Journal of Banking & Finance 37 (2013) 1747–1758

Contents lists available at SciVerse ScienceDirect

Journal of Banking & Finance

journal homepage: www.elsevier.com/locate/jbf

How does the stock market react to the announcement of green policies?

Vikash Ramiah *, Belinda Martin, Imad Moosa

School of Economics, Finance and Marketing, RMIT, Australia

ARTICLE INFO

Article history:
Received 11 January 2012
Accepted 8 January 2013
Available online 26 January 2013

JEL classification:
G1
G11
H56

Keywords:
Environmental regulation
Green
Policies
Abnormal returns
Event study
Systematic risk
Diamond risk

ABSTRACT

We investigate the impact of 19 announcements of environmental regulation on the equities listed on the Australian Stock Exchange over the period 2005–2011. Using a well-established event study methodology, we assess whether these announcements are value constructive or destructive for equity investors. Additionally, we estimate the change in systematic risk following the announcements. Our results show that the Australian market was particularly sensitive to the carbon pollution reduction scheme (CPRS) announcement. A cumulative abnormal return of −31% was recorded in the alternative energy sector after Australia submitted its target range to the Copenhagen Accord. We observe that a move towards a greener nation has a mixed effect on abnormal returns with apparent sector-by-sector differences. Green policies appear to affect the long-term systematic risk of industries, leading to the diamond risk phenomenon.

1. Introduction

A heated but unsettled debate, which often has an ideological dimension, has been raging on the economic and financial effects of regulation in general and environmental regulation in particular. Research has been conducted on the effect of environmental standards on corporate performance as measured by stock returns, profitability, risk, employment and output but there is no agreement on whether environmental regulation creates or destroys value. Opponents of regulation suggest that it inflicts damage on the economy by raising the costs of production, leading to a fall in sales and employment as well as deterioration of corporate financial indicators. Shapiro and Irons (2011), on the other hand, argue that studies of environmental regulation have consistently failed to find significant negative effects. They even suggest that the effect of environmental regulation on big polluters is small but positive.

The objective of this study is to examine the effect of green policy announcements on the Australian stock market. This is an important issue, given the level of commitment Australia has assigned to green policies, particularly with respect to climate change. It is also important because Australia is one of the largest, if not the largest, per capita producer of greenhouse emissions. The importance assigned by the Australian government to green policies was confirmed by the ratification of the Kyoto Protocol as the first act of former Prime Minister Kevin Rudd after being sworn in on 3 December 2007 (Topsfield et al., 2007). We examine the reaction of the Australian stock market to the Kyoto Protocol, the climate change review, the carbon pollution reduction scheme (CPRS), and renewable energy schemes. To this end, we follow the lead of Hamilton (1995), White (1995) and Klassen and McLaughlin (1996) by using the technique of event study to explore the effect of the announcement of green policies on stock returns.

2. Literature review

Common sense tells us that it is cheaper for firms to operate in countries where environmental regulation is either lax or not enforced because regulation brings with it fines, liabilities and administrative or legal action against polluters (Stewart, 1993). There is also some evidence suggesting that environmental regulation affects productivity because it forces firms to commit resources to non-productive uses such as environmental auditing, waste treatment and litigation (Gray and Shadbegian, 1995; Haveman and Christiansen, 1981). Other channels through which environmental regulation exerts an adverse effect on firms is that, in the absence of environmental regulation, firms can recapitalize

* Corresponding author. Address: School of Economics, Finance and Marketing, RMIT, 445 Swanston Street, Melbourne, Victoria 3000, Australia. Tel.: +61 3 9925 5828; fax: +61 3 9925 5986.
E-mail address: vikash.ramiah@rmit.edu.au (V. Ramiah).

0378-4266/$ - see front matter © 2013 Elsevier B.V. All rights reserved.
http://dx.doi.org/10.1016/j.jbankfin.2013.01.012

old equipment that is no longer acceptable (not being environmentally-friendly) and market products that may be discouraged or banned by some environmental standards (Vernon, 1992; Korten, 1995).

On the other hand those who argue that environmental regulation creates rather than destroys value have several reasons to believe so. Arguments in favor of environmental regulation include the following (Dowell et al., 2000): (i) the cost savings associated with lower environmental standards may be exaggerated and may not even exist; (ii) when firms make new investments they may find it more costly not to adhere to higher environmental standards; (iii) firms can reduce pollution by making changes in the production process rather than by incurring direct costs; and (iv) some fringe benefits may be associated with adhering to high environmental standards such as heightened employee morale and hence productivity. For all of these arguments, Dowell et al. (2000) suggest that "the relationship between corporate environmental standards and firm value is an empirical question".

Hamilton (1995), White (1995) and Klassen and McLaughlin (1996) use event study to demonstrate that news of high level of toxic emissions results in significantly negative abnormal returns. They also show that firms with strong environmental management practices produce higher stock returns than firms with poor practices following a major environmental disaster, such the 2010 BP incident in the Gulf of Mexico. These results are interpreted by Dowell et al. (2000) to mean that "investors expect that firms incur trivial costs for environmental cleanup and that these costs are lower for firms with better environmental records". Another result produced by event study is that environmental performance awards results in significant positive abnormal returns. Dowell et al. (2000) interpret this finding to imply that recognition of environmental performance has a positive reputational effect that boosts firm value. They also point out that the positive reputational effect may include not just investors' impression of a firm's environmental performance but also investors' impression of a firm's management ability.

Apart from studying the effect of environmental regulation on stock returns, some studies consider the effect on market value and risk. Dowell et al. (2000) analyze the global environmental standards of a sample of US multinational corporations and find that those adopting higher environmental standards have much higher market values as measured by Tobin's q. A policy implication of their findings is that developing countries that use lax environmental regulation to attract foreign direct investment may end up attracting poor-quality firms. Feldman et al. (1996) analyze a sample of 300 US firms to find out if investment in environmental management leads to reduction in risk and whether or not this risk reduction is valued by financial markets. Their findings suggest that risk reduction would materialize, coupled with an increase in stock price.

Studies dealing with the effect of environmental regulation on corporate profitability have been conducted by Cohen et al. (1995), Hart and Ahuja (1996), Russo and Fotus (1997), and Nehrt (1996). Cohen et al. (1995) find strong correlation between environmental performance and corporate profitability, Hart and Ahuja (1996) provide evidence indicating that efforts to prevent pollution and reduce emissions are positively associated with returns on sales and assets. Russo and Fotus (1997) find environmental performance and return on assets to be positively correlated and that returns to environmental performance are higher for high-growth industries. Nehrt (1996) examines the relation between timing and intensity of investment in pollution prevention and growth in the profits of 50 firms. Again his results show that a positive relation exists between early adopters of pollution prevention measures and profit growth.

Some economists have dealt with the effect of environmental regulation on the economy at large by examining the consequences for growth and employment. Masur and Posner (2011) cast doubt on the validity of the process used by regulatory agencies to estimate the potential unemployment effect of proposed regulation, describing it as *ad hoc*. The procedure boils down to a rejection of a proposed regulation if the predicted unemployment effects are too high according to a predetermined threshold level. They suggest that a better approach is to incorporate unemployment effects into cost-benefit analysis by monetizing the unemployment effect. Morgenstern et al. (2000) provide evidence indicating that "increased environmental spending does not cause a significant change in industry-level employment". They actually detect a net gain of 1.5 jobs per $1 million of environmental spending.

3. Methodology

The methodology consists of three elements: the estimation and testing of abnormal returns, robustness tests and risk analysis. These elements are described in turn.

3.1. Abnormal return analysis

We start by calculating daily returns, represented by the first natural logarithmic difference of the underlying stock price, for all of the individual companies in our sample. Following Brown and Warner (1985), daily returns are adjusted to obtain the *ex post* abnormal returns where adjustments are approximated by the CAPM. The abnormal returns (AR) are then grouped into industries to obtain the average industry (I) abnormal returns at time t, (AR_{It}). The standard t statistic for an industry's abnormal return is computed to find out if it is statistically different from zero. This gives rise to three possible outcomes:

$$(AR_{It}) = 0 \quad (1)$$

$$(AR_{It}) > 0 \quad (2)$$

$$(AR_{It}) < 0 \quad (3)$$

Our implicit assumption is that the abnormal return of an industry is a function of revenue minus cost. Outcome (1) of zero abnormal return occurs when neither revenue nor cost changes as a result of the introduction of green policies. It may also materialize if the industry experiences a decrease in revenue, which is offset by a decrease in cost in the form of government subsidy (or vice versa). Under this scenario, the wealth of shareholders remains unchanged. Outcome (2) is that there is wealth creation for shareholders represented by positive abnormal return. We postulate that this outcome pertains to renewable energy and environmentally-friendly businesses, emerging as a result of an increase in the demand for their products and hence revenue. Introduction of the CPRS may have an adverse effect on the profitability of polluting firms as the cost of production rises by the amount of the carbon penalties. The effect depends on the ability of the polluter to pass on the extra cost to the consumer (which may be prevented by regulators) and the elasticity of demand for the underlying product. Outcome (3) will materialize if demand is elastic (hence a price rise reduces total revenue) or if the polluter cannot pass on the extra cost to consumers.In an efficient market hypothesis (EMH) framework, the stock market reacts instantly to new information arrival and prices reflect all available information. Abnormal return analysis enables us to capture the reaction of the stock market on the first day of trading following the announcement. For non-believers in the EMH, however, investors may not react rationally on the first day and there may be some delayed responses. There is a possibility for market participants either to over-react or under-react when new information is released, which means that they have a tendency to correct their mistakes in subsequent periods. To that end, we estimate the cumulative abnormal return (CAR) over the following five trading