

RESEARCH REPORT

CARBON RISK: A CONTEMPORARY BUSINESS CHALLENGE AND THE ROLE OF BANK MONITORING

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EXECUTIVE SUMMARY

Exposure to carbon risk is a dominant theme for contemporary business. Carbon risk refers to any corporate risk from climate change or the use of fossil fuels likely restricting managers' ability to conduct business (Hoffman and Busch, 2008).

Key to a firm's capacity to evolve and adapt in a carbon-constrained future is an understanding of how capital providers view carbon-related risks. Such knowledge allows the development of informed strategies to manage a firm's exposure to carbon-related risks, as well as enabling investors to make informed decisions about how companies are responding to the risks and opportunities stemming from climate change.

To date, academic and industry researchers have investigated the impact of carbon emissions on firm value or financial performance (e.g. Deutsche Bank, 2009; Chapple *et al.*, 2013; Clarkson *et al.*, 2015). However, there is a paucity of research on what information investors find useful in assessing a firm's carbon risk exposure. One possible source of information on a borrowing firm's carbon risk is provided by bank loan announcements. Through their banking relationships, banks have access to inside information about clients that is unavailable to external stakeholders. The aim of this study is to investigate whether equity markets infer positive news about borrowing firms' carbon risk exposure from the announcement of bank loans. The specific focus is on whether this effect is significant for firms with greater apparent carbon risk as revealed by their historic carbon footprint and other public disclosures.

We analyse the equity market reaction to 120 bank loan announcements for 81 Australian Stock Exchange (ASX)-listed companies over the period 2009-2015. Overall, there are no significant cumulative abnormal returns in the three-day window around the announcements. This result is consistent with

recent research suggesting that the benefits of banking relationships have been eroded over recent years due to increased non-bank competition and more affordable information sources. However, when we partition the loan announcements into loan renewals and loan initiations we document positive excess loan returns for loan renewals for high carbon risk firms, which is consistent with prior research suggesting that bank loan renewals are more informative to equity markets than initiations because of the increased knowledge of a borrower's risk and profitability that accrues over time. Additionally, we find that loan renewals are associated with positive and significant announcement returns, irrespective of whether a domestic or foreign bank is involved.

Our results suggest that investors value the information advantages enjoyed by banks in assessing their client firm's carbon risk exposure. That is, banks provide a credible, alternative information source to investors when they are confronted with the information asymmetries surrounding carbon risk. Thus, the one-dimensional view of the role of banks as facilitators of global warming through the provision of finance is called into question, at least in part by the results of this study. Instead, banks appear to have a multi-dimensional role and are viewed as an important source of information on carbon risk which can be used to better inform equity markets about firms' exposure to carbon risk.

INTRODUCTION

BACKGROUND TO STUDY

There is concern that greenhouse gas emissions from human-related activities are attenuating global warming, with likely harmful climate change resulting (IPPC, 2007; Stern, 2007; Bebbington and Larrinaga-González, 2008). These concerns have led to pressure from governments, investors and other stakeholders on companies to address the risks and opportunities associated with climate change, and in particular those in relation to a high profile subset of greenhouse gases – carbon. Within this context, credible information on companies' exposure to carbon risk is fundamental for informing capital markets.

Carbon risk has been variously defined, but succinctly it is 'any corporate risk related to climate change or the use of fossil fuels' (Hoffmann and Busch, 2008, p. 514). It comprises regulatory risk, physical risk and business risk (Labatt and White, 2007). Regulatory risk encompasses the costs of compliance with carbon-related regulations and policies such as the recently repealed Carbon Pricing Mechanism (CPM) in Australia; physical risk relates to the potential costs to business from the physical manifestations of climate changes such as flooding and drought; and business risk refers to potential reputational, legal and competitive costs from an increased sensitivity of consumers, suppliers and other external stakeholders to climate change (Thompson, 1998; Cho and Patten, 2007; Labatt and White, 2007; Chen and Gao, 2012).

Significant information asymmetry surrounds companies' carbon risk exposure, which can be attributed at least in part to the inherently complex nature of carbon risk and the incomplete mandated and voluntary public carbon-related disclosures. Certainly, carbon-related public disclosures allow equity markets to identify greater potential carbon risk due to industry location (e.g. carbon intensive industries), and the geographical location of a company's operations (e.g. greater likelihood of carbon regulation being introduced). However, currently available public disclosures do not provide insights into the initiatives and strategies currently being implemented by a company to future-proof it against carbon risk exposure. To illustrate,

various jurisdictions such as the European Union (EU), Australia and the U.S. have mandated the disclosure of greenhouse gas emissions prior to an anticipated emissions trading scheme. Analysis of the usefulness of these disclosures suggests that while investors find the disclosure of historical carbon emissions to be informative (Chapple *et al.*, 2013; Matsumura *et al.*, 2014; Clarkson *et al.*, 2015; Griffin *et al.*, 2015), there is scope and a need for a much broader set of disclosures. Similarly, reviews of current voluntary disclosures on carbon in multiple reporting jurisdictions suggest that these disclosures are incomplete, lack transparency and accuracy, and have been used as a tool to attain legitimacy with external stakeholders (e.g. Kolk *et al.*, 2008; Prado-Lorenzo *et al.*, 2009; Freedman and Jaggi, 2010; Hraskey, 2011; Rankin *et al.*, 2011; Comyns and Figge, 2015; KPMG, 2015; Liesen *et al.*, 2015).

OBJECTIVE OF STUDY

In this study, we investigate whether banks through their lending decisions provide an alternative source of information to help inform capital markets about a company's carbon risk exposure and thereby reduce the information asymmetry problem. Through their banking relationships, banks have access to inside information about clients that is unavailable to external stakeholders. The aim of this study is to investigate whether equity markets infer positive news about borrowing firms' carbon risk exposure from the announcement of bank loans. The specific focus is on whether this effect is significant for firms with greater apparent carbon risk as revealed by their historic carbon footprint and other public disclosures.

PRIOR RESEARCH KNOWLEDGE

A long-held view of banks is that they are unique and provide expert services not available from other lenders (Leland and Pyle, 1977; Diamond, 1984; Fama, 1985; Diamond, 1991; Johnson, 1997; Diamond and Rajan, 2000; Kashyap *et al.*, 2002). Of interest in relation to the information asymmetry surrounding investors' assessment of a company's carbon risk is the pre-loan screening and subsequent monitoring activities of banks. The screening and monitoring of clients by banks is enhanced due to 'access to information from an organisation's decision process not otherwise publicly available' (Fama, 1985, p.36). Access to this private information can occur through a bank's investment in information-gathering technology for screening potential borrowers and/or through a continuing, close business relationship with potential borrowers (Lummer and McConnell, 1989).

In addition to an ability to monitor carbon risk via inside information, it appears that banks have incentives to take carbon risk into account in their lending decisions. Witness the public commitments of banks to voluntary codes of lending practice such as the United Nations Environmental Programme (UNEP) Statement of Commitment by Financial Institutions on Sustainable Development (UNEP FI Statement) (2013), the Equator

Principles (2003), the Carbon Principles (2005) and the Climate Principles (2008) (RAN, 2011). There is also empirical evidence that banks incorporate social and environmental risks (including carbon risk) into the cost of debt (Goss and Roberts, 2011; Chen and Gao, 2012; Jung *et al.*, 2016) and their credit assessment practices (Coulson and Monks, 1999; Thompson, 1998; Thompson and Cowton, 2004; Weber, 2012). We argue that a client's potential exposure to carbon risk is a significant consideration in a bank's lending decisions because of the direct costs through reduced future profitability and cash flows, and increased default risk; as well as indirect costs in the form of reputational damage to banks.

Indirect evidence is available from a study of Canadian firms by Aintablian *et al.* (2007) which documents that bank loans are incrementally informative when relating to companies from industries characterised by a negative environmental event (e.g. oil spill). Thus, we propose that bank loan announcements likely convey information to capital markets about companies' carbon risk exposure collected through pre-loan screening, as well as the banks' ongoing commitment to monitoring carbon risk into the future through maturity. Since carbon risk varies significantly across and within industries (UNEPFI, 2006; Clarkson *et al.*, 2015), we expect that the value of bank loan announcements is greater for more carbon intensive companies with likely higher potential carbon risk as revealed by their historic carbon footprint. Expressed another way, our first research proposition is that the announcement of a bank loan for firms with higher potential carbon risk provides equity markets with an implicit assurance of the firms' current and expected levels of carbon risk exposure.

Recent evidence suggests that bank loan renewals are incrementally more informative than loan initiations due to the inside information gleaned over time from ongoing business interaction (Fama, 1985; Lummer and McConnell, 1989). We consider this possibility via our second research proposition that for firms with higher potential carbon risk, the value of bank loan announcements is greater for bank loan renewals than for initiations.

The involvement of a domestic bank compared with a foreign bank may also influence the value of a loan announcement to equity markets. On the one hand, evidence suggests that for credit markets characterised by information asymmetry, as is the case with carbon risk, local banks have access to 'soft' information such as an understanding

of the state and national political climate in relation to carbon regulation which provides them with an informational advantage (Petersen and Rajan, 2002; Degryse and Ongena, 2005; Agarwal and Hauswald, 2010). On the other hand, there is some evidence that foreign banks have organisational and informational advantages that contribute to more informative bank loan announcements (Ongena and Roscovan, 2013). We consider the impact of domestic and foreign involvement in a bank loan in our third research proposition that there is a differential value of bank loan announcements for firms with higher potential carbon risk in which domestic banks are involved compared with foreign banks.

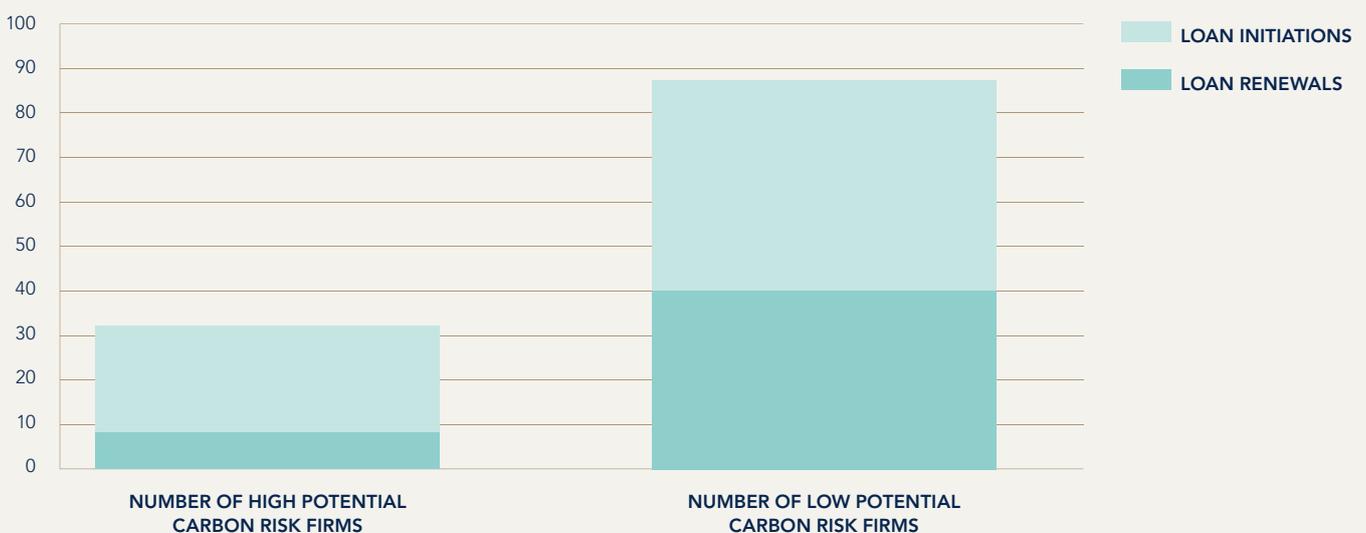
RESEARCH DESIGN

We identify a sample of 120 bank loan announcements from 81 unique companies listed on the Australian Securities Exchange (ASX) over the period 2009-2015. The announcements were sourced from the Factiva and SIRCA Australian Company Announcements (ACA) databases by searching on the following key words or phrases drawn from Fields *et al.* (2006): 'bank loan', 'line of credit', 'credit agreement' and 'credit facility'. We matched these companies with companies registered under the National Greenhouse and Energy Reporting (NGER) scheme for which greenhouse gas emissions meet or exceed emissions reporting thresholds specified by the NGER Act (2007). The sample composition is shown below in Figures 1 and 2.

The sample comprises more announcements from companies with low potential carbon risk (i.e. 88 out of 120 announcements), there are more loan initiations (i.e. 72 out of 120 announcements) and more loan announcements involve domestic banks (i.e. 67 out of 120 announcements).

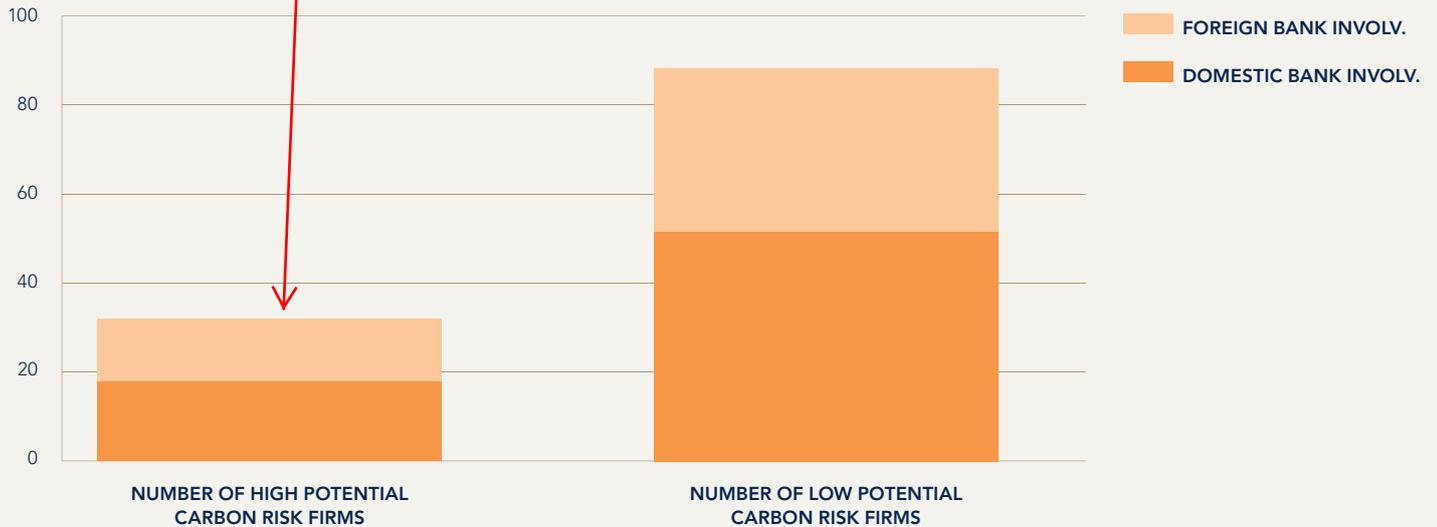
For high potential carbon risk firms, the number of loan initiations (i.e. 24 out of 32 announcements) is greater than loan renewals (i.e. 8 out of 32 announcements), while an almost equal number of loans are made by domestic banks (i.e. 15 out of 32 announcements) compared with foreign banks (i.e. 17 out of 32 announcements).

FIGURE 1:
SAMPLE COMPOSITION - LOAN INITIATIONS / LOAN RENEWALS.
(LOAN ANNOUNCEMENTS FOR ASX-LISTED COMPANIES 2009-2015)



Wrong area increased. Should be: Light orange area should be 17. Dark orange area should be 15. Total 32.

FIGURE 2:
SAMPLE COMPOSITION - DOMESTIC / FOREIGN BANK INVOLVEMENT
(LOAN ANNOUNCEMENTS FOR ASX-LISTED COMPANIES 2009-2015)



We estimate cumulative abnormal returns (CARs) over the three-day trading window [0, 2] around a company’s announcement. Abnormal returns are calculated using the market model estimated with daily stock and market returns over the -200 through -10 day window prior to the loan announcement. We source all stock price data from Datastream.

We test our research propositions using univariate and multivariate analysis. Our basic multivariate model regresses an indicator variable *H CARBON* and control variables found to be related to equity market reaction to bank loan announcements on CARs. The variable *H CARBON* is a proxy for a firm’s potential exposure to high levels of carbon risk, which is equal to one if a firm is required to report its greenhouse gas emissions under the NGER scheme, and 0 otherwise. The control variables include controls for borrowers’ size, profitability, and capital structure. We partition our analysis by loan type – renewal and initiations.

RESULTS

For the sample of 120 bank loan announcements, the mean CAR at 0.42% is statistically insignificant. However, when we partition the bank loan announcements by potential carbon risk, we find a statistically significant positive excess market reaction of 2.00% to the bank loan announcements for firms with high potential carbon risk, compared with an insignificant market reaction of -0.15% for potential low risk carbon firms. These results are consistent with our first research proposition and suggest that bank loan announcements for high carbon risk companies are informative to capital markets.

The multivariate analysis results refine upon these univariate results. A summary of the key results is presented in Table 1. From the regression of *HCARBON* and the control variables on *CAR* using the pooled sample of 120 loan announcements, the estimated coefficient on *HCARBON*, while positive, is not statistically significant at conventional levels. Thus, overall there is no support for our first research proposition. Instead, the results are consistent with prior research suggesting that the information value of bank loan decisions has decreased in recent years with increased non-bank competition and more affordable information sources. (Fields *et al.*, 2006).

We next partition the bank loan announcements into loan renewals and initiations, and then re-run the regression. For the renewals sample, the estimated coefficient on *HCARBON* is positive and statistically significant at less than the 10% level¹. In contrast, the estimated coefficient on *HCARBON* is not statistically significant for the initiations sample. These results are consistent with our second research proposition, suggesting that equity markets perceive the announcement of a renewal of a bank loan to high potential carbon risk companies as a “good news” event. That is, a bank loan renewal signals to equity markets that the lending bank likely has access to inside information built up over an extended period of ongoing interactions with the borrower (Fama, 1985; Lummer and

McConnell, 1989). This extended access to inside information adds additional credibility to the bank loan announcement, thus providing an implicit assurance on the firms’ current and future carbon risk exposure. Finally, we investigate our third research proposition by modifying our original regression by replacing *HCARBON* with two indicator variables – *HDOMESTIC*, and *HFOREIGN*. Here, *HDOMESTIC* is an indicator variable set equal to one if the bank loan announcement is made to a potential high carbon risk firm with a domestic bank involved, and zero otherwise. Similarly, *HFOREIGN* is an indicator variable set equal to one if the bank loan announcement is made to a potential high carbon risk firm with a foreign bank involved, and zero otherwise. Again, we only find significant results for the loan renewal sample. Specifically, for the renewal sample the reported coefficients on *HDOMESTIC* and *HFOREIGN* are both positive and statistically significant at less than the 10% level. Thus, our results suggest that for the sample of bank loan renewals, the equity market values bank involvement irrespective of whether a domestic or foreign bank is involved.

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¹ The calculated probability (P-value) equals 0.058 using a two-tailed test. Any co-efficient with a P-value greater than 0.10 using a two-tailed test is described as 'insignificant'

Table 1. Summary of key multivariate analysis results

SAMPLE	HCARBON	
(1) Pooled sample of 120 bank loan announcements	Not significant	
(2) Sample partitioned on loan type		
(a) Renewals	Significant	
(b) Initiations	Not significant	
SAMPLE	HDOMESTIC	HFOREIGN
(3) Sample partitioned on loan type		
(a) Renewals	Significant	Significant
(b) Initiations	Not significant	Not significant

Details of the analysis are provided in research design. This table provides a summary of our key multivariate analysis results from a regression of an indicator variable *HCARBON* and control variables found to be related to equity market reaction to bank loan announcements on *CARs*. The variable *HCARBON* is a proxy for a firm's potential exposure to high levels of carbon risk, which is equal to one if a firm is required to report its greenhouse gas emissions under the NGER scheme, and 0 otherwise. We also breakdown *HCARBON* into high carbon firms with a domestic bank involved in the loan (*HDOMESTIC*) and high carbon firms with a foreign bank involved in the loan (*HFOREIGN*).

CONCLUDING COMMENTS

In this study, we investigate whether banks through their lending decisions provide an alternative source of information to help inform the capital markets about a company's carbon risk exposure and thereby reduce information asymmetry. Specifically, the aim of this study is to investigate whether equity markets infer positive news about borrowing firms' carbon risk exposure from the announcement of bank loans; and whether this effect is significant for firms with greater apparent carbon risk as revealed by their historic carbon footprint and other public disclosures. The implicit assurance of companies' current and future carbon risk provided by a bank loan announcement is a different lens through which to view banks long criticised for contributing to climate change through the provision of finance.

We analyse the equity market reaction to 120 bank loan announcements for 81 ASX-listed companies over the period 2009-2015. Overall, there are no significant cumulative abnormal returns in the three-day window around the announcements. This result is consistent with recent research suggesting that the benefits of banking relationships have been eroded over recent years due to increased non-bank competition and more affordable information sources. However, when we partition the loan announcements into loan renewals and loan initiations we document positive excess loan returns for loan renewals for high carbon risk firms, which is consistent with prior research suggesting that bank loan renewals are more informative to equity markets than initiations because of the increased knowledge of a borrower's risk and profitability that accrues over time. Additionally, we find that equity markets value both domestic and foreign bank involvement in relation to firms with high apparent carbon risk.

Our results suggest that investors value the information advantages enjoyed by banks in assessing their client firm's carbon risk

exposure. That is, banks provide a credible, alternative information source to investors when they are confronted with the information asymmetries surrounding carbon risk. Thus, the one-dimensional view of the role of banks as facilitators of global warming is called into question, at least in part by the results of this study. Instead, banks appear to be viewed as an important source of information on carbon risk that can be used to better inform equity markets about firms' exposure to carbon risk.

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