable for firm size since prior studies (Kato *et al*., 2009) find larger firms have less optimistic forecasts possibly due to higher external discipline (they may be cross-listed on overseas exchanges or may face greater political and regulatory scrutiny). Further, managers of larger firms may bear relatively larger reputational costs. Cash burn rate (*Cash_Burn_Rate*) is included to control for incentives in communicating forecast cash outflow underestimates due to the restrictions on remaining cash balances. *Cash_Burn_Rate* is calculated as the inverse of the number of quarter's worth of expenditure activity remaining at the current cash spending rate. Other variables included are the lagged amount of cash available in the firm in the quarter (*Cash*) scaled by lagged market value (*Size*). We include the age of the company (*Firm age*) as the number of days the firm has been listed on the ASX to control for skill in forecasting payments since older firms will have more experience and therefore should result in a smaller forecast bias. To control for ownership concentration, we include the ratio of shares owned by the top 20 shareholders in the company (*Top_20*).[20]

[20] Firms are required by ASX to disclose the top 20 shareholders in their annual reports.

Performance characteristics (*Perfomance_Controls*) include commodity price control (*CRB_Index*) in the six months preceding the forecast, the market returns in the previous quarter (*Return_Quarter*), the lagged amount of reserves defined by the company (*Reserves*) along with the lagged amount of resources defined by the company (*Resources*). The commodity sentiment control (*CRB_Index*) is included in order to capture incentives to decrease (increase) estimates of cash outflow given that higher commodity prices may encourage managers to spend more while lower commodity prices may encourage managers to spend less. The amount of reserves (*Reserves*) and resources (*Resources*) is included to control for project lifecycle effects with larger amounts of resources and reserves generally associated with project milestone progressions such as completion of feasibility studies and lower project risk. Finally, the stock market return on the quarter before the forecast (*Return_Quarter*) is used to control for stock-price performance which encapsulates any other firm-level geological information or project milestone accomplishment released to the market that is not captured by the amount of resources and reserves and might include announcements such as timely drilling or assay results or feasibility study completions.

3.2 Sample and data

The archive of Appendix 5B quarterly cash flow statements was hand collected from files provided by the Securities Institute Research Corporation Asia Pacific (SIRCA). The forecast data collected from the Appendix 5Bs contains four different types of mandatory forecasts of cash outflows along with current period actuals. These four forecasts types include management forecasts of exploration and evaluation expenditure, management forecasts of development expenditure, management forecasts of production expenditure and management forecasts of administration expenditures (see 5B example on Appendix II with cash flow payments on section 1.2 page 1 and estimated cash outflows section 1.5 on page 3). The extraction of the data consisted

of firstly transforming into spreadsheets the pdf files containing Appendix 5B and then applying an algorithm written in Python to scrape the data from these tables. For the pdf files that contain scanned pictures, we apply an algorithm of optical character recognition (OCR) to convert picture into machine-readable text before transforming into a spreadsheet.

The sample period spans July 1996 through September 2014 containing 30,813 Appendix 5Bs disclosed by 1,029 MEEs (all known observations). The sample selection is represented in Table 1, a total of 3,362 Appendix 5Bs without a preceding 5B filing are unable to be used as the forecast error cannot be calculated.[21] We excluded 11 companies (183 firm-quarter observations) as our Appendix 5Bs date after these firms receiving project financing.[22] The merging of financial data, ownership, and mineral data results in a maximum of 24,082 observations, with the number of observations differing depending on the type of test conducted.

PF approvals for 137 firms are hand collected from announcements to the ASX with a total of 4,424 quarters observed in Table 1 being from companies receiving PF approval. PF approvals are identified using the Morningstar DatAnalysis Premium and Factiva databases. The Factiva database is used to supplement DatAnalysis Premium as it only contains searchable text after September 1998.[23] Convertible debt facilities and interest-bearing loans from director related entities are not included. The search criteria utilized is 'Project and Finance and Facility' in the

[21] Missing data caused by 1,029 first disclosure and 2,333 missing reports in our database.

[22] For example, project financing announcement approval occurs early in 1995, while our first Appendix 5B appeared only in September 1996.

[23] In Factiva, under the 'Free Text Search' option, we enter the search terms 'Project' or 'Finance' or 'Facility.' The source of the search is restricted to 'Australian Stock Exchange Company Announcements' under the 'Source' header after removing the check on 'Exclude Discontinued Sources' since the ASX announcements are no longer supplied to Factiva after 2014. No industry filter is available on this search as the mining industry filter is not working, so we searched across all industries with 2216 announcements identified. We downloaded headers only for these 2216 and manually inspected each of these with a focus on the period up to the end of 2003. This is because, under the PDF search on DatAnalysis Premium, some PF deals might be missed because some PDFs were supplied to the ASX in image format up until the end of 2003 meaning they are not searchable using DatAnalysis Premium.

DatAnalysis Premium.[24] Financial information is collected from Eikon Thompson Reuters' database. Resource and Reserve information is collected from the SNL Metals and Mining database. The ownership structure is hand collected from annual reports available through Morningstar Datanalysis Premium. To mitigate the influence of outliers, all continuous variables are winsorized at the 1st and 99th percentiles.

4. Main empirical results

4.1 Descriptive Statistics

Table 2, Panel A, presents descriptive statistics. The number of forecast observations issued after a company receives PF (*POST x TREAT*) is 6.8%. The mean (median) unsigned forecast bias (*UnsForecastError*) is 2.7% (1.4%). The mean of the unsigned forecast underestimates (*UnderestimateBias*) is 2.5% while for the forecast overestimates *(OverestimateBias*) is 2.8%, indicating that the mean is slightly skewed towards forecast overestimates. The market value of MEEs (*Size*) has a mean (median) of $50 ($13) million Australian dollars and mean (median) total assets of $33 ($9) million dollars. The mean (median) age of the firms in the sample is 10 (7.1) years. In terms of ownership, the mean (median) percentage ownership by the top 20 shareholders

[24] The search terms are applied in DatAnalysis Premium 'ASX Announcements (PDF) Search' Search Tool using 'All Companies' search scope and filtering on 'Energy' and 'Materials' GICS Sectors in 'Section A.' The announcement type selected in 'Section B' is 'Progress Report.' In section B, we also choose the 'Market sensitive' flag. The DatAnalysis database is queried from the 1/1/1995 to 28/03/2019. We include dates after 2014 since some firms might use the terms 'Project' and 'Finance' and 'Facility' after their initial PF approval announcement, but these firms are then identified, and PF approval dates recorded during the analysis of the firm's announcement histories. In Section C (Search Criteria) is populated with the terms 'Project' and 'Finance' and 'Facility' using the 'Entire Document' filter. The 'Materials' search reported 3701 announcements while the 'Energy' reported 830 announcements meeting the criteria. These announcements are then manually inspected to identify valid PF approvals. Typically, there are many repeat observations (or separate announcements discussing the PF), so there are many 'duplicates' in each announcement database. This reduced the overall amount of time involved in hand reading of the announcements. When a potential PF deal is identified from the search, the entire announcement history on DatAnalysis Premium for that firm is reviewed. This means that while a relatively recent announcement might discuss PF, but not be relevant for the study, a PF deal many years prior that is relevant for the study might be captured. A small number of PF approvals are identified as a result of Joint Venture participation. Further, a small number of approvals are identified that do not contain search keywords. These PF approvals are referred to as those with 'non-standard terminology.' Lastly, several PF approvals are identified with standard terminology that does not appear in the DatAnalysis search owing to the problem of image PDF announcement files lodged with the ASX up until around 2003. These PF approvals are mainly identified from the Factiva search.

(*Top_20*) is 57% (56%). Appendix 5Bs have a mean (median) number of pages of 8.8 (7) pages. The average proportion of reserves in dollars (*Reserves*) to the market value is 0.17, while resources (*Resources*) is 24. This is consistent with MEEs being typified by having deposits and projects with lower geological certainty compared to mining producers (*i.e.*, MEEs typically disclose *Resources* as opposed to *Reserves*, unless they are moving towards project development and have completed suitable economics studies of those ore bodies).[25] The return of assets (*ROA*) has a mean (median) of -0.36 (-0.12) consistent with sample constituents being pre-production exploration, evaluation and development companies (systematically loss-making). Lastly, the mean (median) leverage (*Leverage*) is 0.073 (0).

Table 2, Panel B, shows a subsample restricted only to firms receiving project financing. This sample shows that 37% of the data (about 1,637 observations) is after the PF. We collect for this subsample, in the period after PF, data about cash inflow proceeding for borrowings with a mean of $5.1 million.

Table 2, Panel C, presents the descriptive statistics for the variables utilized for empirical tests comparing the two quarters before and the two quarters after with the sample restricted only to companies receiving the loan (presented in Table 2, Panel B). The mean (median) unsigned forecast error (*UnsForecastError*) increases by 77% after PF loan approval. However, we find that the mean (median) of the unsigned forecast underestimates (*UnderestimateBias*) increases by 20% but is not significant while for the forecast overestimates (*OverestimateBias*) increases by 101% after PF and is significant at $p<0.01$. Descriptive statistics show that the quarter after obtaining PF

[25] Resource and reserve categories are now required to comply with the Committee for Mineral Reserves International Reporting Standards (CRIRSCO). Previously, Australian resource and reserve reporting fell under the Joint Ore Reserve Committee (JORC) Code reporting requirements, which have heavily influenced the CRIRSCO standards now in place. The JORC Code emphasizes both geological certainty and economic certainty in resource and reserve reporting.

firms is about 39% larger in terms of market value (*Size*) reflecting equity issues typically undertaken around PF at higher share prices. There is no significant difference in cash burn and concentration of the top 20 shareholders (*Top_20*) during this period. The commodity index (*CRB_Index*) does not change pre and post PF. The amount of reserves (*Reserves*) also does not change in the short period after receiving the PF. Leverage is higher as expected, increasing by 129% in the two-quarters after to PF approval. We find that the two components of forecast error increase at the same time with estimated cost (*Estimated_Cost*) by 75% and actual cost (*Actual_Cost*) by 44%, indicating that the overestimated bias observed is not due to reductions on actual costs but indeed to higher estimated costs.

Table 2, Panel D, reports the descriptive statistics regarding the PF loans written to MEEs during the 1997 and 2014 period. Of a total of 1,018 MEEs, about 13% (137 firms) obtain PF. The mean (median) size of the loans is 80 million dollars (*Loan_Amount*), representing on average about 11 times their total assets (*Loan_Amount_TA*) and three times equity (*Loan_Amount_SE*).

Table 3 provides a Pearson correlation matrix for the explanatory variables. The correlation coefficient between *SigForecastError* and *POST x TREAT* is 0.06, suggesting the forecast error increases after PF approval. The correlation between *Cash_Burn_Rate* and *SigForecastError* (coefficient -0.03) indicates that MEEs spending cash faster are more accurate in their forecasts. *Top_20* and *SigForecastError* are positively correlated (coefficient 0.02), indicating that firms with larger shareholders have less accurate forecasts.

In Panel B, Table 3, we report correlation results partitioning between overestimates and underestimates. The correlation between *OverestimateBias* and *POST x TREAT* is positive (coefficient 0.08). However, the correlation between *UnderestimateBias* and *POST x TREAT* is negative but not significant. This bivariate analysis supports the contention that bias increases only

in terms of overestimates but not underestimates after PF approval.[26] In contrast, the coefficient between *Top_20* and *OverestimateBias* is positive (coefficient 0.03), suggesting larger shareholders are associated with greater overestimates, at least on a bivariate level.

4.2 Multivariate analysis

Management forecasts after PF (Hypothesis H1)

Table 4, Panel A, presents regression results of tests examining the relation between forecast bias PF approvals. Column (I) depicts the effect of PF approval (*POST x TREAT*) on the unsigned or absolute value of the forecast error (*UnsForecastError*) (absolute value of estimated payments for quarter *t* minus realized payments for quarter *t*, deflated by lagged market value (*Size*)). The coefficient on *POST x TREAT* is positive (0.007) and significant at $p<0.01$, indicating that forecasts become less accurate after PF approvals. In Column (II), we repeat the same test using a signed variable, and the coefficient on *POST x TREAT* is again positive (0.005) and significant at $p<0.05$.[27] Notably, *TREAT* is significant in Columns I, III, and IV ($p<0.05$), indicating that on average there are differences in forecast bias between the treatment and control group before firms receive PF.

In Columns (III) and Column (IV) we partition the dependent variable between unsigned forecast underestimates (*UnderestimateBias*: unsigned *SigForecastError* when the difference between estimated and actual is negative – *i.e.*, payments are more than expected) and unsigned forecast overestimates (*OverestimateBias*: unsigned *SigForecastError* when the difference between estimated and realized is positive – *i.e.*, payments are less than expected or creation of

[26] Multivariate analysis depicted in Table 4 fails to identify any association between larger shareholders proxied for by the *Top_20* and overestimates, suggesting that debt monitoring is of greater importance than large shareholder monitoring in this setting.

[27] We run the variance inflation factor to check for multicollinearity and find an average of 1.22 with no variable higher than 1.56.

budget slack) respectively. *POST x TREAT* is not significant in Column (III), indicating that firms do not issue more forecast underestimates after PF approvals. However, in Column (IV), we find that the coefficient on *POST x TREAT* is positive (0.011, significant at $p<0.01$), suggesting an increase in the overestimates. This is consistent with the hypothesis that forecasts bias increases, but is asymmetric, with increasing forecast overestimates (*OverestimateBias*), and no difference in the forecast underestimates (*UnderestimateBias)*.

In terms of the coefficients on control variables, one interesting finding is the absence of any significant results for *Top_20*. In contrast to bivariate results, in a multivariate setting, the coefficients on *Top_20* across columns (I)-(IV) (0.000, 0.004, 0.001, 0.000) are insignificant or marginally insignificant, suggesting that larger shareholders have less monitoring impact than debt providers at the PF approval stage. In terms of other control variables, commodity sentiment has the opposite effect on each type of forecast error bias, being negative and insignificant for *UnderestimateBias* but positive and significant for *OverestimateBias*. The amount of mineral reserves (*Reserves*) is associated with higher *SigForecastError* and underestimates, while resources (*Resources*) has a negative association. Higher quarterly returns are associated with both smaller underestimates and overestimates. Thus, overall, we find multivariate evidence consistent with H1.

To examine potential self-selection bias associated with firms receiving PF approvals and the role of loan size as a determinant of overestimation bias, tests are re-run in Table 4, Panel B, after restricting the sample only to firms receiving PF.[28] Results are overall similar to those in Table 4,

[28] Untabulated test, available upon request.

Panel A, suggesting the increase in overestimates is due to PF and not firm characteristics.[29,30] Moreover, the interaction *POST x TREAT x Loan_amount_SE* is positive and significant in Column IV, indicating that the bias is stronger when the loan represents a higher percentage of the firm capital structure.

In untabulated results, we run a logistic regression examining the persistence of forecast bias using a comprehensive sample with both firms receiving and not receiving PF loans before and after the loan. While examining the determinants of underestimation bias, we find that *POST x TREAT* is negative and significant, indicating that post-PF, MEEs are less prone to the underestimation. However, when we switch the dependent variable to overestimated bias the same variable is positive and significant, indicating that after PF, firms are more likely to provide overestimates, consistent with Hypothesis I. Prior studies in the management forecast literature have identified that forecast characteristic tend to persist or are autocorrelated. Together, this evidence of persistence both in terms of underestimates and overestimates supports findings in

[29] Some PF loan approvals are occasionally preceded by smaller seed or bridge loans. Seed loans are typically provided for pre-development tasks such as feasibility study completion or pilot plant construction and operation used in feasibility studies. In contrast, bridging finance is usually provided to MEEs having completed bankable feasibility studies and requiring finance to commence project activity in the form of preliminary site works or to pay deposits on capital equipment with long lead times to delivery. The association between seed and bridge loans and forecast bias are considered in untabulated results. For this test, we include an additional dichotomous variable equal to one indicating quarter forecasts after a seed or bridge loan is provided. We find similar results using this measure when compared to actual PF loans examined in Table 4 with a positive relation between after bridge and overestimation but not after seed and overestimation. This suggests an increase in forecast overestimates is not restricted to PF deals but includes any smaller pre-development loans received before PF approval. This result is intuitive since good stewardship of minor bridging loans commences the loan life cycle for these MEEs and thus contributes to the development of the borrowers' track record (Diamond, 1991). Thus, we interpret findings on bridge loans made to PF loan recipients as being consistent with H1.

[30] The dependent variable (*SigForecastError*) comprises four different types of mandatory forecasts of cash outflows along with current period actuals. These four forecasts include management forecasts of exploration and evaluation expenditure, management forecasts of development expenditure, management forecasts of production expenditure, and management forecasts of administration expenditure (see 5B example in Appendix II). In untabulated results, we examine the association between PF and forecast error by management forecast type (exploration and evaluation expenditure, development expenditure, production expenditure, and administration expenditure). We find no difference pre or post PF for overestimation of exploration bias or administration bias. This makes sense since exploration and administration have been forecast by the firm for a long time before PF and also, are likely to be of less interest to the lender. However, debt monitoring is likely to be focused on development and production payments, which are the drivers of results.

Kato *et al*., who state that "*These results are inconsistent with the reputation argument, which predicts negative rather than positive autocorrelation in forecast bias."*[31, 32]

Management forecast timing (Hypothesis H2)

We hypothesize that MEEs face higher uncertainty during the high-risk construction phase and have greater incentives to signal debtholders of lower risk of cost overruns by creating budget slack, or to 'under promise and over deliver' as the project nears production (Rogers and Stocken, 2005). In Table 5, we examine cash flow estimates during the years after PF. In Column I, the signed forecast error (*SigForecastError*) increases after PF. However, we find that overestimates the increase in the first and second year as shown in Column (II) (*Y1_After_Loan* = 0.024, $p<0.000$, *Y2_After_Loan* = 0.009, $p<0.000$) and not in the subsequent years. Results showing that overestimation bias (Column II) is only higher in the first two years after PF approval is provided consistent with the hypothesis that companies use budget slack for just a short period, providing support for Hypothesis H2. A two year period after PF approval would see most MEEs already in production. This result is graphically represented in Figure 1, where we plot estimates of firms receiving PF approvals. It is possible to see that the greatest budget slack (overestimation) occurs within the first four quarters (first year) after PF approval (quarter 0).

In Table 6, we consider whether management forecasts exhibit budget slack during high uncertainty, proxied by the standard deviation of all the components involved in the estimation

[31] In untabulated results, we also control for the lender identity in the PF loan approvals, enabling us to consider lender characteristics such as industry leadership, specialization, and loan syndication. However, we observe no incremental effects on overestimation from the leading project financier, alternative measures of specialists, or for projects funded by syndicates. This may be due to the smaller loan size in PF deals to MEEs, compared to PF deals in the US, for example. The smaller loan size suggests greater competition between potential lenders, with a large number of PF participants to MEEs identified in Ferguson, Grosse and Lam (2018).

[32] To deal with the self-selection associated with the characteristics of firms receiving PF, tests are re-run restricting the sample only to firms receiving PF in untabulated results. Again, results are similar to those presented in the full sample, providing further support that increases in the likelihood of overestimation are due to PF approvals and not firm characteristics.

bias found in Table 4. In Columns (I) through Column (V), we find that the variable *Y1_After_Loan* is significant and positive in all cases, consistent with our expectation that firms in the first year following the loan are less homogeneous. This result provides some evidence that payments are more heterogeneous in the first year and associated with higher dispersion. As time passes, the MEEs need to manage lender expectations and create budget slack decreases as the project nears production, risk decreases and an internal source of financing becomes available (see Figure 1). Thus, budget slack is used for a short period of time where managers are incentivized to please lenders who still maintain discretion around making available remaining debt tranches. This supports the suggestions that managers create budget slack and are not driven merely by the estimation difficulties during the construction period.

4.3 Additional tests and sensitivity analysis

Debt or equity signals?

Table 7 examines whether managers incentives are likely to be driven by debt or equity market incentives. Column I shows that lagged cash from debt tranche drawdown (*CashBorrowing*) is positive and significant (0.097, $p<0.01$) while lagged cash from share issuance (*CashShares*) is positive but not significant. This result is consistent with managers creating budget slack to signal lower risk of cost overruns motivated by credit market as opposed to equity market incentives. In relation to Hypothesis 2, we include the variable $\Sigma\, CashBorrowing_{i,(t-2)}$, calculated as the sum of all debt tranches given up to 2 quarters before the overestimation is observed. We find the interaction between $CashShares_{i,(t-1)}$ x $\Sigma\, CashBorrowing_{i,(t-2)}$ positive and significant (0.074, $p<0.05$), indicating that as debt tranches are drawn-down, managers continue creating budget slack. Column III and IV show the breakdown of *SigForecastError* and confirm that only overestimations (positive *SigForecastError*) and not underestimations (negative

SigForecastError) increase after debt or equity is issued. These results further support the interpretation that managers are motivated by credit market incentives.

Costs of overestimates and market reaction tests

In Table 8, we explore why all firms do not issue overestimates given the incentives to signal lower risk of cost overruns to investors? Firstly, the incurrence of estimated greater cash outflows by mining firms may be perceived positively by investors as it could be associated with the MEEs increasing estimated spend due to an investment opportunity. Alternatively, an increase in spending could signal cost overruns. In Table 8, Column I, we compute a mechanical model calculated on the autocorrelation of the lagged four quarter to measure the surprise in the increase of estimated cash outflow ($\Delta M\_Estimated\_Cost_t$) of firms before receiving PF. $\Delta M\_Estimated\_Cost_t$ is calculated by the subtraction of the estimated cash outflow in quarter *t* by the predicted estimated cash outflow in quarter *t* provided by the model. Our results in Column I show that an increase in estimated cash outflows is associated with higher market reactions ($\Delta M\_Estimated\_Cost_t = 0.119$, $p<0.000$), consistent with investors perceiving this increase as an investment opportunity.

We also capture the investors' perception of the overestimation of cash outflows by creating the variable *M_Predicted_Overspend*, calculated as the difference between management forecasts of payments for the quarter *t*+1 disclosed at quarter *t* and the predicted actual cost in *t* as a proxy of expected payments in *t*+1.[33] Our results in Column (I) indicate that the interaction of

[33] We run four regressions to examine the autocorrelation between actual cost, estimated cost, and the forecast bias (underestimate/overestimate). In untabulated results we find a significant autocorrelation between actual payments (cash outflows) and its four (+, +, +, +) lagged quarters except for the third quarter with an adjusted R^2 of 53% (Column I). In the estimated payments we find a similar R^2 although all lagged quarters are significant. Lastly, we find that the expected bias in the next quarter is also a function of its prior four quarters but presents a smaller adjusted R^2 of 16.1% and 21% respectively. These results are consistent with the expectation that firms follow certain patterns in forecasts and actual payments, and thus, investors recognize and unexpected forecast increase. The use of the mechanical model is preferred as investors are likely to adjust their expectations given the higher systematic overestimate bias after

M_Predicted_Overspend and $\Delta Estimated\_Cost_t$ is negative and significant (-0.171, $p<0.05$), suggesting there is a negative market reaction when managers increase estimates if investors believe spending should be lower than forecast by managers. These results are consistent in Column (II) after including year fixed effect. These results indicate that an increase in spending could signal greater cash burn than expected and is associated with greater risk of distress, suggesting a cost that may provide an equilibrium associated with the choice to increase overestimations.

Market reactions to the announcement of Appendix 5Bs are reported in Table 8. In Columns (I) and (II) the variable *Underestimated_Bias* is negative and significant (-0.295, $p<0.01$; -0.214, $p<0.05$;), supporting our assumption that managers have incentives to avoid cost overruns by overestimating expenses as equity markets perceive this as bad news.

Lifecycle effects on overestimates

We examine in Table 9 whether signals of overestimation is driven by lifecycle changes or just from borrowing activities. We create the variable $POST\_DEVEL_{i,t}$ equal to 1 indicating when a firm enters the development lifecycle (i.e., the amount of development cost is greater than exploration and evaluation payments). Column IV shows that $POST\_DEVEL_{i,t}$ is positive but not significant, indicating that the change of lifecycle does not alter the amount of overestimation unless firms belong to the group receiving PF as the positive and significant interaction between $POST\_DEVEL_{i,t}$ *x* $TREAT_{i,t}$. (0.009, $p<0.05$) demonstrates. This result supports suggestions that overestimation increases due to capital raised from banks during the development phase and not due to examples where equity finance is the sole project funding channel.

Overestimates and production commencement

project financing and is reasonable that the mechanical model better captures this adjustment as autocorrelations are considered.

We examine in Table 10 whether signals of overestimations can predict positive project milestones such as advancements into the production lifecycle or amount of receipts from early ramp-up revenue. This table presents regression results of tests examining the determinants of production costs (Column I and II) as a proxy for firms moving into production lifecycle and receipts costs (Column III and IV) as a proxy for firms' initial revenue generation. Our variable of interest is the interaction *Cumul_Overestimation*, which is the cumulative average of overestimations (*OverestimateBias*) up to the quarter before the production cost and revenue disclosure in Appendix 5B. ProductionCost represents a continuous variable equal to the actual expenditure in production (see Item 1.2 c in Appendix II) scaled by lagged market value (*Size*) and *Receipts* represents a continuous variable equal to the actual receipts in quarter t (see Item 1.1in Appendix II) scaled by lagged market value (*Size*). We find in Column I that the cumulative overestimation is positive (0.158, $p<0.05$) and significant as in Column III (0.277, $p<0.01$) while cumulative underestimation is not significant in Column II and IV. This result shows that higher the cumulative signal in terms of overestimation after PF approval, the higher the likelihood of the firm 1) advancing to producer status and 2) receives higher project ramp-up revenues. These results suggest that signaling provided by managers through overestimates is effective in securing remaining debt funding and progressing to producer status.

Determinants of debt drawdowns

Table 11 examines the debt market incentives in overestimated forecasts, given that there may be similar debt market benefits (track record) in signals of managerial forecasts after PF approvals. Accordingly, Column I shows that the lagged cumulative overestimation (*Cumul_Overestimation*) is positive and significant (0.593, $p<0.01$) with the amount of cash received from debt drawdowns (*CashBorrowing*) while the cumulative underestimation in Column II is not significant. This result

suggests that the way managers forecast and spend their cash flows may be associated with a good track record. This result does not necessarily support that banks rely on public information for their credit decisions, but, alternatively, that the forecast information used internally may be the same benchmark disclosed to the public through cash flow forecasts. Finally, we repeat this test in Column III by using a breakdown of overestimations by type of expense finding the driver of overestimation is development expenses as predicted.

Endogeneity tests

Propensity Score Matching

Table 12 presents the propensity score matching used in controlling for the possibility that other characteristics of firms obtaining PF might be associated with greater forecast overestimates. Table 12 shows the first stage with an R^2 of 19% and including 12,177 observations. Panel B shows the estimates of the treatment group and control groups, where the difference in the treatment group is significant at 1%. Panel C shows details common support indicating there is a high level of common support. There are only three observations the propensity score did not align with the propensity score of another observation in the opposite treatment category. The common support is also shown graphically in Figure 3 depicting an overlap on propensity score corroborating with our results shown on the propensity score matching output. Lastly, in Panel D we estimate the effect of receiving PF on management forecasts using an inverse-probability-weighted (IPW) treatment-effects estimator and find that the average treatment effect (ATE) is 0.018.

The regression using the weights calculated for the propensity score matching is presented on Table 12 Panel E. Results corroborate with our main findings shown in Table 4, providing support that the association between the overestimations and PF approval is not an endogenous one.

Managerial Overconfidence

It has been suggested these results may be consistent with a managerial overconfidence interpretation. There are several reasons why this doesn't make sense in this setting. Firstly, managers face prolonged project life cycles. For example, it is typical for it to take a decade from first mineral discovery to mine development (or even longer). Secondly, mineral exploration is extremely high risk, with the chances of progressing from a greenfields geological target to a profitable mine is 1 in 1000. If the target is redefined as a world-class deposit, the chances fall to 1 in 3333.[34,35] Thirdly, mineral exploration is highly competitive with large numbers of MEEs listed on the ASX and intense global competition for the exploration dollar, particularly from Canada and Africa. Mineral explorers also have long track records of loss-making in an industry known for its conservatism.

We conduct several tests which further decrease the likelihood of this interpretation. If overconfidence is driven by an increase in cash via PF approval, we would observe that other prior changes in cash that may be caused by non-routine project disposal (a non-pecking order related avenue) are likewise associated with overestimation. However, in unreported analysis, we rule out this explanation with overestimates only associated with debt and equity issuance (see Figure 2 for graphical support of this evidence). Further, if large sums of money associated with PF were to change managers behaviourally, we would observe differing (lower overconfidence) effects for much smaller seed and bridge loans. However, controlling for seed and bridge loans makes no

[34] Del Real, G, 'Increasing the odds of Exploration Success. 13/01/2015)

[35] Beatty, R, in 'The declining discovery trend: People, Science or Scarcity? Society for Economic Geologists, April, 2010 suggests; *Exploration is getting tougher. Despite increasing global exploration budgets year after year, it seems that fewer and fewer new discoveries are being made. Why is this? Is it due to a lower quality of mineral explorationists working globally, a dearth of new scientific methods being applied to discovery, or the increasing scarcity of mineral deposits? It is most unlikely that there is a lower level of intellectual capital or science being applied to exploration. My vote is therefore for scarcity.*

difference to our primary results suggesting similar pecking order equity signaling effects apply to small mezzanine type finance obtained, for example for feasibility study completions as to PF.

5. Conclusion

This study investigates whether managers create budget slack in expense forecasts driven by debt market incentives (Cotter, Tuna and Wysocki, 2006; Kato, Skinner and Kunimura, 2009, Hutton et al., 2012). Using a large sample of firms making mandatory forecasts of expenses, we hypothesize MEE managers forecasts of cash outflows will feature more overestimates after PF approvals. To examine the determinants of forecast bias, a dichotomous variable equal to one for quarters after PF approval is utilized. Results are consistent with predictions in that after PF, the cash outflow forecast bias increases, but only for overestimates, with no difference for underestimates. Examining the timing of the overestimation, we find that managers are more likely to create budget slack while debt tranches remain to be drawn, coinciding with the high-risk mine construction phase. These results robust to using a propensity score matching approach.

This study is subject to limitations in the form of considering PF sources only in the form of non-convertible loans, while we excluding instances of debt supplied to MEEs by director related entities, which are typically of not great size. Secondly, we proxy for drawdowns using the information contained in Appendix 5B, though obviously, this does not reflect precise tranche drawdown dates, which are announced to the ASX relatively infrequently. Another possibility is that management signaling takes place through construction updates in the Quarterly Activities Report, which is it typically announced at the same time as the 5B. Thus, there may be qualitative signaling of project progress in the activities report while the quantitative signaling appears in the 5B. We do not control for qualitative signals. Implications of the study more generally are limited by the industry setting in Australia.

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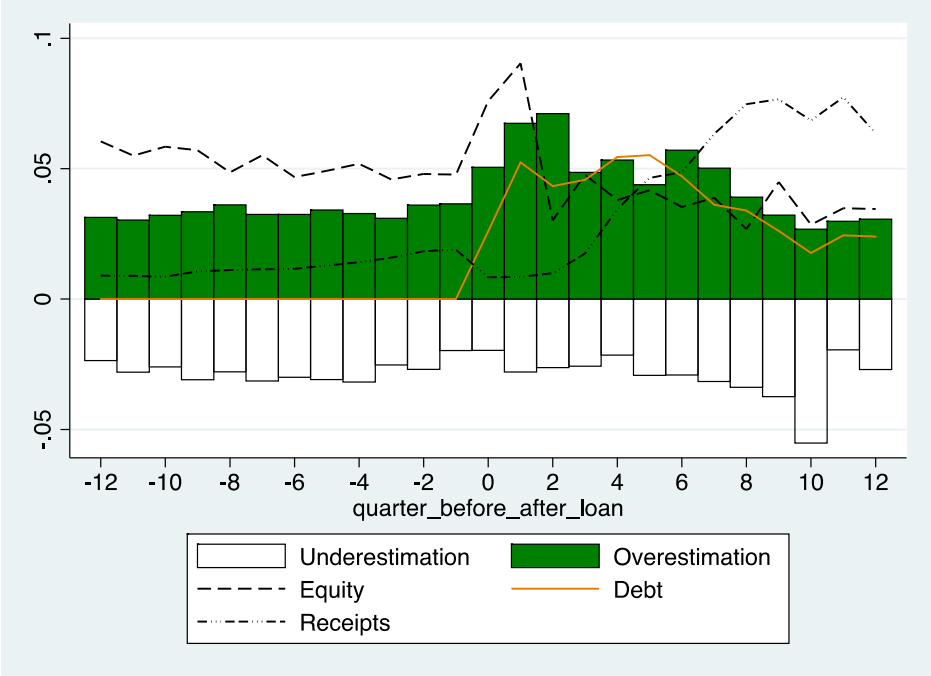

Figure 1 – Over (under) estimation and sources of financing around project financing with sample restricted by only firms receiving project financing

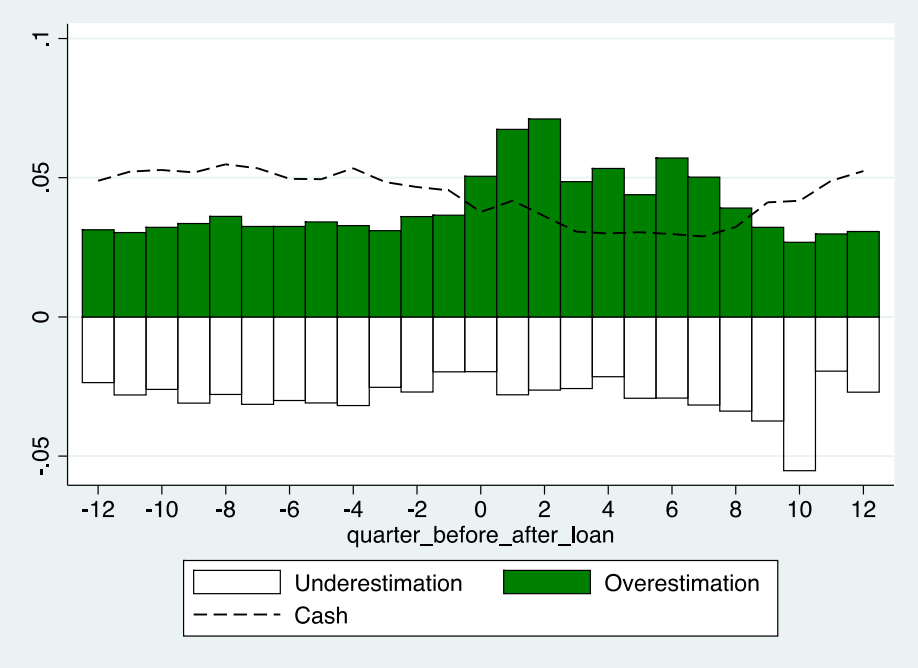

Figure 2 – Over (under) estimation and cash around project financing with sample restricted by only firms receiving project financing

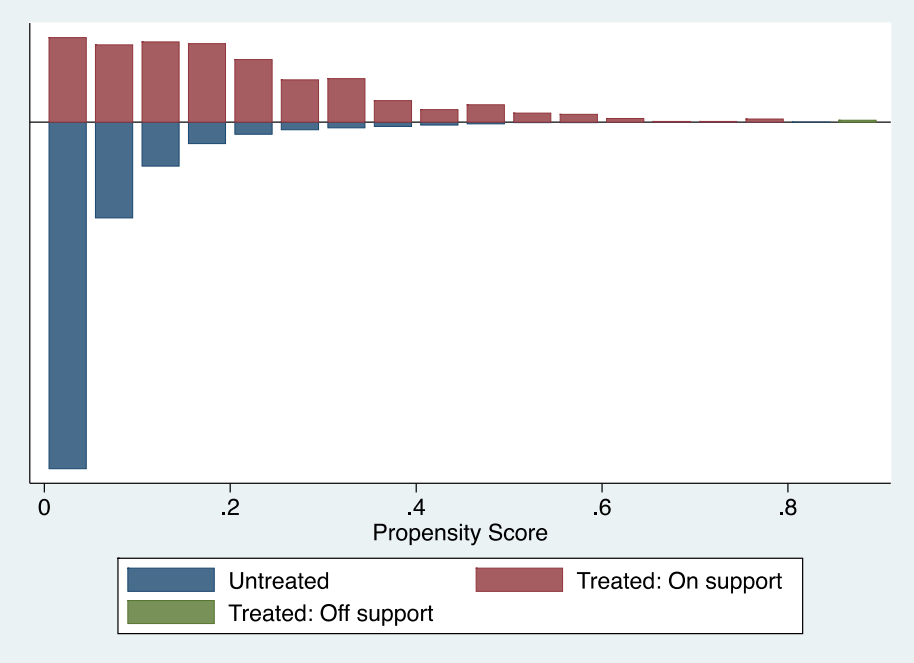

Figure 3 – Common support for propensity score matching

Table 1
Sample Selection

This table shows that the sample period spans July 1996 through September 2014 containing 30,813 Appendix 5Bs disclosed by 1,018 MEEs (all known observations). The sample selection is represented in Table 1, a total of 3,362 Appendix 5Bs without a preceding 5B filing are unable to be used as the forecast bias can't be calculated. The merging of financial data, ownership, and mineral data results in a maximum of 24,082 observations, with the number of observations differing depending on the type of test conducted.

	Observations	N. Firms	Period
Initial sample	30,813	1,029	Jul 1996 to Sep 2014
Less: missing quarter *t*-1	3,362		
Less: missing Eikon Thompson	3,186		
Less: PF starts before sample observation	183	11	
Final sample	24,082	1,018	Jan 1997 to Sep 2014
Subsample of firms receiving PF	4,424	137	Jan 1997 to Aug 2014

Table 2
Univariate Statistics

Panel A: Descriptive Statistics complete sample

	N. Obs.	Mean	p25	p50	p75	Std. Dev.
POST x TREAT	24,082	0.068	0.000	0.000	0.000	0.252
UnsForecastError	24,082	0.027	0.005	0.014	0.032	0.036
SigForecastError	24,082	0.002	-0.013	0.000	0.014	0.045
UnderestimateBias	11,800	0.025	0.005	0.013	0.031	0.031
OverestimateBias	12,282	0.028	0.005	0.014	0.033	0.040
Return_Quarter	24,082	1.034	0.818	0.972	1.144	0.410
Size (mil)	24,082	50.065	5.645	13.050	37.469	117.480
Cash_Burn_Rate	24,082	0.876	0.155	0.341	0.846	1.355
Cash	24,082	0.242	0.062	0.145	0.302	0.289
Firm age	24,082	10.379	3.653	7.169	15.167	8.809
Top_20	24,082	0.573	0.446	0.567	0.694	0.177
CRB_Index	24,082	1.021	0.963	1.014	1.093	0.097
Number_Pages	24,082	8.830	5.000	7.000	11.000	4.739
Reserves	24,082	0.177	0.000	0.000	0.000	0.668
Resources	24,082	24.405	0.000	0.000	0.263	74.530
Total Assets (mil)	24,082	33.679	3.091	9.281	25.501	76.290
ROA	24,082	-0.362	-0.356	-0.122	-0.021	0.775
Leverage	24,082	0.073	0.000	0.000	0.004	0.358
Cash from shares (mil)	24,082	1.349	0.000	0.000	0.474	4.516

Panel B: Descriptive statistics only firms receiving the loan (subsample)

	N. Obs.	Mean	p25	p50	p75	Std. Dev.
POST x TREAT	4,424	0.371	0.000	0.000	1.000	0.483
UnsForecastError	4,424	0.029	0.005	0.014	0.035	0.041
SigForecastError	4,424	0.007	-0.010	0.002	0.017	0.049
UnderestimateBias	2,009	0.024	0.005	0.012	0.029	0.031
OverestimateBias	2,415	0.033	0.005	0.015	0.039	0.047
Return_Quarter	4,424	1.045	0.838	1.000	1.159	0.395
Size (mil)	4,424	98.052	10.627	30.329	86.761	175.849
Cash_Burn_Rate	4,424	0.943	0.172	0.397	1.003	1.370
Cash	4,424	0.215	0.062	0.132	0.262	0.253
Firm age	4,424	10.585	4.538	8.821	15.339	7.468
Top_20	4,424	0.584	0.455	0.574	0.715	0.184
CRB_Index	4,424	1.022	0.965	1.017	1.093	0.096
Number_Pages	4,424	9.378	5.000	7.000	12.000	5.363
Reserves	4,424	0.274	0.000	0.000	0.000	0.816
Resources	4,424	15.594	0.000	0.000	0.205	55.643
Total Assets(mil)	4,424	66.064	5.113	19.488	72.251	110.333
Return on Assets	4,424	-0.257	-0.235	-0.071	0.000	0.713
Leverage	4,424	0.160	0.000	0.000	0.129	0.484
Cash from loan (mil)	1,030	5.103	0.000	0.000	1.523	16.505
Cash from shares (mil)	4,424	2.446	0.000	0.000	1.011	6.532

Panel C: Descriptives for firms receiving PF comparing two quarters before and two quarters after firms receive PF

	Column I		Column II		Column III	
	Before Loan		After Loan		Difference	
	Mean	Std. Dev.	Mean	Std. Dev.	Perc.	T-stat
UnsForecastError	0.025	0.039	0.045	0.053	78%	4.439***
SigForecastError	0.008	0.045	0.026	0.065	220%	3.308***
UnderestimateBias	0.019	0.025	0.023	0.028	20%	1.039
OverestimateBias	0.030	0.046	0.060	0.061	101%	4.38***
Return_Quarter	1.091	0.275	1.045	0.257	-4%	-1.851*
Size	129.193	183.818	179.407	219.386	39%	2.649***
Cash_Burn_Rate	0.813	1.207	1.144	1.568	41%	2.542**
Cash	0.193	0.205	0.197	0.213	2%	0.174
Firm age	9.291	7.189	10.574	7.447	14%	1.885*
Top_20	0.616	0.166	0.638	0.172	4%	1.421
CRB_Index	1.029	0.091	1.027	0.089	0%	-0.177
Number_Pages	9.357	5.428	9.605	5.584	3%	0.477
Reserves	0.292	0.850	0.305	0.855	4%	0.163
Resources	14.577	56.698	10.252	41.721	-30%	-0.928
Total Assets (mil)	77.721	99.945	116.069	125.976	49%	3.626***
Return on Assets	-0.121	0.257	-0.111	0.325	-8%	0.36
Leverage	0.150	0.323	0.345	0.558	129%	4.59***
Estimated_Cost	0.074	0.085	0.130	0.117	75%	5.814***
Actual_Cost	0.060	0.057	0.086	0.085	44%	3.873***
Cash from shares (mil)	0.057	0.137	0.061	0.150	7%	0.277

Panel D: Loan Characteristics

	N. Obs.	Mean	p25	p50	p75	Std. Dev.
Loan_amount (million)	137	80.500	20.000	43.900	85.300	145.000
Loan_amount_SE	137	3.044	0.483	1.154	2.317	11.488
Loan_amount_TA	137	11.261	0.424	0.976	1.985	103.670

Variables are defined in Appendix I.

Table 3
Correlation Matrix

Panel A: Forecast Bias

		1	2	3	4	5	6	7	8	9	10	11	12
1	*SigForecastError*	1											
2	*POST x TREAT*	0.062*	1										
3	*Number_Pages*	-0.013	0.070*	1									
4	*Size*	0.027*	0.277*	0.233*	1								
5	*Cash_Burn_Rate*	-0.039*	0.069*	-0.033*	-0.076*	1							
6	*Cash*	0.096*	-0.039*	-0.017	-0.242*	-0.277*	1						
7	*Firm age*	0.013	0.082*	0.0069	0.110*	0.139*	-0.162*	1					
8	*Top_20*	0.028*	0.070*	0.026*	0.142*	0.043*	0.025*	-0.007	1				
9	*CRB_Index*	-0.022	0.020	0.035*	0.092*	-0.043*	-0.057*	0.001	-0.013	1			
10	*Reserves*	-0.008	0.064*	0.047*	0.114*	0.047*	-0.023	0.053*	0.102*	0.007	1		
11	*Resources*	-0.008	-0.003	0.040*	0.0136	0.036*	-0.002	0.026*	0.052*	-0.008	0.450*	1	
12	*Return_Quarter*	-0.023	-0.010	0.0146	0.075*	-0.038*	-0.037*	-0.004	-0.014	0.222*	-0.009	-0.029	1

Panel B: Forecast Bias split between Overestimates and Underestimates

		1	2	3	4	5	6	7	8	9	10	11	12	13
1	*OverestimateBias*	1												
2	*UnderestimateBias*	-0.216*	1											
3	*POST x TREAT*	0.085*	-0.003	1										
4	*Number_Pages*	-0.013	0.008	0.070*	1									
5	*Size*	-0.056*	-0.120*	0.277*	0.233*	1								
6	*Cash_Burn_Rate*	0.020	0.096*	0.069*	-0.033*	-0.076*	1							
7	*Cash*	0.176*	0.051*	-0.039*	-0.017	-0.242*	-0.277*	1						
8	*Firm age*	-0.038*	-0.072*	0.082*	0.006	0.110*	0.139*	-0.162*	1					
9	*Top_20*	0.036*	-0.005	0.070*	0.026*	0.142*	0.043*	0.025*	-0.007	1				
10	*CRB_Index*	-0.040*	-0.012	0.020	0.035*	0.092*	-0.043*	-0.057*	0.001	-0.013	1			
11	*Reserves*	0.026*	0.048*	0.064*	0.047*	0.114*	0.047*	-0.023	0.053*	0.102*	0.007	1		
12	*Resources*	0.011	0.028*	-0.003	0.040*	0.013	0.036*	-0.002	0.026*	0.052*	-0.008	0.450*	1	
13	*Return_Quarter*	-0.052*	-0.026*	-0.010	0.014	0.075*	-0.038*	-0.037*	-0.004	-0.014	0.222*	-0.009	-0.021	1

Table 4

Regression of forecast bias on the start of project financing and its forecast controls, firm controls, performance controls and year control

Panel A: Complete sample containing both groups of firms receiving PF (treatment) and the control group of only equity-financed firms

The sample consists of 24,082 mandatory quarterly cash flow forecasts issued by 1,018 firms between 1997 and 2014 in the mining industry. This table presents regression results of tests examining the change in management forecast bias before and after the announcement of a project financing approval. Our variable of interest is the interaction *POST x TREAT*. *TREAT* represents a dichotomous variable equal to 1 if the firm belongs to the treatment group of companies that eventually receive project financing during our sample period and *POST* represents a dichotomous variable equal to 1 if the quarter *t* issuing the cash flow forecast occurs after receiving a project financing loan and 0 otherwise. Column I depicts the effect of PF approval (*POST x TREAT*) on the unsigned or absolute value of the forecast bias (*UnsForecastError*) (the absolute estimated cash payments on operating activities on quarter *t* minus the actual cash outflow on quarter *t*, deflate by lagged market value (*Size*)). Column II repeats the test on the signed forecast error (*SigForecastError*). Column III and IV separate the analysis between underestimate bias (when the estimated cash payments on operating activities on quarter *t* minus the actual cash outflow on quarter *t* is negative, *i.e.*, payments were understated) and overestimate bias (when the estimated cash payments on operating activities on quarter *t* minus the actual cash outflow on quarter *t* is positive, *i.e.*, payments were overstate) respectively. Hypothesis I predicts that firms overstate forecasts after receiving debt financing. All variables vary quarterly with exception to *Top_20* annually updated. Control variables are described in Appendix I. Standard errors are clustered at the firm and year-quarter level. Z-stat is reported in brackets. Symbols ***, **, and * indicate two-sided significance at the 1%, 5%, and 10% levels. Year-quarter fixed effect is included.

Model: $ForecastError_t = \alpha_t + b_1 TREAT_{i,t} + b_2 TREAT_{i,t} \times POST_{i,t} + b_k Controls_{i,(t-1)} + \varepsilon$

VARIABLES	Column I *UnsForescast Error$_t$*	Column II *SigForecast Error$_t$*	Column III *Underestimate Bias$_t$*	Column IV *Overestimate Bias$_t$*
TREAT$_{i,t}$	0.002***	0.001	0.003**	0.002*
	[2.993]	[1.092]	[2.381]	[1.972]
POST$_{i,t}$ x TREAT$_{i,t}$	0.007***	0.005**	0.002	0.011***
	[4.219]	[2.184]	[1.339]	[4.569]
UnsForecastError$_{i,(t-1)}$	0.387***		0.296***	0.437***
	[23.285]		[13.464]	[19.864]
SigForecastError$_{i,(t-1)}$		0.323***		
		[17.840]		
Number_Pages$_{i,t}$	0.000	-0.000**	0.000*	0.000
	[0.990]	[-2.338]	[1.745]	[0.134]
Size$_{i,(t-1)}$	-0.002***	0.001***	-0.004***	-0.001***
	[-7.705]	[3.178]	[-8.482]	[-4.337]
Cash_Burn_Rate$_{i,(t-1)}$	0.002***	0.001*	0.002***	0.002***
	[6.809]	[1.975]	[6.747]	[5.248]
Cash$_{i,(t-1)}$	0.013***	0.013***	0.009***	0.016***
	[9.170]	[6.779]	[5.434]	[8.428]
Firm age$_{i,(t-1)}$	-0.000***	0.000*	-0.000***	-0.000
	[-3.041]	[1.713]	[-3.854]	[-1.613]
Top_20$_{i,t}$	0.001	0.004*	0.001	0.000
	[0.688]	[1.780]	[0.539]	[0.181]
CRB_Index$_{i,(t-1)}$	0.018	0.060**	-0.013	0.045**
	[1.178]	[2.152]	[-0.516]	[2.063]
Reserves$_{i,(t-1)}$	0.002***	-0.001	0.003***	0.001*
	[3.503]	[-0.774]	[3.365]	[1.980]
Resources$_{i,(t-1)}$	-0.000**	0.000	-0.000***	-0.000
	[-2.546]	[0.617]	[-2.785]	[-0.520]

Return_Quarter$_{i,(t-1)}$	-0.005***	-0.002***	-0.004***	-0.006***
	[-6.657]	[-4.162]	[-5.562]	[-5.796]
Constant	0.053***	-0.023***	0.078***	0.037***
	[10.661]	[-3.827]	[10.941]	[6.742]
Observations	24,082	24,082	11,800	12,282
Year-quarter FE	Yes	Yes	Yes	Yes
Firm & Year-q Cluster	Yes	Yes	Yes	Yes
Adj. R-squared	0.237	0.138	0.222	0.260

Panel B: Homogeneous sample restricted to the treatment group of firms receiving PF for self-selection robustness and test for loan size

The sample consists of 4,424 mandatory quarterly cash flow forecasts issued by 137 firms receiving project financing between 1997 and 2014 in the mining industry. The following test re-runs the analysis on Panel A after restricting the sample only to firms receiving PF and including firm-fixed effect as a robustness test for the possibility of self-selection associated with the characteristic of firms receiving project financing. All variables vary quarterly with exception to *Top_20* annually updated. Control variables are described in Appendix I. Standard errors are clustered at the firm and year-quarter level. Z-stat is reported in brackets. Symbols ***, **, and * indicate two-sided significance at the 1%, 5%, and 10% levels. Firm and year-quarter fixed effects are included.

Model: $ForecastError_t = \alpha_t + b_1 TREAT_{i,t} \times POST_{i,t} + b_k Controls_{i,(t-1)} + \varepsilon$

VARIABLES	Column I *UnsForescast Error*$_t$	Column II *SigForecast Error*$_t$	Column III *Underestimate Bias*$_t$	Column IV *Overestimate Bias*$_t$
$POST_{i,t} \times TREAT_{i,t}$	0.010***	0.010**	-0.000	0.018***
	[3.823]	[2.587]	[-0.004]	[5.227]
$POST_{i,t} \times TREAT_{i,t} \times Loan\_amount\_SE_{i,t}$	0.000***	0.001***	-0.000	0.001***
	[6.375]	[4.638]	[-0.107]	[6.413]
$UnsForecastError_{i,(t-1)}$	0.344***		0.219***	0.360***
	[10.760]		[5.027]	[9.128]
$SigForecastError_{i,(t-1)}$		0.290***		
		[9.182]		
$Number\_Pages_{i,t}$	-0.000	-0.000	0.000	0.000
	[-0.535]	[-0.506]	[0.184]	[0.005]
$Size_{i,(t-1)}$	-0.001**	0.002***	-0.003***	-0.001
	[-2.024]	[3.067]	[-3.330]	[-0.971]
$Cash\_Burn\_Rate_{i,(t-1)}$	0.002***	0.001	0.002***	0.001
	[2.729]	[0.946]	[4.374]	[1.102]
$Cash_{i,(t-1)}$	0.014***	0.010**	0.008*	0.016***
	[3.842]	[2.113]	[1.957]	[2.960]
$Firm\ age_{i,(t-1)}$	0.003	-0.031	0.020	-0.019
	[0.099]	[-0.492]	[0.429]	[-0.286]
$Top\_20_{i,t}$	0.005	0.003	-0.002	0.016
	[0.809]	[0.340]	[-0.372]	[1.645]
$CRB\_Index_{i,(t-1)}$	-0.056	0.010	-0.074	-0.015
	[-1.181]	[0.213]	[-1.615]	[-0.291]
$Reserves_{i,(t-1)}$	0.005***	0.000	0.006**	0.005**
	[2.953]	[0.146]	[2.358]	[2.573]
$Resources_{i,(t-1)}$	-0.000	0.000	-0.000	-0.000***
	[-1.334]	[0.618]	[-0.100]	[-2.895]
$Return\_Quarter_{i,(t-1)}$	-0.004**	-0.001	-0.004**	-0.004
	[-2.324]	[-0.532]	[-2.482]	[-1.188]
Constant	-0.000	0.278	-0.141	0.218
	[-0.001]	[0.426]	[-0.285]	[0.314]
Observations	4,424	4,424	2,006	2,412
Year-quarter FE	Yes	Yes	Yes	Yes
Firm & Year-q Cluster	Yes	Yes	Yes	Yes
Adj. R-squared	0.283	0.209	0.276	0.336

Table 5

Regression of forecast bias timing on the year dummies indicating years around the start of project financing and its forecast controls, firm controls, performance controls and year control

Using the subsample of firms receiving project financing, this table examines the timing when the forecast bias occurs. Our hypothesis II predicts that the forecast bias is stronger in the first years after project financing starts, therefore we expect the indicators for first year after project financing (*i.e., Y1_After_Loan*) to be significantly positive with overestimation bias while we expect a negative or not significant association with the dummies indicating the years before project financing starts (*i.e., Y1_Before_Loan, Y2_Before_Loan, etc*.). All variables vary quarterly with exception to dummies indicating years around PF and *Top_20* annually updated. Control variables are described in Appendix I. Standard errors are clustered at the firm and year-quarter level. Z-stat is reported in brackets. Symbols ***, **, and * indicate two-sided significance at the 1%, 5%, and 10% levels. Firm fixed effects is included.

Model: $SigForecastError_{i,t} = b_0 + b_k\sum_{k=1}^{k=4} Y(k)Before\_loan + b_k\sum_{k=1}^{k=4} Y(k)After\_Loan + b_k Controls_{i,(t-1)} + \varepsilon$

VARIABLES	Column I *SigForecast Error$_t$*	Column II *Overestimate Bias$_t$*	Column III *Actual Cost$_t$*	Column IV *Estimated Cost$_t$*
Y4_Before_Loan$_{i,t}$	-0.001	-0.000	-0.004	0.004
	[-0.172]	[-0.122]	[-0.851]	[0.770]
Y3_Before_Loan$_{i,t}$	-0.001	-0.002	-0.007	-0.001
	[-0.313]	[-0.683]	[-1.296]	[-0.299]
Y2_Before_Loan$_{i,t}$	-0.002	-0.001	-0.000	-0.003
	[-0.582]	[-0.186]	[-0.040]	[-0.491]
Y1_Before_Loan$_{i,t}$	-0.002	-0.002	-0.008	0.001
	[-0.953]	[-0.580]	[-1.369]	[0.245]
Y1_After_Loan$_{i,t}$	0.013***	0.024***	0.017**	0.041***
	[3.143]	[5.225]	[2.011]	[4.838]
Y2_After_Loan$_{i,t}$	0.009*	0.019***	0.041***	0.006
	[1.898]	[4.149]	[3.270]	[0.530]
Y3_After_Loan$_{i,t}$	-0.006	0.003	0.051***	-0.023*
	[-1.526]	[0.709]	[3.800]	[-1.987]
Y4_After_Loan$_{i,t}$	-0.003	0.007	0.022***	0.001
	[-0.524]	[1.258]	[2.680]	[0.109]
SigForecastError$_{i,(t-1)}$	0.289***		0.019	0.142***
	[8.873]		[0.414]	[2.840]
UnsForecastError$_{i,(t-1)}$		0.354***		
		[9.103]		
Number_Pages$_{i,t}$	-0.000	0.000	0.001**	-0.000
	[-0.477]	[0.170]	[2.317]	[-0.348]
Size$_{i,(t-1)}$	0.002**	-0.001	-0.014***	-0.002
	[2.564]	[-1.193]	[-7.158]	[-0.751]
Cash_Burn_Rate$_{i,(t-1)}$	0.001	0.001	0.012***	-0.000
	[1.202]	[1.127]	[6.001]	[-0.327]
Cash$_{i,(t-1)}$	0.010**	0.015***	0.038***	0.019**
	[2.052]	[2.811]	[5.311]	[2.280]
Firm age$_{i,(t-1)}$	-0.032	-0.029	0.083	-0.065
	[-0.515]	[-0.447]	[1.086]	[-0.787]
Top_20$_{i,t}$	0.005	0.017*	0.016	0.009
	[0.628]	[1.798]	[0.954]	[0.621]
CRB_Index$_{i,(t-1)}$	0.017	0.002	-0.072	0.072
	[0.385]	[0.043]	[-0.811]	[1.320]
Reserves$_{i,(t-1)}$	-0.000	0.004**	0.015**	0.002
	[-0.014]	[2.234]	[2.103]	[0.507]
Resources$_{i,(t-1)}$	0.000	-0.000**	-0.000	0.000
	[0.504]	[-2.360]	[-1.516]	[0.949]

Return_Quarter$_{i,(t-1)}$	-0.001	-0.004	-0.003	0.001
	[-0.542]	[-1.264]	[-1.613]	[0.403]
Estimated_Cost$_{i,t}$			0.329***	
			[8.921]	
Actual Cost$_{i,t}$				0.424***
				[8.022]
Constant	0.283	0.332	-0.590	0.717
	[0.446]	[0.489]	[-0.749]	[0.845]
Observations	4,424	2,412	4,424	4,424
Firm FE	Yes	Yes	Yes	Yes
Firm & Year-q Cluster	Yes	Yes	Yes	Yes
Adj. R-squared	0.209	0.339	0.470	0.394

Table 6

Regression on the standard deviation (dispersion) of estimation elements and year dummies.

We examine the yearly standard deviation of all dependent variables examined in Table 5. We expect firms in the first year following the loan to present less homogeneous elements (higher standard deviation) involved in the forecast of cash outflows (actual cash flows, estimations) and therefore find difficulty in identifying overestimations. Our variable of interest is *Y1_After_Loan*, and we expect to be positively associated with all the elements involved in forecasting cash outflows. All variables vary quarterly with exception to dummies indicating years around PF and *Top_20* annually updated. Control variables are described in Appendix I. Standard errors are clustered at the firm and year-quarter level. Z-stat is reported in brackets. Symbols ***, **, and * indicate two-sided significance at the 1%, 5%, and 10% levels. Firm fixed effects is included.

Model: $SD(ForecastError_{i,t}) = b_0 + b_k\sum Y(k)Before\_loan_{i,t} + b_k\sum Y(k)After\_Loan_{i,t} + b_kControls_{i,(t-1)} + \varepsilon$

VARIABLES	Column I $SD(SigForecast\ Error_t)$	Column III $SD(Overestimate\ Bias_t)$	Column IV $SD(Actual\ Cost_t)$	Column V $SD(Estimated\ Cost_t)$
$Y4\_Before\_Loan_{i,t}$	-0.004*	-0.001	-0.005	-0.002
	[-1.720]	[-0.756]	[-1.296]	[-0.525]
$Y3\_Before\_Loan_{i,t}$	-0.004	-0.002	-0.000	-0.000
	[-1.451]	[-0.892]	[-0.040]	[-0.105]
$Y2\_Before\_Loan_{i,t}$	-0.001	-0.003*	-0.001	-0.002
	[-0.283]	[-1.712]	[-0.220]	[-0.517]
$Y1\_Before\_Loan_{i,t}$	0.001	-0.000	-0.000	0.006
	[0.467]	[-0.136]	[-0.123]	[1.329]
$Y1\_After\_Loan_{i,t}$	0.014***	0.004**	0.015***	0.023***
	[4.415]	[2.138]	[4.181]	[4.224]
$Y2\_After\_Loan_{i,t}$	0.007**	-0.001	0.016***	0.009
	[2.072]	[-0.559]	[4.151]	[1.647]
$Y3\_After\_Loan_{i,t}$	0.000	-0.002	0.014***	-0.001
	[0.117]	[-0.952]	[2.712]	[-0.205]
$Y4\_After\_Loan_{i,t}$	-0.001	0.001	0.008*	0.004
	[-0.186]	[0.455]	[1.733]	[0.661]
$SigForecastError_{i,(t-1)}$	0.057***		0.019	0.089***
	[2.915]		[0.888]	[3.148]
$UnsForecastError_{i,(t-1)}$		0.746***		
		[11.134]		
$Number\_Pages_{i,t}$	0.000	-0.000	0.000*	-0.000
	[0.927]	[-0.939]	[1.863]	[-0.088]
$Size_{i,(t-1)}$	-0.003***	-0.000	-0.005***	-0.002
	[-2.889]	[-0.144]	[-5.275]	[-1.628]
$Cash\_Burn\_Rate_{i,(t-1)}$	0.004***	0.000	0.006***	0.003***
	[5.541]	[0.615]	[6.753]	[3.651]
$Cash_{i,(t-1)}$	0.018***	0.002	0.022***	0.018***
	[5.594]	[1.121]	[5.196]	[3.887]
$Firm\ age_{i,(t-1)}$	-0.058	0.030	-0.012	0.016
	[-1.014]	[0.863]	[-0.274]	[0.204]
$Top\_20_{i,t}$	-0.004	0.002	-0.000	-0.000
	[-0.637]	[0.329]	[-0.026]	[-0.012]
$CRB\_Index_{i,(t-1)}$	0.013	-0.006	0.009	-0.004
	[1.003]	[-0.192]	[0.262]	[-0.167]
$Reserves_{i,(t-1)}$	0.003	-0.000	0.004	0.003
	[1.653]	[-0.428]	[1.564]	[1.135]
$Resources_{i,(t-1)}$	0.000	-0.000	-0.000	-0.000
	[0.222]	[-0.165]	[-1.119]	[-0.538]
$Return\_Quarter_{i,(t-1)}$	0.000	0.001	0.001	0.004**
	[0.182]	[0.866]	[0.701]	[2.211]

Constant	0.659	-0.304	0.237	-0.108
	[1.124]	[-0.847]	[0.505]	[-0.134]
Observations	4,365	2,882	4,368	4,368
Firm FE	Yes	Yes	Yes	Yes
Firm & Year-q Cluster	Yes	Yes	Yes	Yes
Adj. R-squared	0.316	0.622	0.349	0.293

Table 7

Regression of forecast error on the issue of cash flow related to proceeds from borrowing and its forecast controls, firm controls, performance controls and year control

This test examines whether the signaling follows the pecking order. Our variable of interest is *CashBorrowing* calculated as the lagged cash from proceeds of borrowing scaled by lagged market value (*Size*). $\Sigma\, CashBorrowing_{i,(t-2)}$, calculated as the sum of all debt trenches paid to the borrower up to 2 quarters before overestimation is observed. Control variables are described in Appendix I. Standard errors are clustered at the firm and year-quarter level. Z-stat is reported in brackets. Symbols ***, **, and * indicate two-sided significance at the 1%, 5%, and 10% levels. Firm and year-quarter fixed effects are included.

Model: $ForecastError_t = \alpha_t + b_1 CashBorrowing_{i,(t-1)} + b_2 CashShares_{i,(t-1)} + b_3 CashShares_{i,(t-1)} \times \Sigma\, CashBorrowing_{i,(t-2)} + b_k Controls_{i,(t-1)} + \varepsilon$

VARIABLES	Column I *SigForecast Error$_t$*	Column II *SigForecast Error$_t$*	Column III *Underestimate Bias$_t$*	Column IV *Overestimate Bias$_t$*
CashBorrowing$_{i,(t-1)}$	0.097***	0.099***	0.056	0.054*
	[2.782]	[2.885]	[1.227]	[1.743]
CashShares$_{i,(t-1)}$	0.008	-0.023	0.011	-0.038
	[0.324]	[-1.099]	[0.395]	[-1.463]
Σ *CashBorrowing$_{i,(t-2)}$*		-0.007	-0.031**	-0.018
		[-0.563]	[-2.129]	[-1.629]
CashShares$_{i,(t-1)}$ x Σ *CashBorrowing$_{i,(t-2)}$*		0.074**	0.047	0.127***
		[2.160]	[0.951]	[4.134]
SigForecast Error$_{t,(t-1)}$	0.236***	0.230***		
	[3.142]	[3.020]		
UnsForecast Error$_{t,(t-1)}$			0.125	0.253***
			[1.598]	[4.602]
Number_Pages$_{i,t}$	0.000	0.000	-0.000	-0.000
	[0.779]	[0.787]	[-0.343]	[-0.372]
Size$_{i,(t-1)}$	0.000	0.000	-0.005	-0.003
	[0.053]	[0.130]	[-0.939]	[-0.860]
Cash_Burn_Rate$_{i,(t-1)}$	-0.001	-0.001	0.000	-0.000
	[-0.385]	[-0.423]	[0.174]	[-0.092]
Cash$_{i,(t-1)}$	0.020	0.025	-0.025	0.017
	[1.267]	[1.574]	[-1.285]	[1.155]
Firm age$_{i,(t-1)}$	-0.004	-0.003	0.023	-0.004
	[-0.203]	[-0.153]	[1.382]	[-0.491]
Top_20$_{i,t}$	0.069**	0.069**	-0.002	0.076***
	[2.501]	[2.559]	[-0.043]	[3.461]
CRB_Index$_{i,(t-1)}$	-0.105	-0.122	0.020	0.097
	[-0.650]	[-0.768]	[0.099]	[0.447]
Reserves$_{i,(t-1)}$	-0.004	-0.004	0.007	0.005
	[-0.809]	[-0.709]	[1.325]	[0.747]
Resources$_{i,(t-1)}$	0.000	-0.000	-0.000	-0.000
	[0.009]	[-0.037]	[-0.338]	[-0.635]
Return_Quarter$_{i,(t-1)}$	-0.001	-0.001	-0.010	-0.006
	[-0.209]	[-0.212]	[-0.893]	[-0.653]
Constant	-0.005	-0.015	-0.056	0.077
	[-0.024]	[-0.071]	[-0.371]	[1.299]
Observations	958	958	364	571
Year dummies	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Firm & Year-q Cluster	Yes	Yes	Yes	Yes
Adjusted R-squared	0.259	0.263	0.225	0.451

Table 8

Regression on cumulative abnormal returns around the disclosure of management forecast and reaction to overestimation of cash outflows

The sample used in restricted to the period after firms receive PF. This table examines the question of why all firms don't issue overestimates to increase their reputation with lenders is considered. We expect that the increase in estimated cash payments ($\Delta M\_Estimated\_Cost_t$) to be associated with good news (investment opportunity) and therefore to be positively associated with cumulative abnormal return on a 3-day window around forecast disclosure ($CAR3_{-1,+1}$). Conversely, we expect the equilibrium is when this increase is perceived by the market to be higher than expected (*M_Predicted_Overspend*), we predict the market will react negatively as it signals overspending in the following quarter. Thus, we expect the interaction $\Delta M\_Estimated\_Cost_t$ x $M\_Predicted\_Overspend_t$ to be negatively associated with $CAR3_{-1,+1}$. We test using a mechanical model, where $\Delta M\_Estimated\_Cost_t$ is calculated by the subtraction of estimated payment of quarter *t* by a predicted estimated payment using a four-quarter autocorrelation model and $M\_Predicted\_Overspend_t$ is calculated by subtracting the estimated payment on quarter *t* by the predicted actual cost of quarter *t*+1 calculated using an autocorrelation model. All variables vary quarterly. Control variables are described in Appendix I. Standard errors are clustered at the firm and year-quarter level. Z-stat is reported in brackets. Symbols ***, **, and * indicate two-sided significance at the 1%, 5%, and 10% levels. Firm and year-quarter fixed effects are included in the full sample and excluded from the restricted sample due to the lower number of observations.

Model: $CAR_{i,t} = b_0 + b_1\Delta M\_Estimated\_Cost_{i,t} + b_2 M\_Predicted\_Overspend_{i,t} + b_3\Delta M\_Estimated\_Cost_{i,t}$ x $M\_Predicted\_Overspend_{i,t} + b_4 OverestimateBias_{i,t} + b_5 Underestimated\_Bias_{i,t} + b_k Controls_{i,(t-1)} + \varepsilon$

Variables	Column I $CAR3_{-1,+1}$	Column II $CAR3_{-1,+1}$
$\Delta M\_Estimated\_Cost_t$	0.119**	0.107**
	[2.163]	[2.069]
$M\_Predicted\_Overspend_t$	-0.101	-0.070
	[-1.572]	[-1.089]
$\Delta M\_Estimated\_Cost_t$ x $M\_Predicted\_Overspend_t$	-0.171**	-0.199**
	[-2.254]	[-2.077]
$OverestimateBias_{i,(t-1)}$	-0.034	-0.052
	[-0.522]	[-0.754]
$UnderestimatedBias_{i,(t-1)}$	-0.295***	-0.214**
	[-2.851]	[-2.244]
$Cash_{i,(t-1)}$	-0.006	-0.003
	[-0.552]	[-0.250]
$Cash\_Burn\_Rate_{i,(t-1)}$	-0.001	-0.000
	[-0.538]	[-0.246]
$Size_{i,(t-1)}$	-0.000	-0.001
	[-0.109]	[-0.803]
$CRB\_Index_{i,(t-1)}$	-0.127*	-0.155*
	[-1.828]	[-1.914]
$Reserves_{i,(t-1)}$	-0.003	-0.002
	[-0.911]	[-1.051]
$Resources_{i,(t-1)}$	0.000	0.000
	[0.535]	[0.378]
$Number\_Pages_{i,t}$	-0.000	-0.001
	[-0.917]	[-1.138]
Constant	0.021	0.043
	[0.618]	[1.270]
Observations	1,250	1,249
Year dummies	NO	YES
Firm & Year-q Cluster	YES	YES
Adjusted R-squared	0.0131	0.0179

Table 9

Regression of forecast bias on the start of project development lifecycle with and without project financing and its forecast controls, firm controls, performance controls and year control

This table presents regression results of tests examining the change in management forecast bias before and after a firm enters into the development lifecycle. Our variable of interest is the interaction *POST_DEVEL x TREAT*. *TREAT* represents a dichotomous variable equal to 1 if the firm belongs to the treatment group of companies that eventually receive project financing during our sample period and *POST_DEVEL* represents a dichotomous variable equal to 1 if the quarter *t* issuing the cash flow forecast occurs after a firm has actual development cash payments higher than exploration and evaluation and 0 otherwise. Control variables are described in Appendix I. Standard errors are clustered at the firm and year-quarter level. Z-stat is reported in brackets. Symbols ***, **, and * indicate two-sided significance at the 1%, 5%, and 10% levels. Year-quarter and firm fixed effects is included.

Model: $ForecastError_t = \alpha_t + b_1 TREAT_{i,t} + b_1 POST\_DEVEL_{i,t} + b_2 TREAT_{i,t} \times POST\_DEVEL_{i,t} + b_k Controls_{i,(t-1)} + \varepsilon$

VARIABLES	Column I *UnsForescast Error$_t$*	Column II *SigForecast Error$_t$*	Column III *Underestimate Bias$_t$*	Column IV *Overestimate Bias$_t$*
TREAT$_{i,t}$	0.007***	-0.005**	0.011***	0.004
	[3.930]	[-2.340]	[4.478]	[1.525]
POST_DEVEL$_{i,t}$	0.000	0.000	0.000	0.000
	[0.000]	[0.000]	[0.000]	[0.000]
POST_DEVEL$_{i,t}$ x TREAT$_{i,t}$	0.006*	0.010**	0.001	0.009**
	[1.897]	[2.530]	[0.402]	[2.088]
UnsForescastBias$_{i,(t-1)}$	0.255***		0.156***	0.282***
	[14.793]		[8.147]	[12.857]
SigForecastError$_{i,(t-1)}$		0.204***		
		[11.187]		
Number_Pages$_{i,t}$	0.000	-0.000	0.000	0.000
	[1.552]	[-0.345]	[1.401]	[1.251]
Size$_{i,(t-1)}$	-0.004***	0.002***	-0.006***	-0.003***
	[-10.546]	[3.025]	[-11.636]	[-5.278]
Cash_Burn_Rate$_{i,(t-1)}$	0.001***	0.000	0.002***	0.001***
	[5.438]	[0.914]	[6.042]	[2.981]
Cash$_{i,(t-1)}$	0.014***	0.013***	0.008***	0.018***
	[8.963]	[6.372]	[5.352]	[8.431]
Firm age$_{i,(t-1)}$	-0.001***	-0.002***	-0.000	-0.002***
	[-4.534]	[-4.389]	[-0.263]	[-5.103]
Top_20$_{i,t}$	0.006**	0.004	0.004	0.009**
	[2.529]	[1.095]	[1.556]	[2.010]
CRB_Index$_{i,(t-1)}$	0.013	0.051**	-0.021	0.035
	[0.837]	[2.285]	[-0.974]	[1.642]
Reserves$_{i,(t-1)}$	0.003***	0.001	0.003**	0.003**
	[3.382]	[0.460]	[2.558]	[2.379]
Resources$_{i,(t-1)}$	-0.000	0.000	-0.000	-0.000
	[-0.422]	[0.385]	[-0.183]	[-0.849]
Return_Quarter$_{i,(t-1)}$	-0.004***	-0.003***	-0.003***	-0.006***
	[-5.902]	[-4.600]	[-3.511]	[-6.336]
Constant	0.092***	-0.004	0.117***	0.085***
	[13.841]	[-0.710]	[6.413]	[9.804]
Observations	24,082	24,082	11,755	12,246
Year-quarter FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Firm & Year-q Cluster	Yes	Yes	Yes	Yes
Adjusted R-squared	0.288	0.189	0.307	0.325

Table 10

Regression of the determinants of production expenditure and initial ramp-up revenue and its forecast controls, firm controls, performance controls and year control

This table presents regression results of tests examining the determinants of production costs (Column I and II) as a proxy for firms moving into production lifecycle and receipts costs (Column III and IV) as a proxy for firms' initial revenue generation. Our variable of interest is the interaction *Cumul_Overestimation*, which is the cumulative average of overestimations (*OverestimateBias)* up to the quarter before the production cost and revenue disclosure in Appendix 5B. *ProductionCost* represents a continuous variable equal to the actual expenditure in production (see Item 1.2 c in Appendix II) scaled by lagged market value (*Size*)and *Receipts* represents a continuous variable equal to the actual receipts in quarter *t* (see Item 1.1in Appendix II) scaled by lagged market value (*Size*). Control variables are described in Appendix I. Standard errors are clustered at the firm and year-quarter level. Z-stat is reported in brackets. Symbols ***, **, and * indicate two-sided significance at the 1%, 5%, and 10% levels. Year-quarter fixed effects is included.

Model: $ProductionCost_t \text{ or } Receipts_t = \alpha_t + b_0 Cumul\_Overestimation_{i,(t-1)} + b_1 Cumul\_Underestimation_{i,(t-1)} + b_k Controls_{i,(t-1)} + \varepsilon$

VARIABLES	Colum I $ProductionCost_{i,t}$	Colum II $ProductionCost_{i,t}$	Colum III $Receipts_{i,t}$	Colum IV $Receipts_{i,t}$
$Cumul\_Overestimation_{i,(t-1)}$	0.158**		0.257***	
	[2.524]		[2.713]	
$Cumul\_Underestimation_{i,(t-1)}$		0.367		0.089
		[1.547]		[0.470]
$Receipts_{i,(t-1)}$	0.108**	0.109**	0.522***	0.525***
	[2.338]	[2.383]	[6.790]	[6.808]
$ProductionCost_{i,(t-1)}$	0.654***	0.654***	0.427***	0.431***
	[8.779]	[8.686]	[4.556]	[4.558]
$Number\_Pages_{i,t}$	-0.000	-0.000	0.000	0.000
	[-0.724]	[-0.527]	[0.736]	[0.810]
$Size_{i,(t-1)}$	0.001	0.001	-0.001	-0.001
	[0.269]	[0.459]	[-0.402]	[-0.488]
$Cash\_Burn\_Rate_{i,(t-1)}$	0.003***	0.003**	0.002	0.001
	[2.846]	[2.574]	[1.209]	[1.061]
$Cash_{i,(t-1)}$	-0.006	-0.007	-0.022**	-0.022**
	[-0.728]	[-0.849]	[-2.343]	[-2.428]
$Firm\ age_{i,(t-1)}$	-0.007	-0.009	0.007	0.005
	[-0.630]	[-0.824]	[0.586]	[0.431]
$Top\_20_{i,t}$	-0.014	-0.016	-0.014	-0.016
	[-1.323]	[-1.447]	[-1.016]	[-1.158]
$CRB\_Index_{i,(t-1)}$	0.035	0.020	0.148	0.141
	[0.518]	[0.300]	[1.394]	[1.325]
$Reserves_{i,(t-1)}$	-0.006**	-0.006**	-0.009*	-0.009*
	[-2.230]	[-2.112]	[-1.908]	[-1.852]
$Resources_{i,(t-1)}$	-0.000	-0.000	-0.000	-0.000
	[-0.177]	[-0.363]	[-0.216]	[-0.609]
$Return\_Quarter_{i,(t-1)}$	-0.003	-0.003	0.001	0.001
	[-0.624]	[-0.644]	[0.213]	[0.216]
Constant	0.064	0.077	-0.034	-0.009
	[0.720]	[0.863]	[-0.324]	[-0.081]
Observations	1,615	1,615	1,615	1,615
Year-quarter FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Firm & Year-q Cluster	Yes	Yes	Yes	Yes
Adjusted R-squared	0.717	0.718	0.737	0.735

Table 11

Regression of the determinants of debt drawdowns and its forecast controls, firm controls, performance controls and year control

This table examines the debt market incentives in increasing overestimations. Our dependent variable is the amount of cash received from debt drawdowns (*CashBorrowing*), and our variable of interest is the lagged cumulative overestimation (*Cumul_Overestimation*). Control variables are described in Appendix I. Standard errors are clustered at the firm and year-quarter level. Z-stat is reported in brackets. Symbols ***, **, and * indicate two-sided significance at the 1%, 5%, and 10% levels. Year-quarter fixed effects is included.

Model: $CashBorrowing_{i,t} = \alpha_t + b_0 Cumul\_Overestimation_{i,(t-1)} + b_1 Cumul\_Underestimation_{i,(t-1)} + b_k Controls_{i,(t-1)} + \varepsilon$

VARIABLES	Colum I $CashBorrowing_{i,t}$	Colum II $CashBorrowing_{i,t}$	Colum III $CashBorrowing_{i,t}$
$Cumul\_Overestimation_{i,(t-1)}$	0.593***		
	[3.822]		
$Cumul\_Underestimation_{i,(t-1)}$		0.274	
		[0.792]	
$OverestimateBias\_Exp_{i,(t-1)}$			0.156
			[0.331]
$OverestimateBias\_Dev_{i,(t-1)}$			0.525***
			[3.438]
$OverestimateBias\_Prod_{i,(t-1)}$			0.476
			[1.446]
$OverestimateBias\_Adm_{i,(t-1)}$			0.250
			[0.550]
$Number\_Pages_{i,t}$	0.001	0.001	0.001
	[1.026]	[1.217]	[0.662]
$Size_{i,(t-1)}$	-0.003	-0.003	0.001
	[-1.282]	[-1.597]	[0.474]
$Cash\_Burn\_Rate_{i,(t-1)}$	0.008***	0.007***	0.011***
	[3.475]	[3.375]	[3.245]
$Cash_{i,(t-1)}$	-0.005	0.000	-0.003
	[-0.370]	[0.002]	[-0.187]
$Firm\ age_{i,(t-1)}$	-0.019***	-0.019***	-0.021***
	[-3.051]	[-3.111]	[-3.165]
$Top\_20_{i,t}$	0.040	0.030	-0.014
	[1.401]	[1.535]	[-0.560]
$CRB\_Index_{i,(t-1)}$	0.011	0.049	-0.007
	[0.050]	[0.214]	[-0.028]
$Reserves_{i,(t-1)}$	-0.004	-0.001	-0.003
	[-1.478]	[-0.522]	[-0.728]
$Resources_{i,(t-1)}$	0.000	0.000	0.000
	[0.922]	[0.525]	[0.207]
$Return\_Quarter_{i,(t-1)}$	-0.000	0.000	0.008
	[-0.046]	[0.012]	[0.578]
Constant	0.187***	0.213***	0.148**
	[2.710]	[3.053]	[2.148]
Observations	971	971	605
Year-quarter FE	Yes	Yes	Yes
Firm & Year-q Cluster	Yes	Yes	Yes
Adjusted R-squared	0.151	0.118	0.0926

Table 12
Propensity score matching

Panel A: first-stage propensity score matching logit regression

This table measures the first stage of propensity score matching with the chosen variables we assume that treatment (receiving PF) is determined by cash but rate, cash, firm age, ownership structure, commodity index, resource/reserve quantum, and quarter market reaction to capture firm-performance. Control variables are described in Appendix I. Standard errors are clustered at the firm and year-quarter level. Z-stat is reported in brackets. Symbols ***, **, and * indicate two-sided significance at the 1%, 5%, and 10% levels. Firm and year-quarter fixed effects are included.

Model: $POST_t \times TREAT_t = \alpha_t + b_1 Size_{(t-1)} + b_2 Cash\_burn\_rate_{(t-1)} + b_3 Cash_{(t-1)} + b_4 Firm\ Age_{(t-1)} + b_5 Top\_20_t + b_6\ CRB\_Index_{(t-1)} + b_7 Reserves_{(t-1)} + b_8 Resources_{(t-1)} + b_9 QuarterReaction_{(t-1)} + \varepsilon$

VARIABLES	Column I *POST x TREAT*
$Size_{(t-1)}$	0.377***
	[28.55]
$Cash\_burn\_rate_{(t-1)}$	0.161***
	[11.62]
$Cash_{(t-1)}$	0.393***
	[5.13]
$Firm\ Age_{(t-1)}$	0.011***
	[5.16]
Top_20_t	0.253**
	[2.36]
$CRB\_Index_{(t-1)}$	0.36*
	[1.87]
$Reserves_{(t-1)}$	0.106***
	[3.85]
$Resources_{(t-1)}$	0.000
	[-1.31]
$QuarterReaction_{(t-1)}$	-0.162***
	[-2.65]
Constant	-8.288
	[-34.78]
Observations	12,177
Pseudo R-squared	0.19

Panel B: Estimate of the treatment effect

This table shows the estimate of the treated group and the control group. This result can also be seen graphically in Figure 3.

Variable	Sample	Treated	Controls	Difference	S.E.	t-stat	stat
Overestimation	Unmatched	0.043	0.026	0.016	0.001	12.34	***
	Matched group	0.043	0.025	0.018	0.002	7.86	***

Panel C: Common support

Treatment Assignment	Off support	On Support
Untreated	0	11,259
Treated	3	915
Total	0	12,174

Panel D: inverse-probability-weighted (IPW) treatment-effects estimator

	Coeff.	Std. Err.	z	P>z	N. Obs
After and before loan (1 vs 0)	0.018	0.002	6.54	0.000	12,177
before loan (0)	0.026	0.0003	73.70	0.000	12,177

Overidentification test for covariate balance H0: Covariates are balanced: chi2(10) = 115.689 Prob > chi2 = 0.0000

Panel E: Association between project financing and forecast bias using propensity score matching weights

This table examines the endogenous relation between receiving the project financing and firm characteristics by re-running our test in Table 4 using the propensity score matching with the weights estimated in Table 12. Control variables are described in Appendix I. Standard errors are clustered at the firm and year-quarter level. Z-stat is reported in brackets. Symbols ***, **, and * indicate two-sided significance at the 1%, 5%, and 10% levels. Firm and year-quarter fixed effects are included.

Model: $ForecastError_t = \alpha_t + b_1 TREAT_{i,t} + b_2 TREAT_{i,t} \times POST_{i,t} + b_k Controls_{i,(t-1)} + \varepsilon$

Variable	Column I $UnsForecastError_t$	Column II $SigForecastError_t$	Column III $UnderestimateBias_t$	Column IV $OverestimateBias_t$
$POST_{i,t} \times TREAT_{i,t}$	0.007***	0.006**	0.002	0.009***
	[3.681]	[2.452]	[0.808]	[3.663]
$UnsForecastError_{i,(t-1)}$	0.491***		0.300***	0.529***
	[13.695]		[6.932]	[11.021]
$SigForecastError_{i,(t-1)}$		0.429***		
		[10.122]		
$Number\_Pages_{i,t}$	-0.000	-0.000	0.000	-0.000
	[-0.345]	[-1.328]	[1.086]	[-0.845]
$Size_{i,(t-1)}$	-0.002***	0.001**	-0.002***	-0.001*
	[-3.351]	[2.024]	[-3.596]	[-1.763]
$Cash\_Burn\_Rate_{i,(t-1)}$	0.001	0.001	0.002***	0.001*
	[1.433]	[1.281]	[4.155]	[1.759]
$Cash_{i,(t-1)}$	0.010***	0.016***	0.008*	0.015**
	[2.739]	[3.507]	[1.932]	[2.394]
$Firm\ age_{i,(t-1)}$	-0.000*	0.000	-0.000***	-0.000
	[-1.972]	[0.092]	[-2.938]	[-0.258]
$Top\_20_{i,t}$	0.005	0.005	0.003	0.005
	[1.034]	[0.979]	[0.495]	[0.690]
$CRB\_Index_{i,(t-1)}$	-0.062	-0.068	-0.144	-0.116
	[-1.070]	[-1.158]	[-1.385]	[-1.419]
$Reserves_{i,(t-1)}$	0.001	0.000	0.002	0.003*
	[1.499]	[0.089]	[1.249]	[1.790]
$Resources_{i,(t-1)}$	-0.000	0.000	-0.000	-0.000
	[-0.813]	[0.461]	[-1.460]	[-1.200]
$Return\_Quarter_{i,(t-1)}$	-0.004	0.003	-0.005**	-0.004
	[-1.539]	[1.176]	[-2.426]	[-0.956]
Constant	0.051***	-0.028**	0.063***	0.039**
	[4.494]	[-2.399]	[5.185]	[2.442]
Observations	3,268	3,268	1,431	1,830
Year-quarter FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Firm & Year-q Cluster	Yes	Yes	Yes	Yes
Adj. R-squared	0.278	0.193	0.162	0.290

Appendix I

List of Variable Definitions

Dependent Variables:	
SigForecastError	Signed estimated payments (estimated, see example on "estimated cash payments" on section 1.5, page 3, of Appendix II) for quarter *t* minus realized payments for quarter *t* (Actual, see example on "actual cash flow spent" on section 1.2, page 1, of Appendix II), deflated by lagged market value (*Size*). This variable is composed of four different types of mandatory forecasts of payment along with current period actuals. These four forecasts include management forecasts of exploration and evaluation expenditure, management forecasts of development expenditure, management forecasts of production expenditure, and management forecasts of administration expenditure (see 5B example in Appendix II). The cash flow payments are for operating activities and only represent cash outflows as the firms don't have relevant sales given their pre-production status.
UnsForecastError	Absolute value of *SigForecastError*.
OverestimateBias	The unsigned Bias when *SigForecastError* > 0. This unsigned variable captures the overestimation of cash flow payments (expected payments higher than actual). Also associated with budget slack or underspending.
UnderestimateBias	The unsigned Bias when *SigForecastError* <= 0. This unsigned variable captures the underestimation of cash flow payments (expected payments lower than actual). It is also associated with cost (budget) overruns or overspending.
Estimated_Cost	Estimated value of cash flow of operations on quarter *t* scaled by lagged size (estimated, see an example on "estimated cash payments" on section 1.5, page 3, of Appendix II).
Actual_Cost	Actual value of cash outflow of operations on quarter *t* scaled by lagged size (Actual, see example on "actual cash flow spent" on section 1.2, page 1, of Appendix II).
$CAR3_{(-1,+1)}$	3-day Cumulative abnormal return around the forecast disclosure.
ProductionCost	Continuous variable equal to the actual expenditure in production (see Item 1.2 c in Appendix II) scaled by lagged market value (*Size*).
Receipts	Continuous variable equal to the actual revenue in quarter *t* (see Item 1.1in Appendix II) scaled by lagged market value (*Size*).
Explanatory Variable:	
TREAT	A dichotomous variable equal to 1 if the firm belongs to the treatment group of MEE companies that eventually receive project financing during our sample period and 0 otherwise. We consider in this group firms receiving the seed, bridge, and first tranche of project financing.
POST x TREAT	A dichotomous variable equal to 1 if the quarter *t* issuing the cash flow forecast occurs after receiving a project financing loan and 0 otherwise. The interaction *POST x TREAT* test allows us to examine if the overall forecast precision changes after receiving *TREAT* and controls for the group difference between firms receiving project financing and those that do not.

Y4_Before_Loan, *Y3_Before_Loan*, *Y2_Before_Loan* and *Y1_Before_Loan*	Dichotomous variables indicating each one of the five years before the loan.
Y1_After_Loan, *Y2_After_Loan*, *Y3_After_Loan* and *Y4_After_Loan*	Dichotomous variables indicating each one of the five years after the loan.
CashBorrowing	Calculated by cash inflow from borrowing (Item 1.18 from Appendix 5B) scaled by lagged market value (*Size*).
CashShares	Calculated by cash inflow from proceeds from issues of shares (Item 1.16 from Appendix 5B) scaled by lagged market value (*Size*).
ΔEstimated_Cost	Calculated by subtracting the estimated payment in quarter t by estimated payment in quarter t-1 (naïve model) scaled by lagged market value (*Size*).
Predicted_Overspend	Calculated by subtracting estimated payment for quarter *t*+1 by actual payment on quarter *t (naïve model) scaled by* lagged market value (*Size*).
ΔM_Estimated_Cost	Mechanical model calculated by the subtraction of estimated payment of quarter *t* by a predicted estimated payment using a four-quarter autocorrelation model.
M_Predicted_Overspend	Mechanical model calculated by subtracting the estimated payment on quarter *t* by the predicted actual cost of quarter *t*+1 calculated using an autocorrelation model.
Cumul_Overestimation	Cumulative average of *OverestimateBias*.
Cumul_Underestimation	Cumulative average of *UnderestimateBias*.
Control Variables:	
Number_Pages	Number of pages in each report
Size	Disclosing firm's size measured by 60-days average market capitalization lagged two months before the announcement (Kato *et al*. (2009)).
Cash_Burn_Rate	Quarterly cash burn rate variable calculated as the multiplicative inverse of the cash at the end of the month divided by the cash outflow as the sum of the actual cash outflows with Exploration and Evaluation, Development, Production and Administration.
Cash	Cash at the end of the quarter scaled by *Size*.
Return on Assets	Return on assets calculated as the net income divided by total assets.
Leverage	Proportion of total debt scaled by shareholder's equity.
Firm age	The number of years the firm has been listed up to the day of the announcement.

Top_20	Fraction of shares owned by the 20 largest owners.
CRB_Index	CRB (Commodity Research Bureau) index return between 10 days before the report and 6-months before the report.
Reserves	Amount of reserves in the quarter before the forecast quarter scaled by *Size*.
Resources	Amount of resources in the quarter before the forecast quarter scaled by *Size*.
Return_Quarter	Buy-and-hold return in the quarter before the forecast.
Loan_Amount_TA	Total amount provided by the PF scaled by total assets from the year before the loan is provided.
Loan_Amount_SE	Total amount provided by the PF scaled by shareholder's equity from the year before the loan is provided.

Appendix II

Rule 5.3

Appendix 5B

Mining exploration entity quarterly report

Introduced 1/7/96. Origin: Appendix 8. Amended 1/7/97, 1/7/98, 30/9/2001, 01/06/10.

Name of entity

GINDALBIE METALS LTD

ABN	Quarter ended ("current quarter")
24 060 857 614	30 SEPTEMBER 2011

1.1. Consolidated statement of cash flows

		Current quarter $A'000	Year to date (3 months) $A'000
	Cash flows related to operating activities		
1.1	Receipts from product sales and related debtors	7,099	7,099
1.2	Payments for (a) exploration & evaluation	(2,420)	(2,420)
	(b) development	(6,078)	(6,078)
	(c) production	(7,376)	(7,376)
	(d) administration	(2,413)	(2,413)
1.3	Dividends received	-	-
1.4	Interest and other items of a similar nature received	3,064	3,064
1.5	Interest and other costs of finance paid	-	-
1.6	Income taxes paid	-	-
1.7	Management fee & labour recovery income	-	-
1.8	Other income	-	-
	Net Operating Cash Flows	(8,124)	(8,124)
	Cash flows related to investing activities		
1.9	Payment for purchases of: (a) prospects	-	-
	(b) equity investments	-	-
	(c) other fixed assets	(107,923)	(107,923)
1.10	Proceeds from sale of: (a) prospects	-	-
	(b) equity investments	-	-
	(c) other fixed assets	-	-
1.11	Loans to other entities		
1.12	Loans repaid by other entities	-	-
1.13	Payment of joint venture subscription	-	-
	Net investing cash flows	(107,823)	(107,923)
1.14	Total operating and investing cash flows (carried forward)	(116,047)	(116,047)

+ See chapter 19 for defined terms.

1.15	Total operating and investing cash flows (brought forward)	(116,047)	(116,047)
	Cash flows related to financing activities		
1.16	Proceeds from issues of shares, options, etc.	133,966	133,966
1.17	Proceeds from sale of forfeited shares	-	-
1.18	Proceeds from borrowings	135,319	135,319
1.19	Repayment of borrowings	-	-
1.20	Dividends paid	-	-
1.21	Capital raising costs	(3,929)	(3,929)
1.22	Payments for cash backing of performance bonds	(8,569)	(8,569)
	Net financing cash flows	256,787	256,787
	Net increase (decrease) in cash held	140,740	140,740
1.23	Cash at beginning of quarter/year to date	236,633	236,633
1.24	Exchange rate adjustments to item 1.23		
1.25	**Cash at end of quarter**	377,373	377,373

1.2. Payments to directors of the entity and associates of the directors

Payments to related entities of the entity and associates of the related entities

		Current quarter $A'000
1.26	Aggregate amount of payments to the parties included in item 1.2	1,147
1.27	Aggregate amount of loans to the parties included in item 1.11	-

1.28 Explanation necessary for an understanding of the transactions

Directors remuneration	1,147

1.3. Non-cash financing and investing activities

2.1 Details of financing and investing transactions which have had a material effect on consolidated assets and liabilities but did not involve cash flows

2.2 Details of outlays made by other entities to establish or increase their share in projects in which the reporting entity has an interest

+ See chapter 19 for defined terms.

1.4. Financing facilities available

Add notes as necessary for an understanding of the position.

		Amount available $A'000	Amount used $A'000
3.1	Loan facilities	71,075	544,579
3.2	Credit standby arrangements	-	-

1.5. Estimated cash outflows for next quarter

		$A'000
4.1	Exploration and evaluation	9,818
4.2	Development	3,195
4.3	Production	9,799
4.4	Administration	1,917
	Total	**24,729**

Reconciliation of cash

Reconciliation of cash at the end of the quarter (as shown in the consolidated statement of cash flows) to the related items in the accounts is as follows.		Current quarter $A'000	Previous quarter $A'000
5.1	Cash on hand and at bank	148,547	91,454
5.2	Deposits at call	228,826	145,179
5.3	Bank overdraft	-	-
5.4	Other (provide details)	-	-
	Total: cash at end of quarter (item 1.25)	377,373	236,633

1.6. Changes in interests in mining tenements

		Tenement reference	Nature of interest (note (2))	Interest at beginning of quarter	Interest at end of quarter
6.1	Interests in mining tenements relinquished, reduced or lapsed				
6.2	Interests in mining tenements acquired or increased				

+ See chapter 19 for defined terms.

1.7. Issued and quoted securities at end of current quarter

Description includes rate of interest and any redemption or conversion rights together with prices and dates.

		Total number	Number quoted	Issue price per security (see note 3) (cents)	Amount paid up per security (see note 3) (cents)
7.1	*Preference* +**securities** *(description)*				
7.2	Changes during quarter (a) Increases through issues (b) Decreases through returns of capital, buy-backs, redemptions				
7.3	+**Ordinary securities**	1,135,565,349	1,135,565,349		
7.4	Changes during quarter (a) Increases through issues (b) Decreases through returns of capital, buy-backs	199,949,759	199,949,759	$0.67	$0.67
7.5	+**Convertible debt securities** (*description)*				
7.6	Changes during quarter (a) Increases through issues (b) Decreases through securities matured, converted				

+ See chapter 19 for defined terms.

7.7	**Options** *(description and conversion factor)*	***Vested Employee Options***		*Exercise price*	*Expiry date*
		2,500,000	Nil	60 cents	6 November 2011
		1,000,000	Nil	$1.31	1 August 2012
		1,500,000	Nil	94 cents	1 August 2012
		300,000	Nil	$1.84	30 September 2013
		250,000	Nil	$1.14	8 October 2015
		Non Vested Employee Options			
		250,000	Nil	$1.14 (Vest 31/12/11)	8 October 2015
		250,000	Nil	$1.14 (Vest 28/2/12)	8 October 2015
		250,000	Nil	$1.14 (Vest 31/3/12)	8 October 2015
		400,000	Nil	$1.19 (Vest 30/4/12)	9 May 2016
		300,000	Nil	$1.19 (Vest 30/6/12)	9 May 2016
		300,000	Nil	$1.19 (Vest 30/6/13)	9 May 2016
		400,000	Nil	$1.19 (Vest 30/4/12)	9 May 2016
		300,000	Nil	$1.19 (Vest 30/6/13)	9 May 2016
		300,000	Nil	$1.19 (Vest 30/6/12)	9 May 2016
		250,000	Nil	$1.14 (Vest 29/2/12)	8 October 2015
		250,000	Nil	$1.14 (Vest 30/4/12)	8 October 2015
		250,000	Nil	$1.14 (Vest 31/5/12)	8 October 2015
7.8	Issued during quarter	250,000	Nil	$1.14 (Vest 29/2/12)	8 October 2015
		250,000	Nil	$1.14 (Vest 30/4/12)	8 October 2015
		250,000	Nil	$1.14 (Vest 31/5/12)	8 October 2015
7.9	Exercised during quarter				
7.10	Lapsed during quarter				
7.11	**Debentures** *(totals only)*				
7.12	**Unsecured notes** *(totals only)*				

Compliance statement

1 This statement has been prepared under accounting policies which comply with accounting standards as defined in the Corporations Act or other standards acceptable to ASX (see note 4).

2 This statement does give a true and fair view of the matters disclosed.

Sign here: ..... Date: 12/10/11
(Director/Company secretary)

Print name: TIM NETSCHER
.....

+ See chapter 19 for defined terms.

Notes

1 The quarterly report provides a basis for informing the market how the entity's activities have been financed for the past quarter and the effect on its cash position. An entity wanting to disclose additional information is encouraged to do so, in a note or notes attached to this report.

2 The "Nature of interest" (items 6.1 and 6.2) includes options in respect of interests in mining tenements acquired, exercised or lapsed during the reporting period. If the entity is involved in a joint venture agreement and there are conditions precedent which will change its percentage interest in a mining tenement, it should disclose the change of percentage interest and conditions precedent in the list required for items 6.1 and 6.2.

3 **Issued and quoted securities** The issue price and amount paid up is not required in items 7.1 and 7.3 for fully paid securities.

4 The definitions in, and provisions of, *AASB 1022: Accounting for Extractive Industries* and *AASB 1026: Statement of Cash Flows* apply to this report.

5 **Accounting Standards** ASX will accept, for example, the use of International Accounting Standards for foreign entities. If the standards used do not address a topic, the Australian standard on that topic (if any) must be complied with.

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