



Carbon BetaTM
and Equity Performance
An Empirical Analysis

Moving from Disclosure to Performance

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“There will be a large creation and re-distribution of shareholder value in the transition to a low carbon economy — there will be winners and losers at sector level, and within sectors at company level. *The winners are more likely to be those businesses that take the time to understand and address this complex area.*”

Tom Delay, Chief Executive, The Carbon Trust
“Climate Change and Shareholder Value” Report

1 Purpose of the Study:

Moving From Awareness to Action

While institutional investor *awareness* of climate risk has increased dramatically (e.g. Carbon Disclosure Project, Investor Network on Climate Risk, Institutional Investors Group on Climate Change, etc.), only a tiny handful have moved beyond rhetoric and shareholder resolutions to take concrete *investment* action – namely, incorporating climate risk considerations directly and systematically into their actual stock selection and portfolio construction processes. It is at that level – where the “rubber meets the road”—that investors can send the strongest message to companies, produce significantly changed company behaviour, and, most importantly, improve their long-term, risk-adjusted returns. *Unfortunately, however, we currently estimate that far less than .1% of the CDP signatories’ \$40 trillion+ in assets is currently invested in any investment strategy which explicitly and systematically takes climate risk into account.*

There have been a number of reasons for this:

- » Investment professionals have long believed that company resources devoted to environmental issues are either wasteful or actually injurious to their competitive and financial performance and therefore to both the performance of the companies themselves *and* investor returns
- » As a direct result, money managers, pension fund consultants, and even pension fund trustees have historically regarded explicitly addressing environmental factors in their investment strategies as incompatible with the proper discharge of their fiduciary responsibilities
- » Until recently, there has been a dearth of robust, credible research evidence and analytical tools linking companies’ environmental performance directly with their financial performance

In order for this situation to change significantly, investors will require at least four things:

- » Compelling evidence that integrating climate risk analysis *can* in fact enhance risk-adjusted financial performance – in short, a robust *investment* case;
- » Compelling evidence that the variance in net climate risk exposure among companies is sufficiently large to warrant investor attention (see chart on page 8 for an example of the significant variability which *does* exist);
- » A comprehensive and sophisticated analytical framework for assessing relative and absolute climate-risk;
- » Company-specific information and analysis

The purpose of this study is to try to help satisfy the first three of these essential preconditions for improved institutional investor decision-making and *action* on climate change, and to provide a concrete example of the fourth.

At present, we believe that far too much attention is focused on two elements of the carbon risk equation which are overly simplistic indicators at best and dangerously misleading at worst: the level of company disclosure, and overall emissions levels. Our own empirical research has confirmed that, while information about each of these variables is potentially useful and important, unless they are supplemented by far more robust and sophisticated analysis, they are woefully inadequate for investors' purposes. One of the principal motivations for the current study is the desire to elucidate what that more robust framework might look like.

2 Context for the Study: *The Financial and Fiduciary Imperatives*

Few environmental issues pose as real, significant, and widespread a financial threat to investors as climate change. International policy responses aimed at cutting greenhouse gas emissions, together with the direct physical impacts of climate change will require investors and money managers to take a much closer look at how their portfolios might be affected by company ‘carbon’ risks and opportunities.

Since there is now growing and incontrovertible evidence that superior overall environmental performance can in fact improve the risk level, profitability, and stock performance of publicly-traded companies¹, and given the emergence of climate change as arguably *the* pre-eminent environmental issue of our time, fiduciaries can now be seen to be derelict in their duties if they do *not* consider climate-driven risks and opportunities where they may be material.

Investors and other fiduciaries would be well advised to assess their portfolios for carbon risk, for at least four reasons:

- » There is increasing evidence showing that superior performance in managing climate risk is a useful proxy for superior, more strategic corporate management, and therefore for superior financial performance and shareholder value-creation
- » The considerable variations in “carbon performance” among same-sector industry competitors are currently not transparent to, nor well understood by, mainstream Wall Street and City analysts. As a result, carbon-driven risks and value potential remain, for the present at least, almost entirely hidden from view
- » In the longer term, the out-performance potential will become even greater as the capital markets become more fully sensitised to the financial and competitive consequences of environmental and climate change considerations
- » There is strong evidence of **dramatic increases in the level of institutional investor concern – and intervention – with climate change issues and their investee companies.**

This last trend is perhaps best exemplified by the formation of three different groups of concerned institutional investors: the Carbon Disclosure Project, the Investor Network on Climate Risk, and the Institutional Investor Group on Climate Change. The former is a global coalition of over 300 institutional investors, with combined assets of over \$40 trillion; the second comprises over 50 U.S. institutional investors. INCR signatories include a number of U.S. State treasurers, as well as several leading labour funds with over \$4 trillion in assets. The third organization includes over 35 of the leading institutional investors in Europe. Innovest has provided the research for the global Carbon Disclosure Project for each of the five years of its existence.

¹ See Bauer et al (2005) ‘The Eco-Efficiency Premium Puzzle in the U.S. Equity Market,’ *Financial Analysts Journal*, Volume 61, Issue 2, 2005; K. Gluck and Y. Becker (2005) ‘The Impact of Eco-Efficiency Alphas,’ *Journal of Asset Management*, Volume 5, 4, 2005.

3 The Business Case and Investment Logic

A Market Price for Carbon Is Now a Reality...



Historically, however, institutional investors—even foundations active in combatting climate change on the program side—have been slow to respond to climate risk. There have been a number of reasons for this:

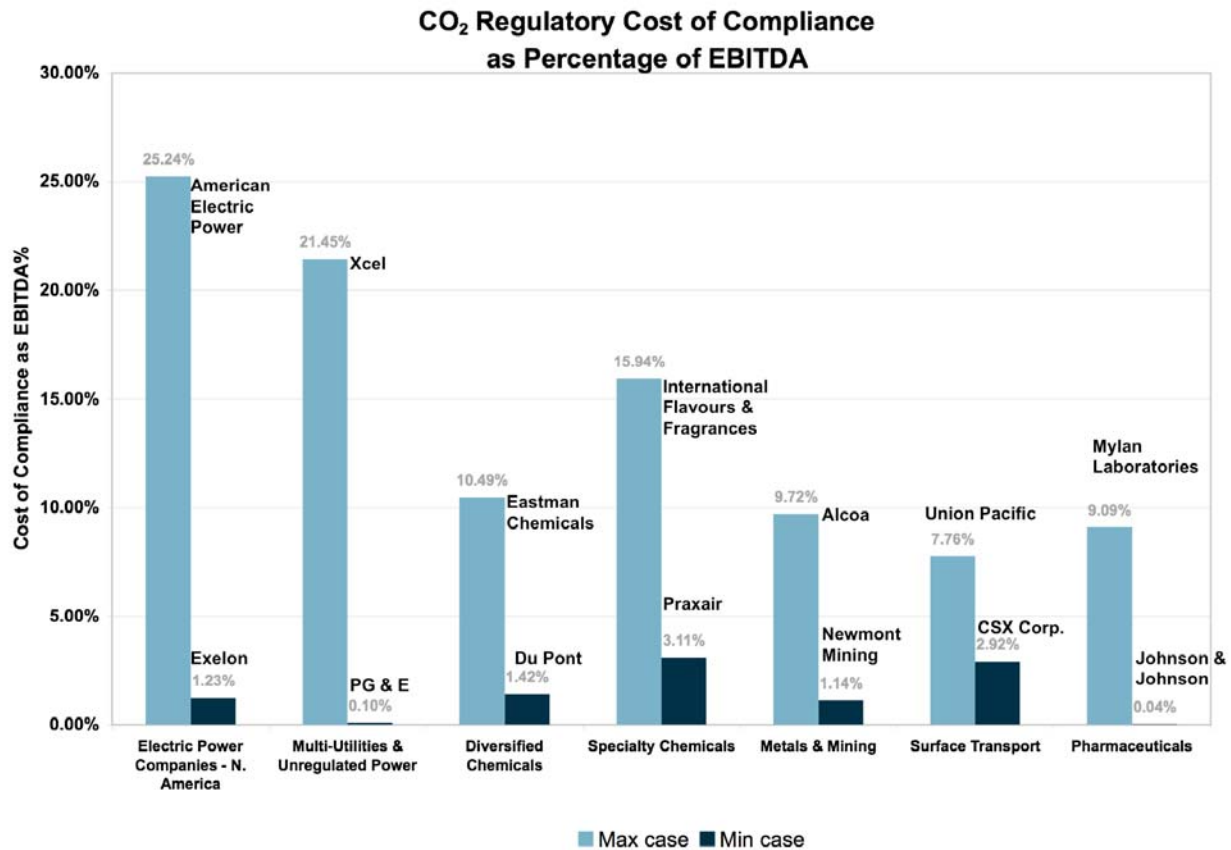
- » Investment professionals have long believed that company resources devoted to environmental issues are either wasteful or actually injurious to their competitive and financial performance and therefore to investor returns
- » As a direct result, money managers, pension fund consultants, and even pension fund trustees have historically regarded explicitly addressing environmental factors in their investment strategies as incompatible with the proper discharge of their fiduciary responsibilities
- » Until recently, there has been a dearth of robust, credible research evidence and analytical tools linking companies' environmental performance directly with their financial performance

All of this, however, is changing rapidly. In many parts of the world, fiduciaries are already legally required to address environmental risks in their investment strategies, precisely because these “non-traditional” risk factors demonstrably *can* affect companies' financial performance.

It is now increasingly widely recognized by leading-edge financial analysts and investors that there is a strong, positive, and growing correlation between industrial companies' “sustainability” in general, and climate change in particular, and their competitiveness and financial performance. “Carbon risk” is, today, arguably the most salient of these sustainability factors for investors.

4 The Variability of Climate Risk...

Risk Exposures and Costs Vary Widely, both Between and Within Sectors...



Investors need to know which companies are which.

5 The Limitations of Disclosure

In Innovest's view, investors simply cannot rely on companies' public disclosures alone as a basis for stock selection and portfolio construction. There are two primary reasons for this:

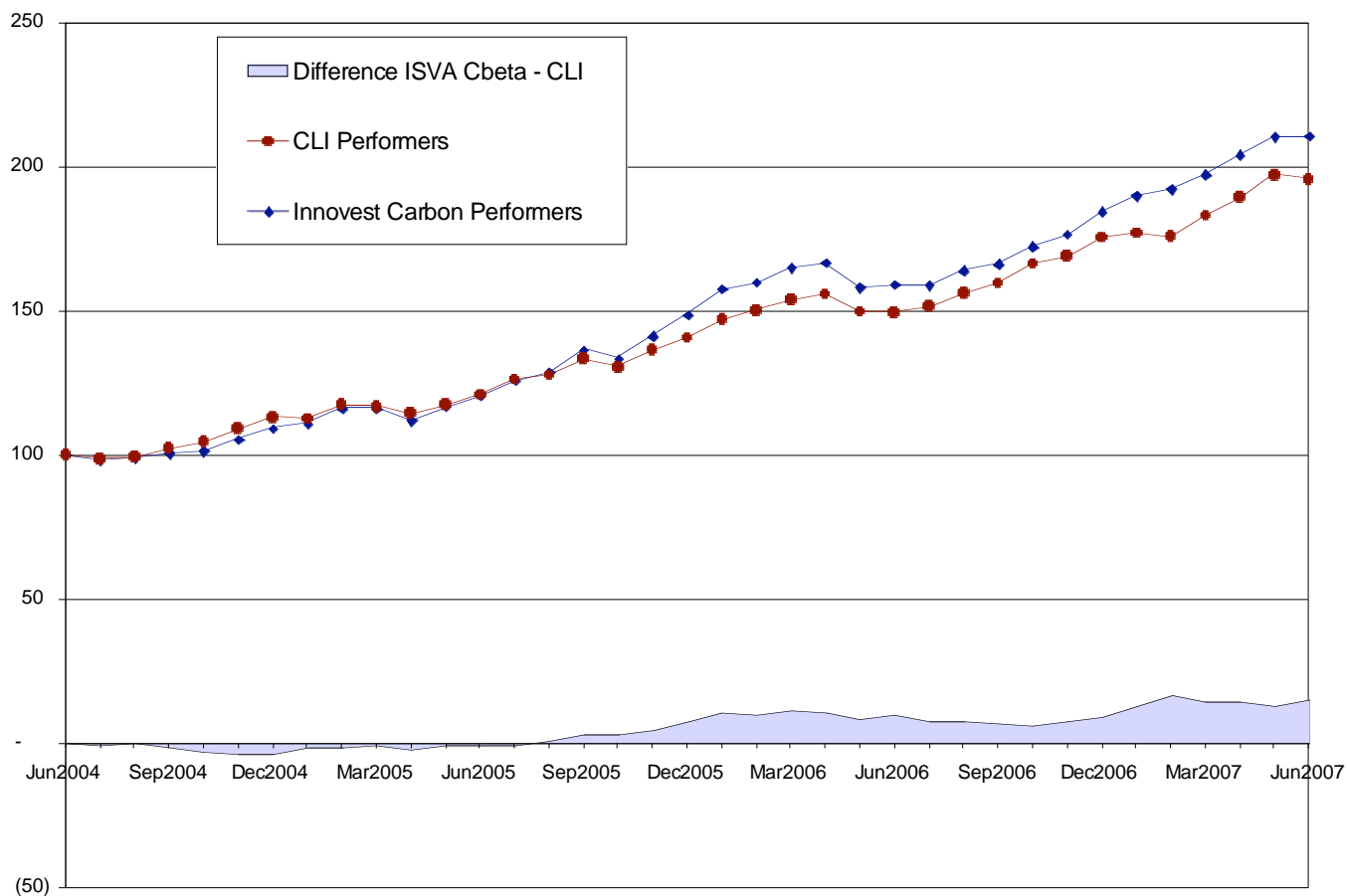
1. **Disclosure information is notoriously unreliable, inconsistently reported across companies and over time, and generally not validated by independent third parties.**
2. **Emissions data alone provides less than 25% of the information a sophisticated investor requires. We believe that much more comprehensive and robust models and analysis are required. (We describe Innovest's 4-factor Carbon Beta model in the Appendix.)**

In order to test these hypotheses, Innovest analyzed and compared the three-year financial performance of global "climate leaders" selected on two very different bases:

- » **"Disclosure Leaders" from Innovest's research for the 2007 Carbon Disclosure Project (The Climate Leadership Index or "CLI"); and**
- » **"Performance Leaders" selected using Innovest's proprietary, 4-factor Carbon Beta™ model (ISVA Cbeta).**

As the performance graph below illustrates, using a more sophisticated and robust – “beyond disclosure” – analytical model and information inputs can indeed generate superior share price performance. Over the 3-year test period, the annualized out-performance premium of the Carbon Beta model exceeded 300 basis points (3%).

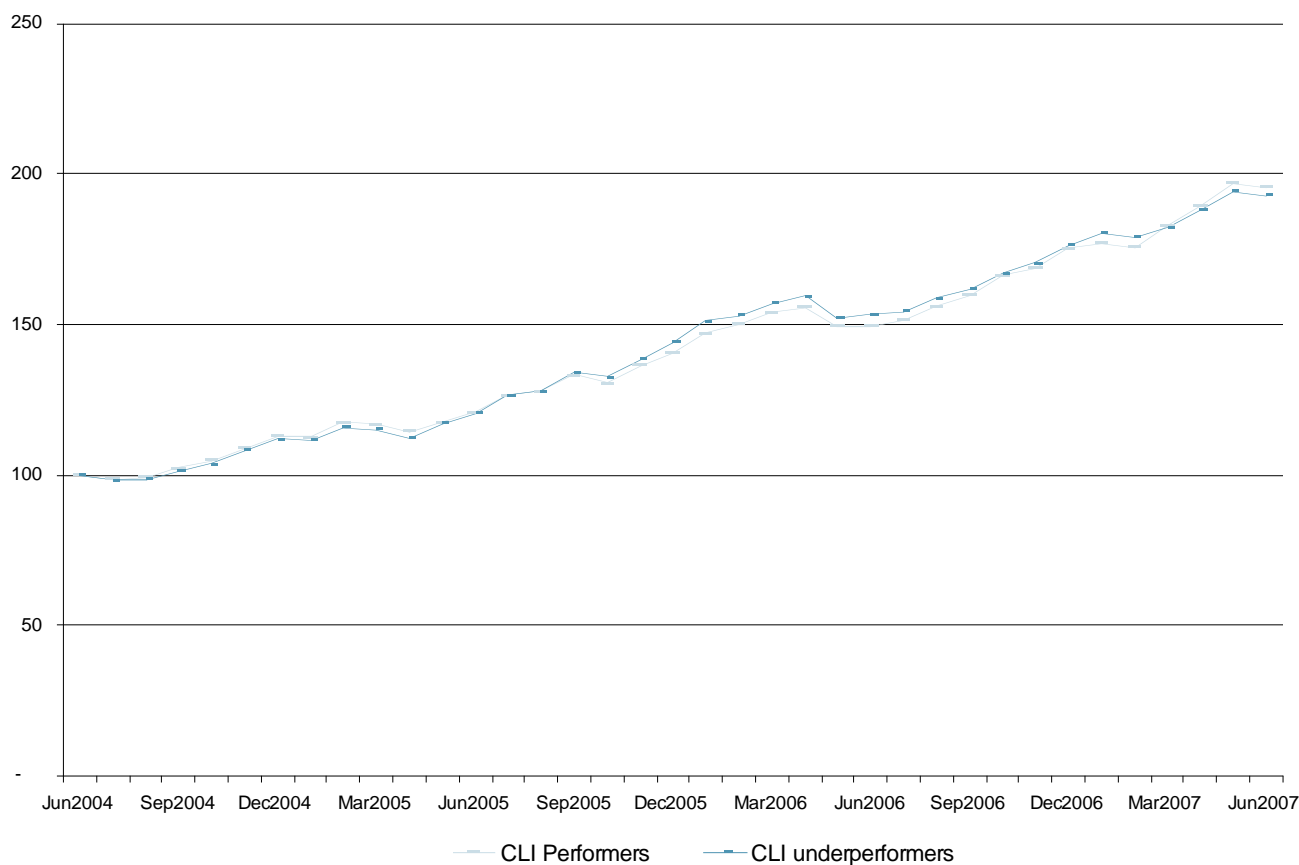
Differential in total return performance between Innovest Performance Leaders and CDP Climate Leaders



It is notable from the data that the “carbon beta premium” is largest over the two most recent years, when regulatory responses to climate change have been at their most robust.

In order to investigate the relationship between disclosure and financial performance in even greater depth, we conducted additional statistical tests. We compared the share price performance of CDP-based “disclosure leaders” to those of “disclosure laggards”.² The results in the performance graph below should be somewhat unsettling for those placing undue reliance on purely disclosure-based analysis: *there was essentially no difference between the financial performance of leaders and laggards*. Simply put, it would appear that, whatever its other merits, *publicly disclosed information alone is an insufficient basis for achieving superior investment returns*.

Comparison of total return performance of CDP Leaders and CDP Laggards



² In technical terms, a parameter stability test was conducted to test for any financial performance differences. Regression coefficients were utilized with the two sets of time series. The results are valid at a confidence interval of 99%.

6 Innovest’s Carbon Beta™ Rating Platform

In order to assist its institutional clients in assessing the level of net risk exposure to climate change in their portfolios and potential future investments, Innovest has developed a proprietary risk analysis model – the Carbon Beta platform.

“Carbon beta” is a term coined by Innovest, borrowing from the traditional finance lexicon. It is quite simply, a “shorthand” measure of a company’s *net* financial and competitive risk exposure to climate change (and of course, the regulatory, public, and consumer responses to it), *relative to its same-sector peers*. Net carbon risk is defined as a function of the interaction of four key variables:

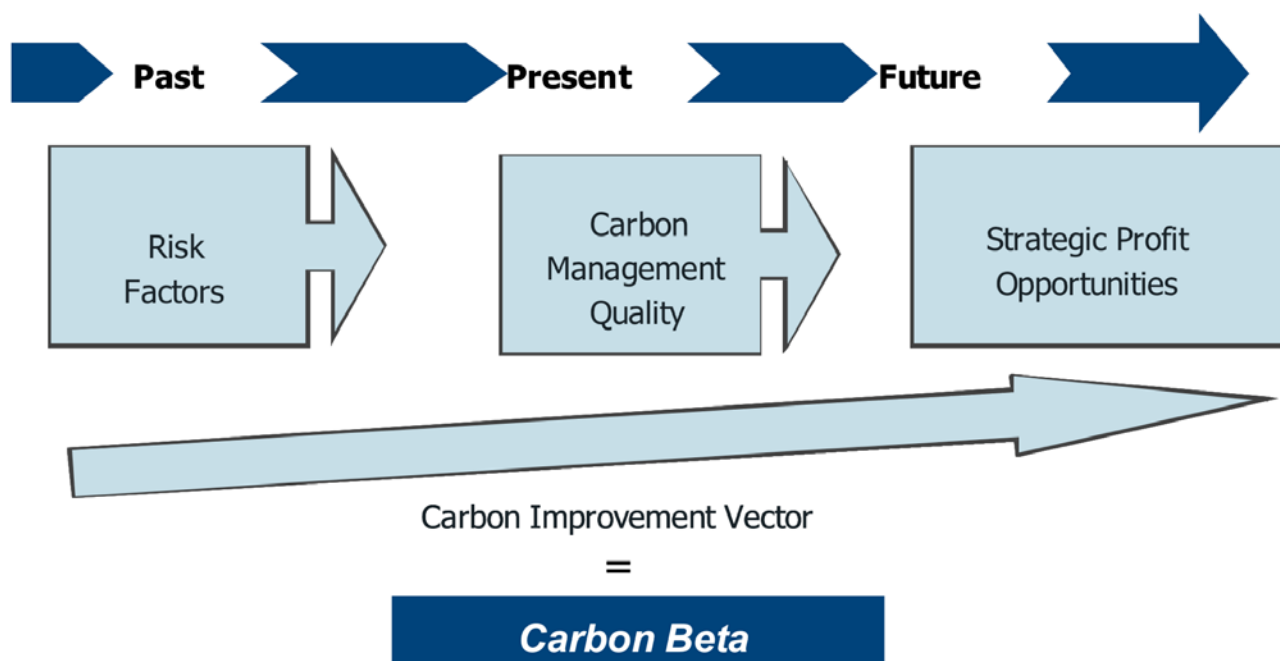
- » **Companies’ overall carbon footprint or *potential* risk exposure, adjusted to reflect differing regulatory circumstances in different countries and regions.**
- » **Their ability to manage and reduce that risk exposure**
- » **Their ability to recognize and seize climate-driven opportunities on the upside**
- » **Their rate of improvement or regression**

The higher a company’s “carbon beta”, the greater its net exposure to climate risk.

Innovest’s Carbon Beta-risk rating model has been applied to a database that currently covers over 750 companies from high-impact sectors around the world, and allows comparisons of management strategy, emissions profiles, and opportunity exposure to be drawn among companies on a consistent, systematic basis.

Innovest’s proprietary Carbon Beta platform identifies and quantifies carbon risk exposures on both a company-specific and portfolio-wide basis. Company-specific carbon rankings identify companies with a superior carbon management in place and those that are relatively better positioned to benefit from carbon regimes, with the potential to generate additional alpha.

 The four key factors in Innovest's Carbon Beta analytics platform



A. INDUSTRY SECTOR EXPOSURES

In order to identify industry sectors that are the most exposed to climate change risks and opportunities, Innovest has developed a 3-pronged approach to rate the specific risks of sectors along their entire value chain: upstream, internal and downstream. A composite climate change (CC) intensity factor is derived from the 3 categories of carbon intensities:

1. **Climate Change Direct Intensity:** This indicator (1-lowest exposure, 5-highest exposure) captures the sector's exposure to carbon regulations and constraints (offsets, capping, bubbles, energy taxes, and other regulatory instruments). The CCDI is directly proportional to a sector's direct emission of greenhouse gases (CO₂ and other GHGs), i.e. the emissions from its own physical assets. (e.g. steel making is a strong emitter of CO₂ inherent to the coking process).
2. **Climate Change Indirect Intensity:** This indicator (1-lowest exposure, 5-highest exposure) captures the sector's sensitivity to upstream energy costs and potential upsurge as a result of a carbon constrained economy. The CCII is directly proportional to a sector's consumption of electricity and other supplies that have caused a large amount of carbon emissions for their production or extraction, i.e. the emissions from the suppliers' assets. (e.g. aluminium making requires a large amount of electricity, which in turn may produce large emissions of CO₂ if reliant upon fossil fuels).

3. **Climate Change Demand Sensitivity:** This indicator (1-lowest exposure, 5-highest exposure) captures the sector's market sensitivity to climate change drivers. High sensitivity sectors include sectors producing goods that engender large GHG emissions during the life use of these goods (e.g. oil & gas products, cars and trucks), those sectors whose invested assets can contribute to high or low carbon emissions (e.g. finance and insurance industries), as well as those sectors having strong carbon related opportunities (e.g. energy generation technology manufacturers).

Combined Climate Change Intensity: This indicator (1-lowest exposure, 5-highest exposure) is a weighted average of the 3 indicators above, and reflect Innovest's respective as to the relative risk exposure of the sectors along the entire value chain.

Applying that methodology to the 60+ industries of the Global Industry Classification Standard (GICS) Innovest has determined the most exposed industries, i.e. those industry sectors that have the highest average carbon exposure in terms of potential impact to net earnings, as well as those sectors offering the highest differential of exposure.

Six of the highest carbon impact sectors

GICS Code	Industry	CC direct intensity (inhouse)	CC indirect intensity (upstream)	CC demand sensitivity (downstream)	CCC intensity (combined intensity)
551010	Electric Utilities	5	4	5	4.9
151020/ 201020	Construction Materials and Building Products	5	4	3	4.3
101020	Oil, Gas & Consumable Fuels	4	3	5	4.2
151050	Paper & Forest Products	4	3	5	4.2
151010	Chemicals	5	5	2	4.1
201050/ 201060	Machinery & Industrial Conglomerates	4	3	4	3.9

Source: Innovest

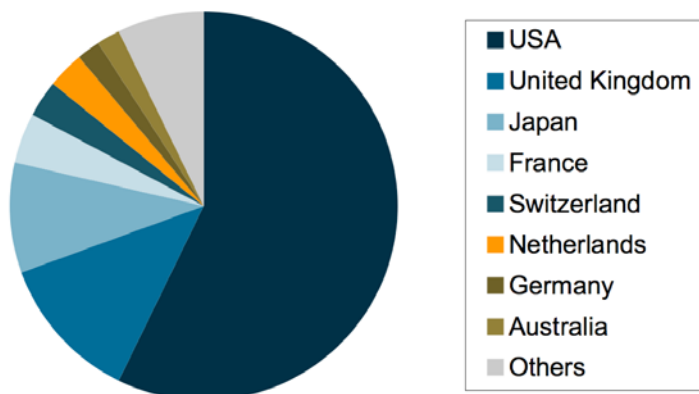
B. GEOGRAPHIC RISK EXPOSURES: WACCRT[®]

The second key determinant of a company's carbon risk is the geographic distribution of its assets.

Because of regional differences in approaches to Kyoto and natural variations in climate conditions, the geographic distribution of a firm's operations and markets is a critical determinant of equity carbon risk. Investors heavily

exposed to GHG-intensive sectors in regions aggressively pursuing emissions reductions – the E.U., Japan, parts of the U.S., and several provinces in Canada – will clearly face greater carbon finance risks than those with more carbon-diversified portfolios. On the other hand, the threat of climate-related litigation hangs over U.S. emitters much more than probably any other. Finally, as we saw recently in Canada, where auto manufacturers in the province of Ontario were exempted from emissions reduction requirements, regional politics can have substantial influence over financial exposure at the facility level.

Geographic exposures of a typical global equity portfolio



Source: Innovest

To assist in carbon risk profiling, Innovest has developed the concept of the Weighted Average Country Carbon Reduction Target (WACCRT[®]), which represents the aggregate extent of emissions reductions over the full range of a firm’s industrial activities.

For example, Honda’s emission-generating operations are divided between Europe (5.6%), U.S. (18%), Canada, (ca. 5%), Japan (14.6%) and Rest of World (57.5%). Under Kyoto, the regional emissions reduction requirements (below 1990 levels) are as follows: EU (8%), U.S. (0%- not a signatory), Canada (6%), RoW (0%).

Based on the WACCRT[®] model, the company’s overall emissions reduction obligations could be:

Europe (5.6% x 8%) + U.S. (1.8% x 0%) + Canada (5% x 6%) + Japan (14.6% x 6%) + RoW (57.5% x 0%) = 1.62%

Note that companies are very likely to have increased emissions since 1990 if pursuing a “business as usual” course, though some may have started mitigation efforts. Thus the actual required reduction would be a much higher percentage than shown above.

C. COMPANY-SPECIFIC FACTORS

Innovest applies its proprietary Carbon Beta[™] platform to assess and benchmark companies in any given sector on a scale from AAA (best in class) to CC (worst in class), which is broadly similar to bond ratings. In order to generate the ratings, our analysts evaluate companies relative to their same-sector peers, typically including a range of global companies. This is accomplished through the completion of our analytical matrix via review of a wide variety of

information from the company, industry trade groups, government databases, research organizations, and non-governmental organizations.

Individual companies' financial exposures are essentially a function of eight company-specific key factors:

- » **Energy intensity and source mix and consumption patterns.**
- » **Geographic locations of production facilities relative to specific regulatory and tax liabilities and compliance schedules in different countries.**
- » **Product mix – direct, indirect, and embedded carbon intensity.**
- » **Company-specific “marginal abatement” cost structures: some companies can reduce emissions at much less cost than others.**
- » **Technology trajectory – level of progress which a company has already made in adapting/replacing its production technologies for a carbon-constrained environment.**
- » **Industry competitive dynamics – ability/inability of companies to pass on costs to consumers.**
- » **Company-specific risk management capability.**
- » **Ability to identify and capture upside and revenue opportunities, including new manufacturing cost efficiencies, new product/service opportunities, and emissions trading.**

All eight of these factors are analysed in Innovest's Carbon Beta analysis. The analysis is both “top down” and bottom up. At the company-specific level, risks and opportunities are analysed and benchmarked, and individual company profiles are created.

D. CARBON FINANCE: THE COMPLIANCE COST MODEL

The costs of adapting to the new environmental and regulatory carbon-constrained reality are critical to the investment decision process of picking and diversifying a portfolio. Innovest has developed a proprietary compliance cost model that estimates as a percentage of EBITDA the current or potential exposure a company has when complying with emissions' restricting regulations.

The elements comprising the compliance cost model are:

Weighted Average Country Carbon Reduction Target

The WACCRT refers to the expected emissions reduction targets according to applicable legislations where a company has relevant assets, domestically and internationally. In this sense, the metric shows a weighted average for the restrictions that a company faces in the countries and regions it operates during the mandated compliance period.

Industry Discount Rate

The industry discount rate is calculated from the Weighed Average Cost of Capital (WACC) from each specific industry as of January, 2007. This is calculated using the weighted average of the cost of equity and after-tax cost

of debt, weighted by the market values of equity and debt (using the cumulated market values for the entire sector for the weights).

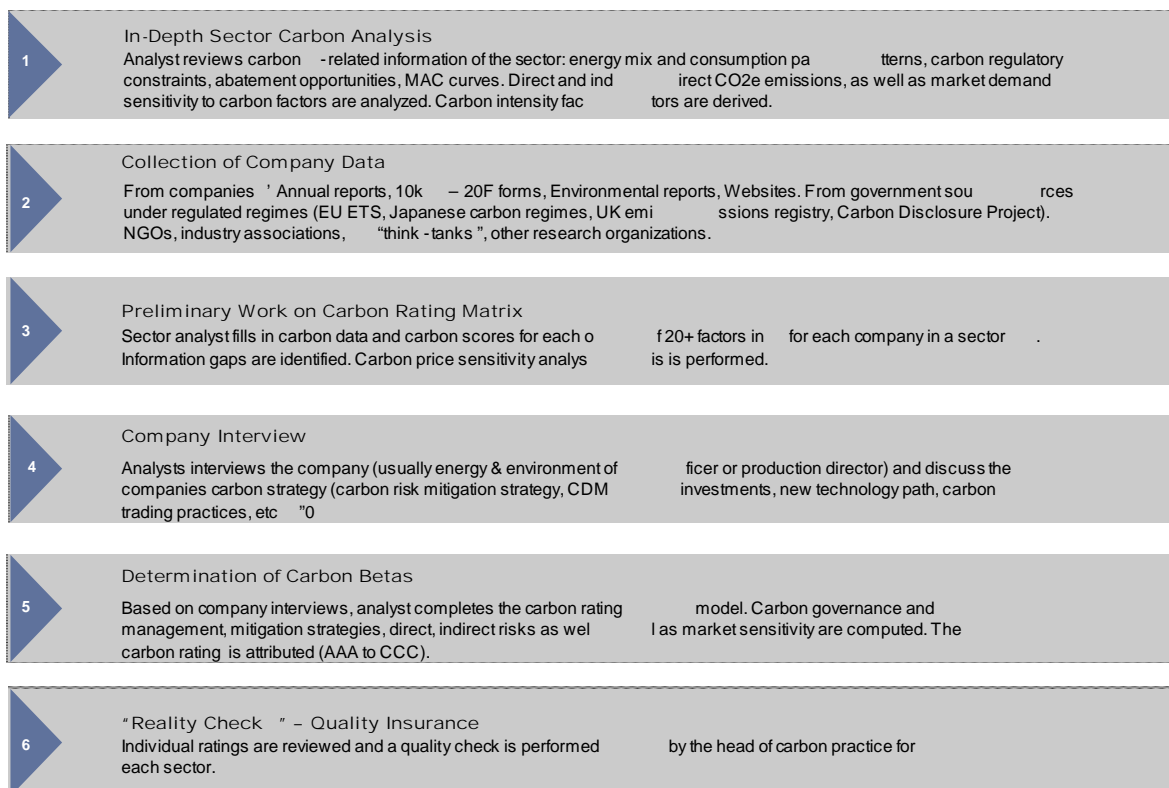
Carbon Cost

Carbon Cost is the weighed price for three different scenarios (expected, maximum and minimum price) per emission allowances (\$ per ton of CO₂ equivalent) in the European Union Emissions Trading Scheme (EUETS) during a specific compliance period. In the case that this period extends beyond 2012, prices are estimated using available data for actual EUA prices from January 2005 to the present, and future prices from the present to 2012.

Net Present Value of meeting emissions reduction targets

To calculate this figure we estimate the abatement compliance cost for each year of the commitment period. In the case of companies operating in countries that are Parties to Kyoto Protocol, the commitment period goes from 2008 to 2012. Previous commitment periods, as EU ETS Phase I, are taken into account on a case by case basis. For countries that currently have or are likely to have different climate change policies to the Kyoto Protocol, specific domestic legislation or possible scenarios are modeled by calculating the Net Present Value of the compliance cost.³

Summary of Steps in Carbon Beta Rating Methodology



³ For instance, for modelling compliance costs of the US Electric Utilities sector, we utilized the Feinstein-Carper Bill proposed on early 2007 in the 110th Congress for regulating greenhouse gas emissions for the electric sector.

7 Summary of the Study Methodology

The project was conducted in two successive phases:

Phase I

Using Innovest's proprietary Carbon Beta™ analytics platform, over 1500 major companies were screened initially and over 800 from high-impact sectors were studied in greater detail and ranked relative to their same-sector peers. (See the Appendix for a detailed summary of Innovest's Carbon Beta™ methodology, and examples of both the model's written output and its integration with more traditional quantitative investment factors.)

Phase II

A rigorous financial performance study was then conducted to test empirically the proposition that companies with superior carbon management practices and strategies can financially out-perform their peers. (The proxy used here for "financial performance" was share price performance with dividends reinvested – "total return"). In order to isolate the possible existence and size of any "carbon risk premium", the impact of other, more traditional investment factors was eliminated through quantitative techniques.

It should be noted that the analysis used in this study is *not* a so-called "static back-cast". That is, the Q2 2007 Carbon Beta™ company ratings were not simply back-cast and assumed to have been the same in 2004 and thereafter. Instead, we have used Innovest's time series database of company ratings for each month and as company ratings were changed over time, those "live" ratings were used in the study. This approach provides a much more robust set of results than a simple, static back-cast.

In all comparisons made between any two portfolios, or between any portfolio and an index benchmark in this report, data was adjusted for sector and regional effects. That is, the weights in each group were adjusted to match the industry sector and geographical distribution of the constituents of the peer group.

Unless otherwise stated, all sector and regional exposures correspond to those of the leaders group of the comparison in question. That is, for comparing global carbon leaders vs. laggards, for instance, the latter group was re-weighted to match the same industry and geographical distribution of the constituents of the former group. In doing this, we have neutralized any effect that could distort the comparative performance of a portfolio due to regional regulations and competitive conditions in a specific market or industrial segment.

8 Carbon Beta and Investment Performance: *The Research Results*

CARBON BETA™ PERFORMANCE

Carbon risk's variance from one industrial sector to another requires different managerial responses and strategies for companies – both to hedge their risk exposure and to take advantage of the different profit opportunities from operations, products and services that climate change can potentially bring. Consequently, for Innovest, companies positioned as top carbon performers have a higher expected return in comparison with the overall market benchmark and, moreover, with same-sector companies judged to be “carbon laggards”. Three year empirical stock market research using Innovest’s Carbon Beta™ model reveals that, in fact, this is the case. As expected, the “carbon beta premium” varies considerably, both by industry sector and by region.

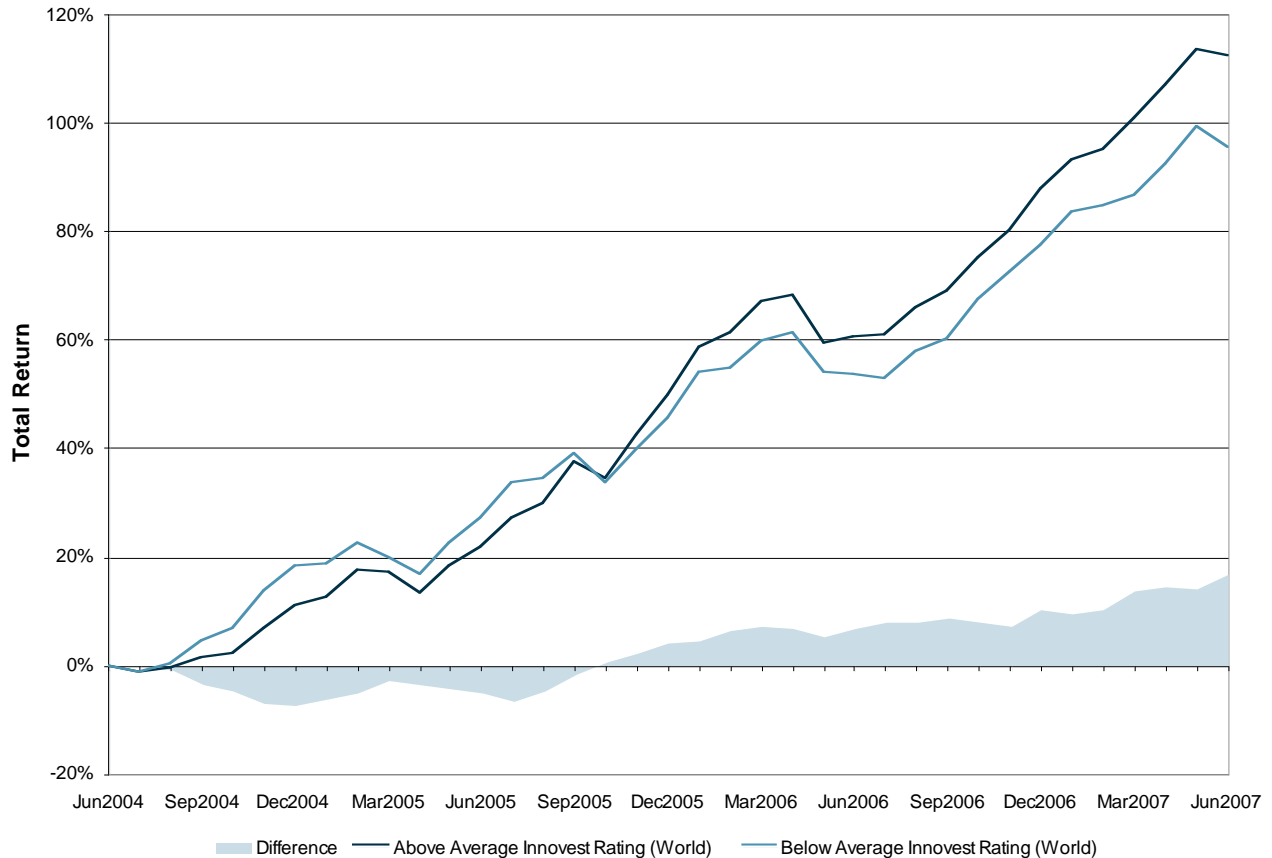
Carbon Beta™ Top Performers vs. Laggards

For Innovest, companies positioned as top “carbon performers” not only have a higher expected financial return in comparison with the broad market benchmark, but also vis a vis same-sector competitors judged to be “carbon laggards”. Again, Innovest’s Carbon Beta™ platform shows that this is a consistent trend across different regions and sectors. All results in this section were adjusted to neutralize for sector and regional effects in both portfolios.

The Global Results

Companies rated under the Carbon Beta™ platform as top carbon performers surpassed the return of companies rated as below average from June 2004 to June 2007 by an annualized rate of return of 3.06% (a cumulative total return of 81.85% compared to 72.67%).⁴ This is shown in Figure 1 below.

FIGURE 1 Carbon Beta™ Performers vs. Laggards Globally

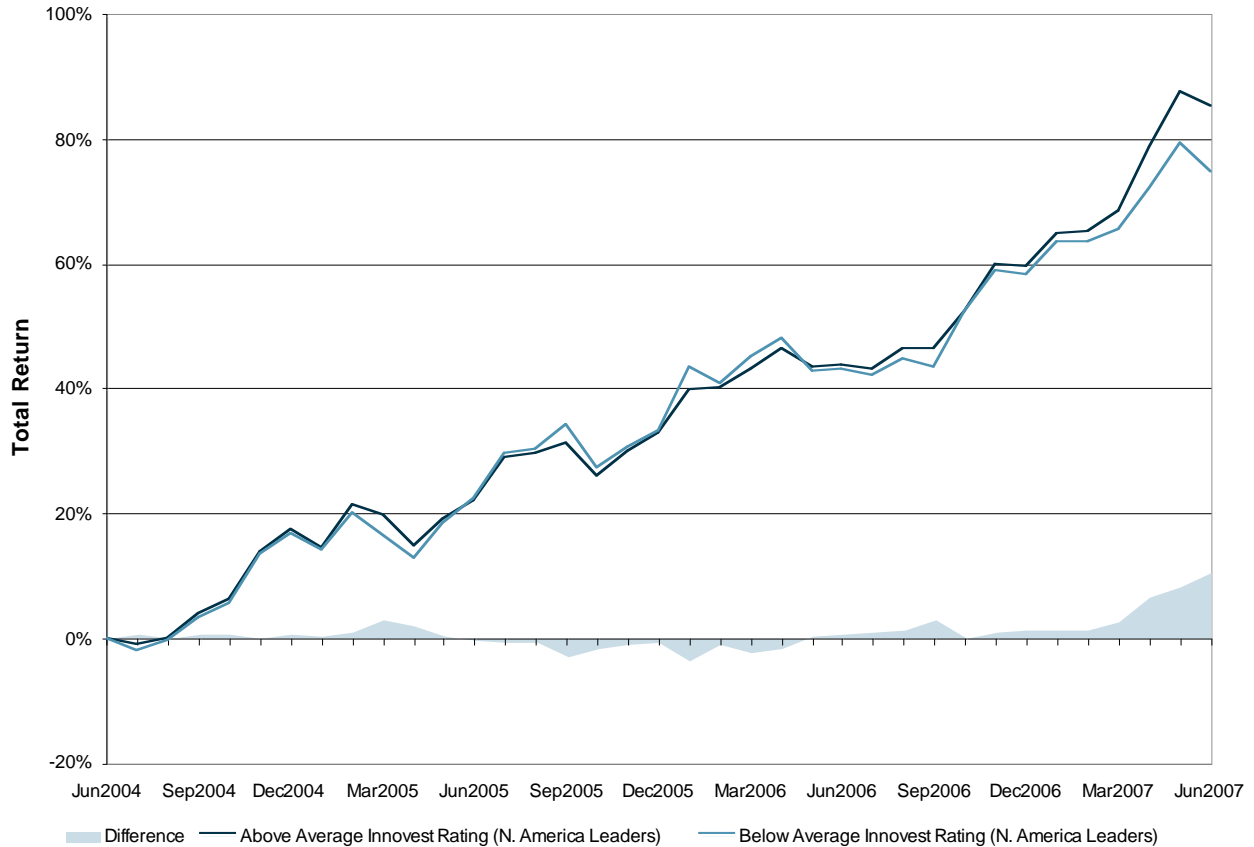


⁴ The selected period was chosen due to the fact that only in 2005 the first significant carbon restricting regulation took place in Europe. Therefore, it is most likely that the market started capturing the climate change effects on the perceived value and risk of a company and sector at this time. For the purposes of this study, "top carbon performers" were defined as those achieving an Innovest Carbon Beta™ rating of BBB "investment grade" or better.

The Regional Perspective

Carbon Beta™ results also hold, but not universally, when the testing universe is adjusted on a regional basis. For the North America region⁵, investment returns from top carbon performers exceeded those of the carbon laggards from June 2005 to June 2007 by an annualized rate of return of 2.40% (a cumulative total return of 68.51% compared to 61.32%), as displayed by Figure 2.

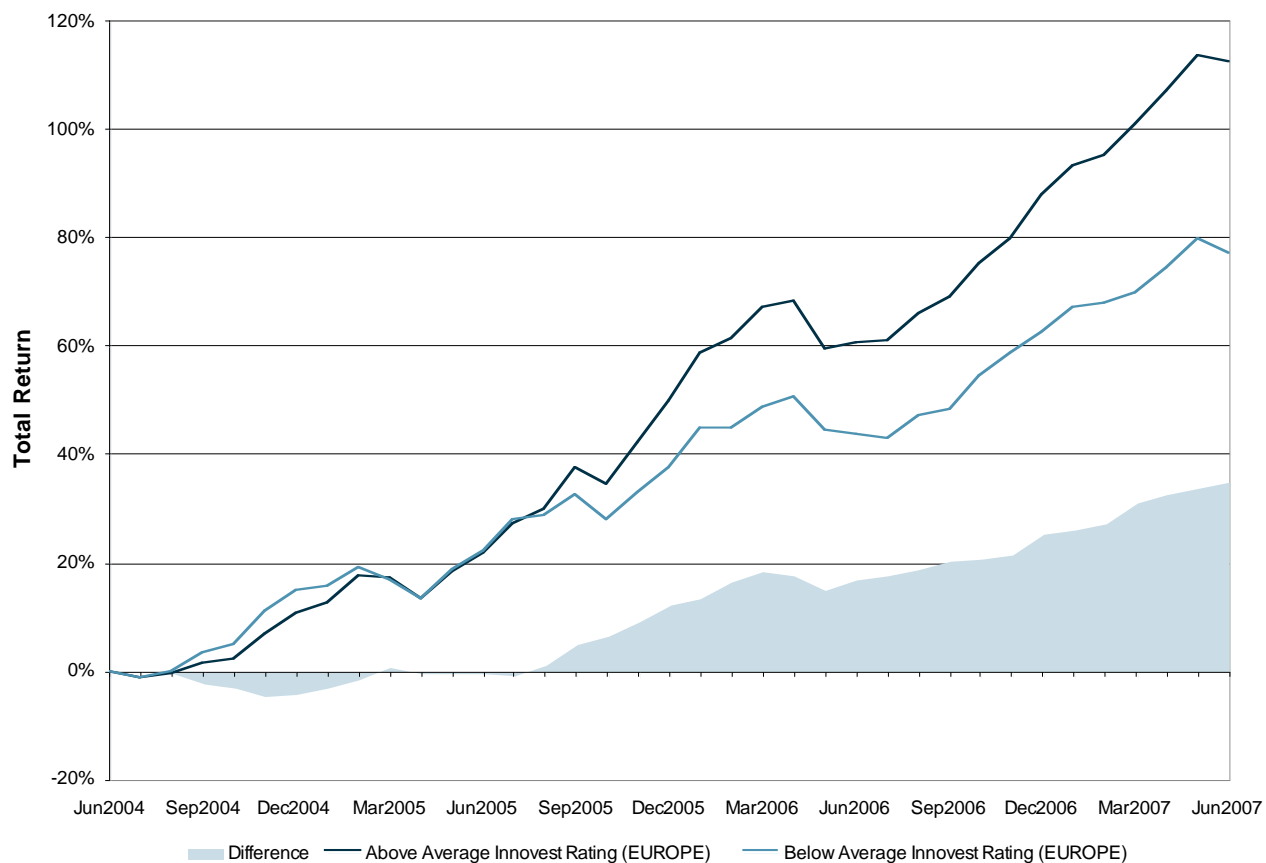
FIGURE 2 Carbon Beta™ Performers vs. Laggards in North America



⁵ US and Canada only.

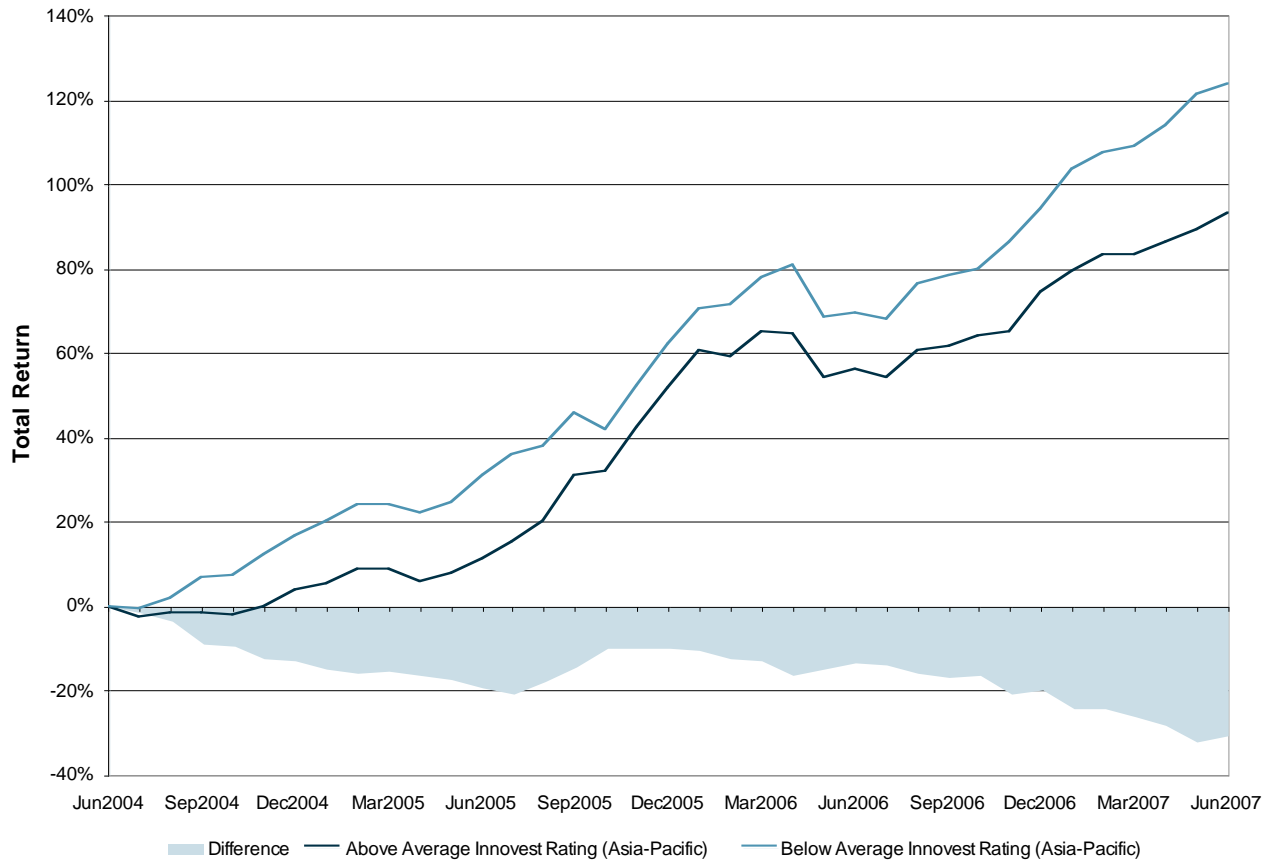
For the European case, returns from top carbon performers exceeded those of the carbon laggards for the same period by an annualized rate of return of 6.60% (a cumulative total return of 81.83% compared to 62.03%), as displayed in Figure 3.

FIGURE 3 Carbon Beta™ Performers vs. Laggards in Europe



For the Asia-Pacific case, however, returns from top carbon performers did not exceed those of the carbon laggards. For the same period, the annualized rate of return of the top carbon performers lagged by 4.45% (a cumulative total return of 73.55% compared to 86.91%), as displayed in Figure 4.

FIGURE 4 Carbon Beta™ Performers vs. Laggards in Asia-Pacific



We believe that there are at least two plausible explanations for this apparent “under-performance” anomaly. First, unlike Europe and North America, where carbon emission restrictions are either already in effect (Europe) or highly probable in the foreseeable future (North America), these conditions do not yet prevail across the Asia Pacific region. It would, therefore, be somewhat surprising if the public markets *did* reward top carbon performers at this relatively early stage.

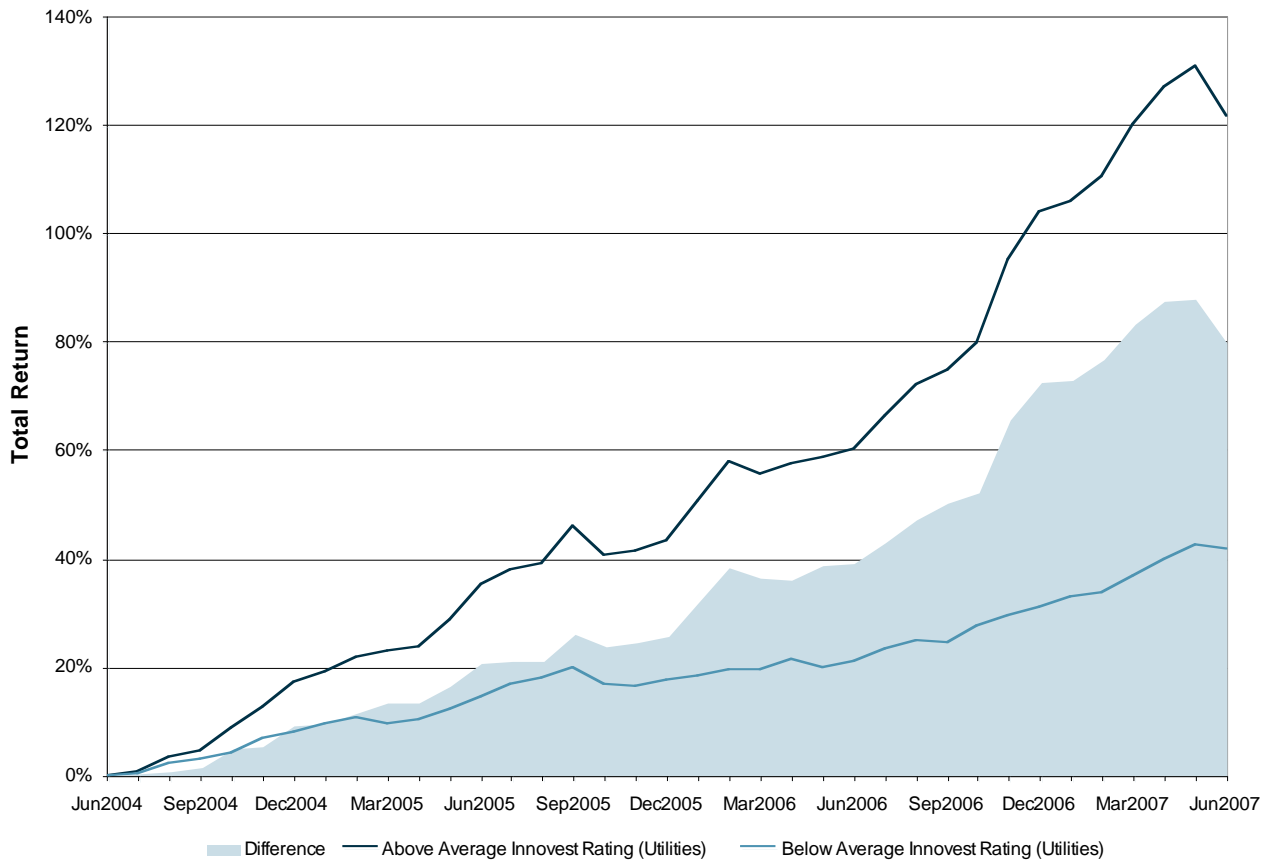
Secondly, our research suggests that marginal abatement costs can be substantially higher for companies in the Asia Pacific region, thereby creating disproportionate financial penalties for those exceptional companies which *are* adopting pro-active strategies and capital expenditures.

Of the companies with poor ratings (and therefore in the Below Average set) but with good financial performance are a number of Chinese (Hong Kong) and Australian companies in sectors such as Utilities, Construction Machinery & Heavy Trucks, Marine Transport, Industrial Machinery, Road & Rail Transport, Transportation Infrastructure and Real Estate. This reflects the rapid growth of the region and indicates that these companies are focused more on this growth than on issues such as carbon emissions.

Sector-Specific Perspectives

The results from the Carbon Beta™ research have also proven to be consistent across a number of different high-impact industries. As expected, the size of the “carbon beta premium” varies significantly across different sectors. In the case of the Utilities Sector⁶, investment returns from top carbon performers exceeded those of the carbon laggards for the same period by an annualized rate of return of 16.02% (a cumulative total return of 83.94% compared to 35.88%), as displayed in Figure 5.

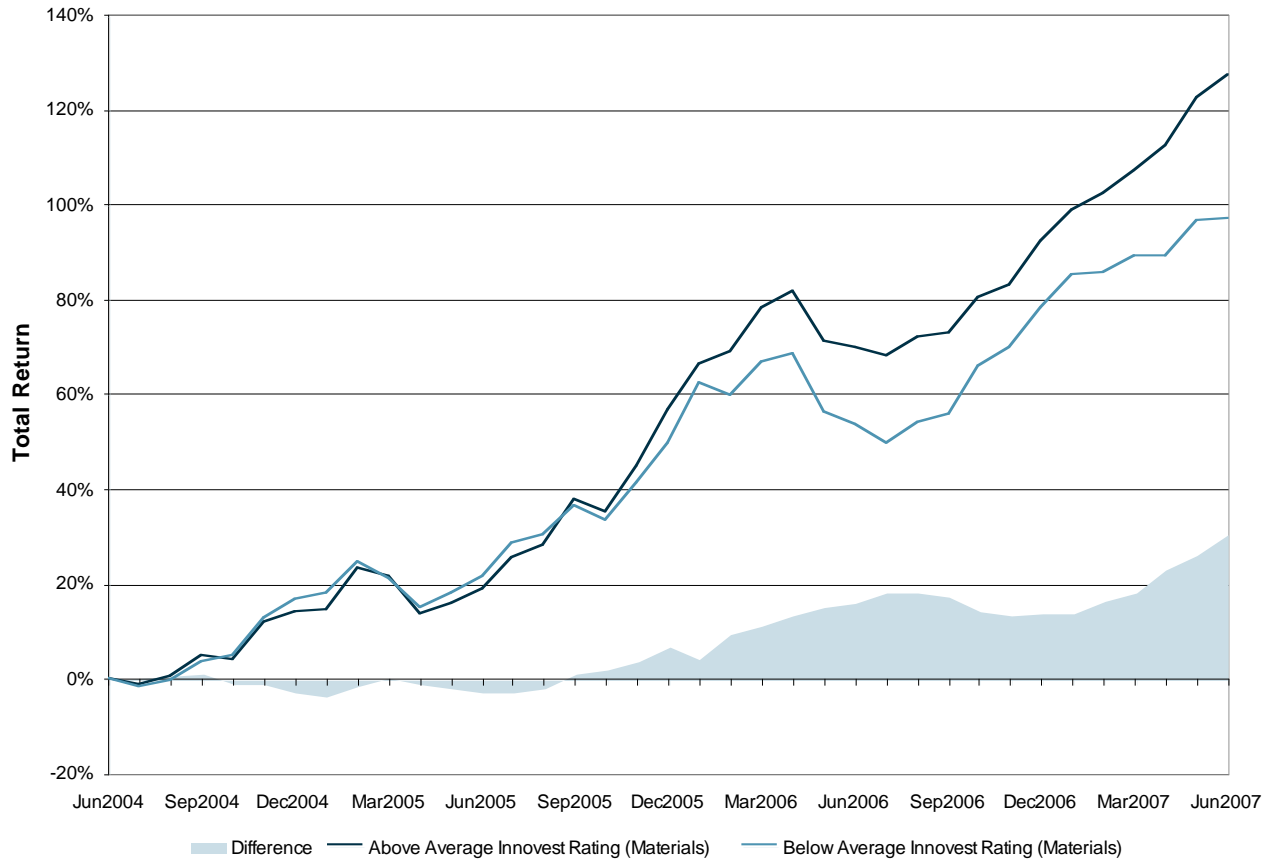
FIGURE 5 Carbon Beta™ Performers vs. Laggards in the Utilities



⁶ Subsectors included in this category are Electric Power Companies - N. America, Electric Utilities – International, Gas Utilities, and Multi-Utilities & Unregulated Power.

For the Materials sector, investment returns from carbon performers exceeded those of the carbon laggards in the aforementioned period by an annualized rate of return of 5.41% (a cumulative total return of 91.00% compared to 74.77%), as displayed by Figure 6.

FIGURE 6 Carbon Beta™ Performers vs. Laggards in the Materials Sector



It must be acknowledged, however, that there are very real limits to the predictive power of any historical analysis of companies' financial performance, particularly in a dynamic area such as climate change, where the future competitive environment is, while unpredictable, almost certain to be different from the one which produced the historical financial results.

Having said that, however, it is also clear that many institutional investors are beginning to use carbon risk management as a proxy for the overall strategic management capacity of major companies in high-risk sectors. For this reason, while caution is urged in interpreting the above results, we believe that they are instructive.

9 Conclusions

Despite the obvious limitations of any purely retrospective study in a field as dynamic as carbon finance, we believe that the results of this study do allow us to reach a number of conclusions with a high degree of confidence:

- » **The competitive and financial consequences of regulatory and public responses to climate change can vary enormously between industry sectors, within sectors, and among different geographic regions.**
- » **Companies' responses to both the risks and opportunities driven by climate change are becoming increasingly critical to their competitiveness and financial performance.**
- » **While non-verified, company-disclosed information can be helpful to investors, it is not sufficient for those investors to take fully informed decisions, or to create optimal financial results.**
- » **In order to accomplish these latter objectives, investors require in depth, company-specific research which addresses each of the critical dimensions of climate risk, not simply companies' gross "carbon footprint". The specific model tested in this study was Innovest's proprietary Carbon Beta model, which explicitly addresses four dimensions:**
 - » Companies' overall carbon footprint or *potential* risk exposure, adjusted to reflect differing regulatory circumstances in different countries and regions.
 - » Their ability to *manage* and reduce that risk exposure
 - » Their ability to recognize and seize climate-driven opportunities on the *upside*
 - » Their rate of improvement or regression
- » **Given the velocity of change in both the public policy environment and companies' responses to it, the premium attached to up-to-date research and analysis is both considerable and growing over time.**

APPENDIX 1

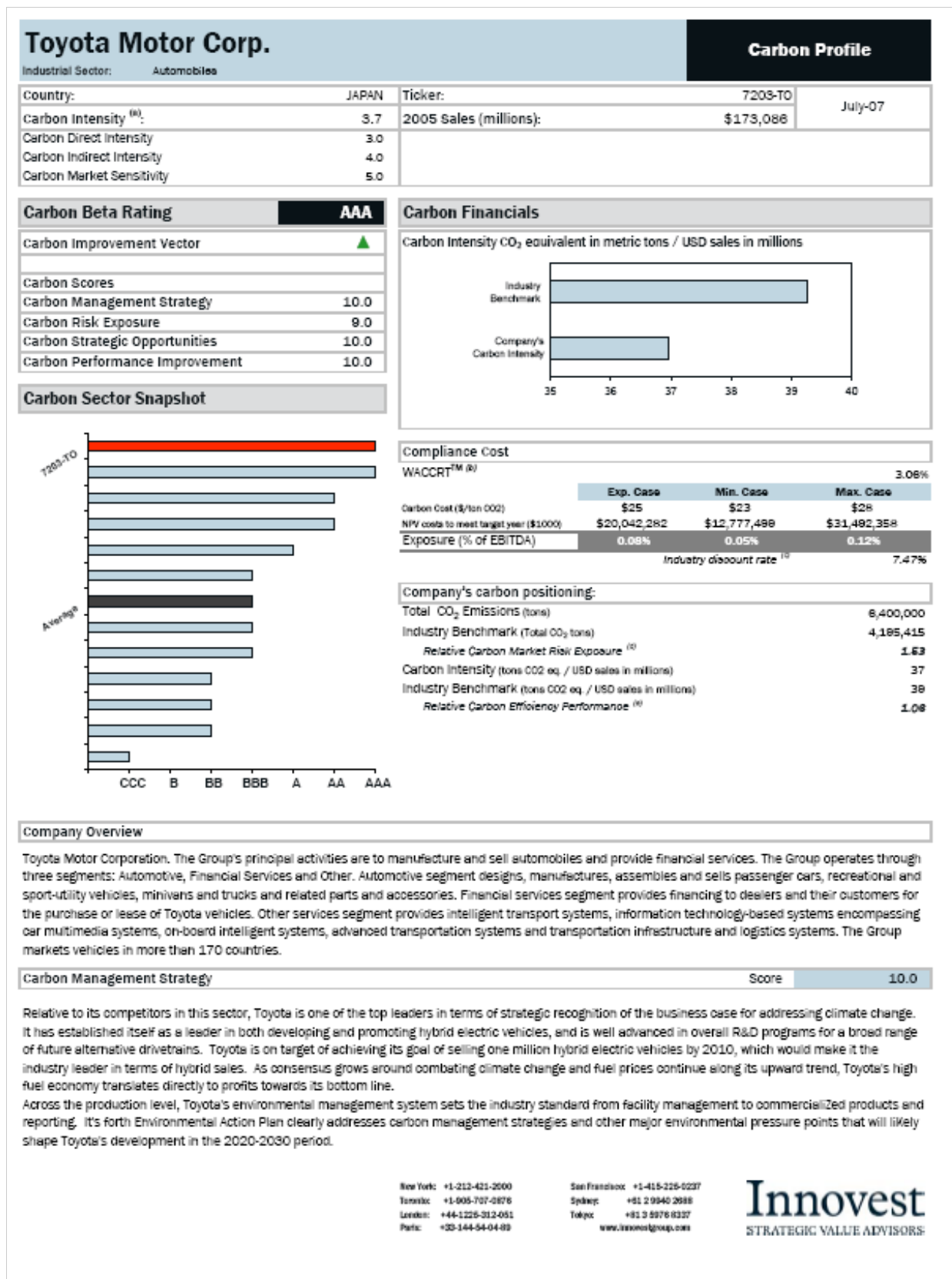
Summary of Previous Innovest Carbon Finance Research

Innovest's Carbon Beta Research: *Selected Highlights*

- » Carbon Disclosure Project, 2006-2007. CDP V: Awarded fifth consecutive global mandate
- » JP Morgan, 2006-2007. Innovest and JP Morgan co-created world's first "climate risk-adjusted" bond index
- » World Wildlife Fund (U.K.) 2007. U.K. Power Giants: Generating Climate Change
- » Carbon Disclosure Project, 2005-2006. CDP IV: Awarded fourth consecutive global mandate
- » World Wildlife Fund, 2005. Analysis of U.K. Power sector
- » Australian Greenhouse Office, 2005. Energy & Carbon Management Risk Benchmarking Study of Selected ASX 200 Companies in Australia
- » Carbon Disclosure Project, 2004-2005. CDP III
- » Carbon Trust, United Kingdom: 2004. Integrating climate risk into investment analysis in multiple sectors
- » Natural Resources Canada, Government of Canada, 2004. Integrating climate risk into valuation models in the oil and gas sector
- » UBS Investment Bank, 2003-2004. Climate Risk Management Training
- » Carbon Disclosure Project, 2003-2004. CDP II
- » World Wildlife Fund, 2003. "Power Switch" report on electric utilities sector
- » Electricité de France, 2003. EDF Rating and Benchmarking Study
- » Carbon Disclosure Project, 2002-2003. CDP I
- » UNEP Finance Initiative, 2002. Climate Change and the Financial Services Industry
- » CERES, 2002. Value at Risk Report: Climate Change and the Future of Governance
- » United Technologies, 2002. Climate Change & United Technologies: Effects on Major Market Segments

APPENDIX 2

Sample Innovest Carbon BetaTM Company Profile



Carbon Risk Exposure	Score	9.0
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In recent years, approximately 52.1% of Toyota's vehicle sales have been light trucks and SUVs. With lower fuel economy, Innovest predicts light trucks will face declining sales as fuel price trend upwards. Automakers which depend heavily on light trucks will be highly exposed to this carbon risk. Toyota also offers a range of high-mileage vehicles, and does not depend on trucks for stability as much as the US Big 3.

Carbon Strategic Opportunities	Score	10.0
--------------------------------	-------	------

Toyota's total fleet fuel economy, according to the latest figures from NHTSA, is 27.8 mpg. Automakers offering high-mileage vehicles will enjoy stronger sales as fuel prices trend upwards. Toyota's vehicle product line is not dependent upon its light truck or SUV sales, which has dragged down its overall fuel efficiency. The majority of its revenue comes from high mileage vehicles including hybrid electric vehicles, a technology it plans to integrate as the standard powertrain on every vehicle. Because of Toyota's expertise and leadership in alternative drivetrains, its hybrid technology is at least one generation ahead of the rest of the industry with the exception of Honda Motor. The Prius is the first mass produced hybrid electric family car in the world and is the fastest selling vehicle in the US. Hybrid electric vehicles are viewed as the best alternative technology until fuel cells mature. As a Japanese company it must meet strict Japanese fuel efficiency and emissions requirements, making its exported fleet generally cleaner and more fuel efficient than competitors'. Toyota achieved the Japanese 2010 fuel efficiency standards five years early in all weight categories. Toyota is also developing techn

Carbon Performance Improvement	Score	10.0
--------------------------------	-------	------

Toyota is the most progressive of the major automakers with respect to carbon issues. The company is the market leader in hybrids. As a Japanese company it must meet strict Japanese fuel efficiency and emissions requirements, making its exported fleet generally cleaner and more fuel efficient than competitors'.

⁽⁴⁾ The Carbon Intensity is an exclusive Innovest intensity factor that characterizes industry sectors that are the most exposed to climate change risks and opportunities along their entire value chain: upstream, internal and downstream. This composite climate change (CC) intensity factor ranges from 1 to 5 (1-lowest exposure, 5-highest exposure). Sectors with CI > 2 are considered to be the most exposed to climate change risks.

⁽⁵⁾ This figure represents the Weighted Average Country Carbon Reduction Target for each of the countries that the company has assets in.

⁽⁶⁾ Industry discount rate is calculated from the WACC from the industry as of January, 2007.

⁽⁷⁾ Relative market carbon risk exposure in the sector equals 1. If CMR>1, the company is considered to have a relatively high risk exposure in its sector.

⁽⁸⁾ Relative market carbon performance in the sector equals 1. If CEP>1, the company is considered to be more efficient carbon wise (i.e., the company generates more output per unit of CO2 emitted).

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APPENDIX 3

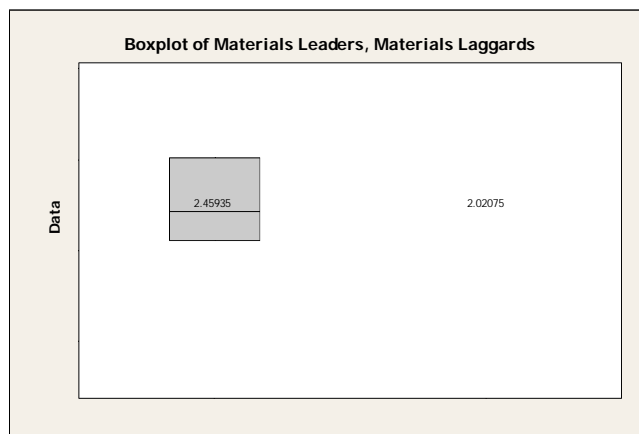
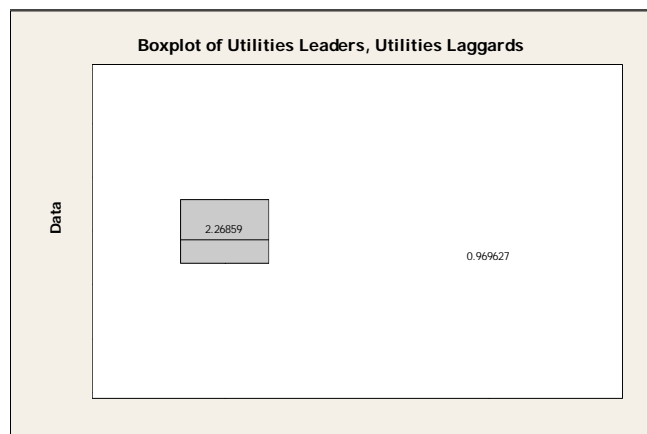
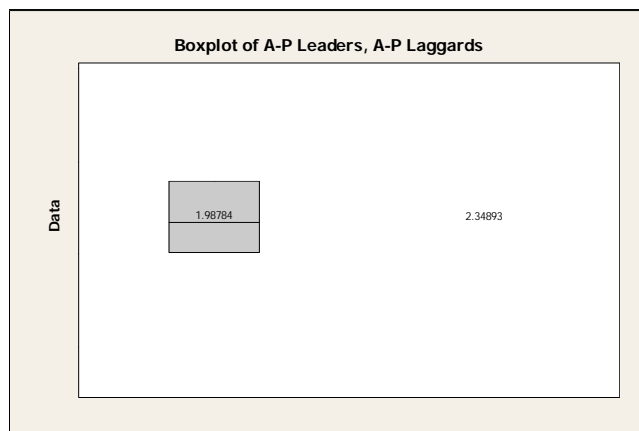
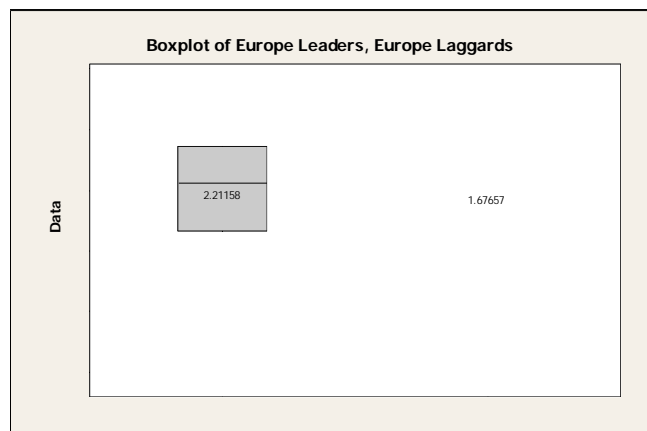
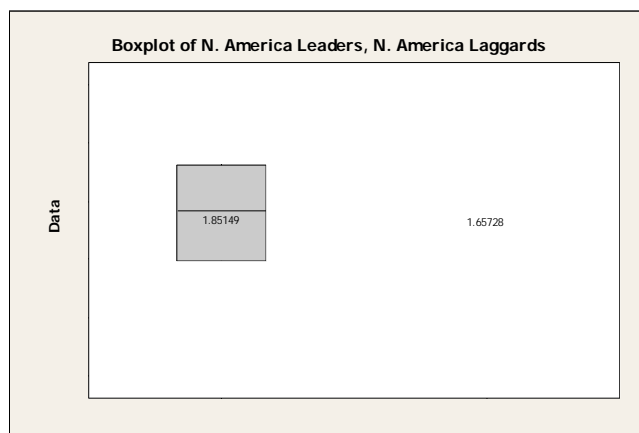
Statistical Data

The following boxplots display the characteristics of the empirical distribution for the returns of the different portfolios that were object of this study.

The diagrams display location, spread, skewness, tail lengths and outliers of the data. The box represents 50% of ordered data stretching between the lower hinge and the upper hinge, which are equivalent to the lower and the upper quartile of the data respectively. That is, the first quartile (Q1); and the third

quartile (Q3), for which 25 and 75 percent of the data values are less than or equal to these values respectively.

The bar in this box indicates the median, which by its position depicts the symmetry or skewness of the data. The expected returns for all data sets are shown in numbers within the boxes. The whiskers include all data to the largest value that is equal to or less than 1.5 (Q3-Q1). This also defines the outliers cutoffs. All data points beyond the whiskers are considered to be outliers.



GLOBAL				NORTH AMERICA			
Leaders		Laggards		Leaders		Laggards	
Mean	2.2121	Mean	1.9642	Mean	1.8515	Mean	1.6573
StDev	2.5859	StDev	2.7455	StDev	2.8651	StDev	3.1975
Variance	6.687	Variance	7.5378	Variance	8.2087	Variance	10.2238
95% Confidence Interval for Mean		95% Confidence Interval for Mean		95% Confidence Interval for Mean		95% Confidence Interval for Mean	
1.3499	3.0743	1.0488	2.8796	0.8962	2.8068	0.5912	2.7234
95% Confidence Interval for StDev		95% Confidence Interval for StDev		95% Confidence Interval for StDev		95% Confidence Interval for StDev	
2.1029	3.359	2.2327	3.5663	2.3299	3.7216	2.6002	4.1534
Sharpe ratio	4.085232	Sharpe ratio	3.072843	Sharpe ratio	2.607784	Sharpe ratio	1.809859
EUROPE				ASIA-PACIFIC			
Leaders		Laggards		Leaders		Laggards	
Mean	2.2116	Mean	1.6766	Mean	1.9878	Mean	2.3489
StDev	2.5834	StDev	2.4411	StDev	3.0545	StDev	2.79
Variance	6.6739	Variance	5.959	Variance	9.33	Variance	7.7841
95% Confidence Interval for Mean		95% Confidence Interval for Mean		95% Confidence Interval for Mean		95% Confidence Interval for Mean	
1.3502	3.0729	0.8627	2.4905	0.9694	3.0063	1.4187	3.2792
95% Confidence Interval for StDev		95% Confidence Interval for StDev		95% Confidence Interval for StDev		95% Confidence Interval for StDev	
2.1008	3.3557	1.9851	3.1709	2.484	3.9677	2.2689	3.6241
Sharpe ratio	4.085794	Sharpe ratio	2.224447	Sharpe ratio	2.941092	Sharpe ratio	4.367608
UTILITIES				MATERIALS			
Leaders		Laggards		Leaders		Laggards	
Mean	2.2686	Mean	0.96963	Mean	2.4593	Mean	2.0208
StDev	2.3785	StDev	1.13307	StDev	3.4776	StDev	3.4937
Variance	5.6575	Variance	1.28385	Variance	12.0939	Variance	12.2063
95% Confidence Interval for Mean		95% Confidence Interval for Mean		95% Confidence Interval for Mean		95% Confidence Interval for Mean	
1.4755	3.0616	0.59184	1.34741	1.2998	3.6188	0.8559	3.1856
95% Confidence Interval for StDev		95% Confidence Interval for StDev		95% Confidence Interval for StDev		95% Confidence Interval for StDev	
1.9343	3.0896	0.92143	1.47182	2.828	4.5173	2.8412	4.5382
Sharpe ratio	4.504937	Sharpe ratio	-0.56757	Sharpe ratio	4.078197	Sharpe ratio	2.770324

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