# The endogenous character of executive compensation: Does corporate strategy affect the choice to adopt residual income-based incentives?

**Frank V. Sonneveld**[31]

**Executive summary**

*This study investigates whether firms following a prospector strategy are less likely to adopt residual income (RI) as their main performance measure than firms following a defender strategy. The rationale behind this research question is that previous research has shown that implementing RI-based incentives has some behavioral consequences that intuitively do not rhyme well with the objectives of a growing firm. The sample consists of 40 RI adopters, matched with 40 non-adopters, for each of which strategy is measured as a combination of three publicly available ratios. Although the empirical results of this study are inconclusive, he research has lead to renewed insights that should be of use to researchers in the future.*

## 1. Introduction

Residual income is a performance measure that has received a lot of attention in the past fifteen years. It is claimed to overcome the problems associated with traditional performance measures. These problems include (investment and operational) myopia and paying too little attention to the costs of capital involved to generate earnings.

RI is calculated by removing from operating income a charge on employed capital. What remains is, according to proponents of RI-type of measures, the true value a firm has created. That is, the value it creates beyond the demanded cost of capital. Under this definition, RI can be used by any for-profit company, at any time, as it is simply the measure that best encompasses all the different aspects of value creation: finance, investments and operations (Bouwens and Speklé 2007).

The most prominent assumption underlying the discussion in favor of RI, is that it is (most) closely aligned with stockholder value. One can therefore take in the advantages of a market-based measure, whilst leaving the disadvantages of uncontrollability and distortion aside. Various researchers, however, have concluded that RI does not explain stock returns as well as claimed (Biddle et al. 1997).

Reluctant to believe RI thereby loses all of it's benefits, I seek to find out why, then, firms apparently still decide to embrace this measure as their primary basis for incentive

[31] This thesis was supervised by Dr. J. Noeverman, Department of Accounting, Auditing & Control, Rotterdam School of Economics, Erasmus University Rotterdam.

Frank Sonneveld has graduated in Economics and Business at the Erasmus University Rotterdam (NL) and is now doing a second master programme in Banking and Finance at the University of Sankt Gallen (CH).

compensation. The answer to this question, I believe, lies in the behavioral consequences of adopting an RI-based performance measure. According to Wallace (1997), firms that adopt RI-based compensation increase their RI performance in the years following RI adoption, thereby confirming the adage 'what you measure is what you get'. Firms do this by (1) decreasing investments, (2) increasing divestments, (3) increase payouts to shareholders, and (4) increase asset turnover. These results indicate the evolvement of more asset-conscious behavior when RI is adopted.
The next step in my line of reasoning is the hypothesized notion that the choice to adopt RI is an endogenous one. That is: some firms are more likely to adopt RI-based measures than others. Considering the behavioral consequences of RI adoption as Wallace (1997) found them, I argue firms following a defender-type of strategy are more likely to adopt RI than are firms following a prospector-type of strategy.
This argument molded into a research question looks as follows:

***Are firms characterized as following a defender-type strategy more likely to adopt residual income-based performance incentives than firms characterized as following a prospector-type strategy?***

I deliberately use the strategy typology defined by Miles and Snow (Miles et al. 1978), because of it's widespread use among researchers and because it is well documented (Simons 1987).
In my research, I create a strategy continuum ranging from defender to prospector. This method is appropriated from Ittner et al. (1997) and involves the measurement of three publicly available ratios which are then modified to weigh equally and compounded into one strategy measure. These ratios are: (1) research and development (R&D) expenditures-to-sales, (2) market-to-book-assets, and (3) employees-to-sales.
My sample consists of 40 firms that have adopted RI as their primary measure for incentive compensation in the last 13 years, matched with 40 control firms, identified through matching on standard industry classification (SIC) codes and total assets (to proxy for firm size). The result is a sample of 80 firms (40 firm couples). For availability reasons, I chose to investigate stock listed U.S. companies only.
With this research I aim to make a valuable contribution to existing incentive compensation literature because research on the endogenous character of RI adoption is scarce. Although corporate strategy has for long been linked to management control systems (Otley 1980), it has rarely been applied to RI-based performance measurement systems. A confirming answer to my research question could lead the way for other researchers to examine whether RI adopting firms following a defender strategy (and thus match the profile of an RI adopter) *perform* better than firms adopting RI whilst following a prospector strategy.
The rest of this paper is organized as follows: the second part will provide summary of relevant prior literature. This will be extended in part three where I will present my hypothesis development. In part four I will set out how I designed my research. The results are then presented in part five, and analyzed in part six. This part will also contain a summary of the paper.

## 2. Prior research

### 2.1 Performance based compensation

Performance based compensation finds it's origin in agency theory (Eisenhardt 1989). Agency relationships arise because firms grow and are thereby forced to decentralize decision-making authorities (Jensen and Meckling 1992; Bouwens and Speklé 2007). Performance based compensation aims to re-align the interests of managers and their superiors.

The ultimate goal for any for-profit organization is to maximize shareholder (or firm) value. It would therefore seem logical to reward employees when they create value for the firm. However, since measuring one's contribution to firm value is rarely possible, alternative ways of rewarding employees have to be sought (Merchant and Van der Stede 2007).

Generally accepted finance literature states the value of any economic asset can be calculated by discounting all future cash flows the asset is expected to generate to present value (Berk and Demarzo 2007). The change in firm value over a certain period of time is called economic income. Building on the principle of discounted future cash flows, employees can create value for the firm by: (1) increasing the size of future cash flows, (2) accelerating the receipt of those cash flows (due to the time value of money), or (3) making the cash flows less susceptible to risk (to lower the discount rate) (Merchant and Van der Stede 2007).

Seeing as managerial tasks are broad and varied, the list of possible performance measures on the basis of which managers can be evaluated and rewarded is extensive. Following Merchant and Van der Stede (2007), I classify these measures to fit into one of two broad categories: market measures and accounting measures. Measures in each of these two categories have their individual advantages and disadvantages. Regardless of what certain consulting firms might argue, there is no such thing as a perfect performance measure.

### 2.2 Market- and accounting-based performance measures

The first type of measure we discuss are those that are market-based. These measures are based on the direct value created for shareholders, also referred to as shareholder return. Shareholder return is calculated as the sum of dividends plus the change in stock price (Berk and Demarzo 2007).

The popularity of stock-based compensation systems lies in the directness by which they relate to changes in shareholder value. Merchant and Van der Stede (2007) furthermore identify market measures of performance as being timely, precise and nearly impossible to manipulate.

Of course there are also disadvantages to using market measures of performance. The biggest of which lies in the numerous amount of uncontrollable factors that influence stock prices. Additionally, it is generally only top management that can significantly influence stock prices as stock prices contain aggregated information from a whole organization.

Accounting measures of performance have traditionally been the primary base for manager evaluations (Van der Stede et al. 2006). Two basic forms of accounting based measures are distinguished by Merchant and Van der Stede (2007): (1) residual measures such as operating profit or RI, and (2) ratio measures such as return on assets (ROA) or return on

investment (ROI). I will be giving ROI special attention as it is, in characteristics, closest to RI.
Accounting measures of performance thank their popularity to a number of advantages which I will appropriate primarily from Merchant and Van der Stede (2007). First of all they are generally relatively congruent with the organization's goal of value (profit) maximization (Lev 1989). Nonetheless, accounting measures of performance are subject to some of the same controllability issues as market measures. A big difference between the two types of measures, however, is that accounting measures can be calculated for individual business units lower down the organization, whereas stock prices are usually only available for corporations as a whole.
Using accounting profits or any other accounting based performance measure, however, has its disadvantages as well. The most heard critique on accounting measures is that they focus on the past. They are said to be backward-looking (Kaplan and Norton 1992). The problem associated with this characteristic is that managers are not motivated to think proactively.

### 2.3 Return-on-investment

The one accounting measure I will address individually is ROI, because I consider it to be closest related to residual income – the measure this paper is about. ROI is a popular measure because it allows comparing of divisions of different sizes. A larger division is supposed to make more profit than a smaller division. Because ROI divides profit by total investments for the particular divisions, it controls for division size.
Other advantages are that ROI clearly reflects the revenue, cost and investment tradeoff managers have to make and the experience most managers have with widely-used measures like this (Merchant and Van der Stede 2007).
There are, however, important disadvantages to using ROI as a performance measure as well. The first disadvantage lies in the inherent difference between ratio and absolute measures. This is explained nicely by Balachandran (2006), who mentions maximizing a ratio measure can induce suboptimal investment behavior. A successful division manager might be reluctant to invest in a project that would lower his division's ROI, even though the project ROI is higher than the company's weighted average cost of capital (WACC). Conversely, a manager of a less successful division may choose to invest in a project that raises average ROI, but does not yield a return equal to the company's WACC. The result of this form of suboptimalization is that company capital is gradually allocated away from the most successful divisions to the least successful divisions (Merchant and Van der Stede 2007).

### 2.4 Residual income

A measure that is supposed to combine the positive characteristics of both measures is residual income (RI). Over the past 2 decades it seems there has been increasing academic and practical interest in performance measures based on RI. This increased interest may be attributed to the New York consulting firm Stern Stewart & Co., that advocates a specific form[32] of RI called economic value added (EVA) (Stewart 1991).

[32] Various other authors, as well as consulting firms have introduced slightly adjusted versions of RI, but EVA is the best known. These other adjusted versions of RI are cash-flow return on investments (CFROI) by Holt Value

The concept of RI has been introduced as early as 1890, by Alfred Marshall (Bouwens and Van Lent 2000), who defined it as net income minus a capital charge.
In short, ROI is calculated by deducting from operating profit a charge on *all* capital employed. Schematically this looks like this (Bouwens and Speklé 2007):

| | |
|---|---|
| | Sales revenue |
| -/- | Costs of operational activities |
| -/- | Financing costs (Cost of capital x Capital employed) |
| = | Residual income |

The result is a measure that takes into account the various areas that affect value: finance, investment and operational decisions are brought into one measure (Bouwens and Speklé 2007). Operational decisions surface in the profit part of the measure, investment and financing decisions in the cost of capital and the size of total assets parts. Managers' decisions are thus directed to asset deployment (for example by increasing profits) and asset commitment (for example by decreasing the risk associated with the assets in place and by timing and determining the size of investments) (Stewart 1991).
RI is supposed to combine the advantages of market- and accounting based performance measures. O'Hanlon and Peasnell (1998) show that discounted RI valuation yields the same results as discounted cash flow valuation. Since it has long been acknowledged stock markets base their value judgments on expected discounted cash flows, it would be logical to assume the market value of a firm and it's RI are closely related (Bouwens and Speklé 2007). The biggest advantage of RI-based measures over market-based measures of performance would then be that RI is less affected by external factors, and thus less noisy than stock prices. In addition, RI is more sensitive to managerial actions (Bouwens and Speklé 2007).
These advantages, however are not specific to RI-based measures of performance (Bouwens and Speklé 2007). Other accounting-based measures, such as net income or return on assets, can be applied in the same situations.
Proponents of RI type of measures claim RI, unlike traditional earnings, is closely aligned with the true value created by a company. Therefore, rewarding managers on the basis of this measure should best align manager and stockholder interests. The reasoning behind this is based on the age-old paradigm that a company creates wealth if it earns more than it's cost of capital (debt and equity) (Biddle et al. 1997). Easton et al. (1992), however, provide convincing evidence that, especially over longer periods in time, accounting earnings and market value are related. Additionally, Biddle et al. (1997) show that RI and EVA are worse predictors of stock returns than traditional measures such as net income.

## 3. Hypothesis development

### 3.1 Behavioral consequences of RI adoption

The question raised by these findings is then why RI is still being used so widely. I can think of two possible explanations for this non-decreasing popularity: (1) companies aren't

Associates, Total Business Return by Boston Consulting Group, Economic Profit by McKinsey & Co. And Shareholder Value Added by LEK/Alcar (Merchant and Van der Stede 2007).

aware of the lack of information content of RI-based measures, or (2) other motives lead companies to adopt RI.
Assuming organizations act rational, I reject the first explanation. I do not find it conceivable that firms (or in this case, compensation committees) choose to use RI/EVA based on the proclaimed correlation between RI and stockholder returns when an extensive list of literature exists on the absence of this relation (Easton et al. 1992; Biddle et al. 1997). This implies RI/EVA is adopted for reasons other than the proclaimed information content. Again, I consider two different reasons: (1) the somewhat cynical explanation of copycat-behavior and consultant-influence, and; (2) RI offers advantages other than the claimed informativeness on stockholder returns.
Again, from the assumption of a rational firm, the first reason is rejected, implying RI has advantages we haven't discussed before. This reason, I claim, lies in the behavior RI induces from managers.
Wallace (1997) is one of the scarce researchers to examine management behavior after RI adoption. His findings support the adage 'what you measure is what you get'. Firms adopting RI-based incentives for top managers increase RI relative to non-adopting firms. Furthermore, they decrease investments, increase divestments, increase payouts to shareholders, and increase asset turnover. These are all actions consistent with the strong rate of return discipline associated with RI.
Balachandran (2006) extends the previous research by adding the factor of prior performance measures. His findings support Wallace's (1997) investment-oriented conclusions, but only for firms who switched from earnings-based incentives to RI-based incentives. His findings show weak evidence that firms switching from ROI to RI actually increase investments.

### 3.2 The value-based management framework

Increasing interest in value-enhancing performance measures such as RI and EVA has led Ittner and Larcker (2001) to incorporate these measures into a value based management (VBM) framework. The idea behind this framework is to combine different aspects of management accounting (such as activity based costing and balanced scorecards) into an integrated framework to measure and manage businesses in the current perspective of creating superior long-term shareholder value.
The six sequential steps of Ittner and Larcker's (2001) VBM framework are the following:
*1.* Choosing specific internal objectives that lead to shareholder value enhancement.
*2.* Selecting strategies and organizational designs consistent with the achievement of the chosen objectives.
*3.* Identifying the specific performance variables, or ''value drivers'', that actually create value in the business given the organization's strategies and organizational design.
*4.* Developing action plans, selecting performance measures, and setting targets based on the priorities identified in the value driver analysis.
*5.* Evaluating the success of action plans and conducting organizational and managerial performance evaluations.
*6.* Assessing the ongoing validity of the organization's internal objectives, strategies, plans, and control systems in light of current results, and modifying them as required.

Over the years, researchers and consultants have placed RI/EVA in the first of these six steps: RI being the primary indicator for shareholder value enhancement (Malmi and Ikäheimo 2003). Placing RI at the top of the VBM framework implies it is the measure that best reflects long-term shareholder value enhancement. As we have seen earlier, however, this assumption appears to be false. RI and EVA do not seem to correlate with stockholder returns as well as is often claimed (Biddle et al. 1997).
If RI, however, is adopted for the management-behavioral changes it is supposed to bring, I argue they do not belong at the top of the Ittner and Larcker (2001) VBM framework, but should be treated as 'just another' performance measure belonging to step three and below. RI-based measures should, then, be treated similar to other performance measurement systems (PMS') such as the balanced scorecard or regular accounting (earnings-)based compensation.
Taking another look at the VBM framework, we see strategic decision-making taking up the second step of the VBM sequence. Should RI-based performance measures belong at the top of the framework, as is usually argued (Malmi and Ikäheimo 2003), RI adoption should not be affected by corporate strategy. I argue, however, that RI/EVA should take it's place among regular performance measures in step three and four. Following this line of reasoning, strategy should be a determinant in the choice whether or not to adopt RI-based performance measures.

### 3.3 Strategy typology

In this research I use the strategy typology adapted from Miles and Snow (Miles et al. 1978). Miles and Snow distinguish between three strategic types of organizations: defenders, analyzers and prospectors. Defenders operate in relatively stable product areas, offer more limited products than competitors, and compete through cost leadership, quality, and service.
They engage in little product/market development. Prospectors, on the other hand, compete through new products and market development. Product lines change over time and this type of firm is constantly seeking new market opportunities. Analyzers are an intermediate hybrid, combining parts of both defender and prospector strategies (Simons 1987). This spectrum from defender to prospector exhibits similar characteristics identified by other researchers.

### 3.4 Hypothesis development

When casting our minds back to Wallace's (1997) findings concerning behavioral consequences of RI adoption, I find these findings to be intuitively misaligned with prospector-types of strategies. Furthermore, previous research on the relative informativeness value of performance measures have shown that companies (Ittner et al. 1997) and business units (Govindarajan and Gupta 1985) following a prospector strategy are less likely to be evaluated by means of financial measures.
My explanation for this hypothesis stems from an informativeness perspective. For (owners of) firms following a prospector strategy, efficient asset utilization is not a primary concern. Since RI is a measure with a strong focus on tight asset management, I consider RI to be a less informative measure for owners of prospector firms than for those of defender firms.

Formally put, my research hypothesis reads as follows:

**H1:** Ceteris paribus, firms characterized as following a prospector strategy are less likely to adopt RI-based compensation for their top executives than firms characterized as following a defender strategy.

## 4. Research method

### 4.1 Sample selection

The sample in this study consists of 40 residual income-based compensation adopters and 40 matched control firms. Strategy scores, as well as three control variables are computed for each of these 80 firms. Data from the five years prior to adoption is used to calculate average scores per firm (400 firm-year observations). This method of matching each adopting firm with one matched control firm is the same as that used by other studies examining determinants of certain management control systems adoptions (Wallace 1997; Kleiman 1999; Said et al. 2003; Balachandran 2006).

Adopters of residual income-based incentives are defined as firms that use a residual income-based measure as their primary measure for annual cash bonuses to named executives[33].

The method by which adopters were identified involved extensive searches through proxy statements contained in the LexisNexis® Academic database. This method was appropriated from Ittner et al. (1997), who use the same method to identify firms using non-financial performance measures for executive compensation. The searches were performed using the keywords 'economic value added', 'economic profit' and 'residual income'.

After having finalized the adopter identification process at 40 firms, each of these firms were individually matched on the basis of standard industry classification (SIC) code followed by total assets.

**Table 4.1**

Definitive sample of adopting firms and matched control firms

| Year of adoption | SIC # | Adopting firm | SIC # | Control firm |
|---|---|---|---|---|
| 1995 | 3841 | Bard, C.R. Inc. | 3841 | United States Surgical Corp. |
| 1995 | 3826 | Beckman Instruments Inc. | 3826 | Millipore Corp. |
| 1995 | 3600 | Emerson Electric Co. | 3674 | Texas Instruments Inc. |
| 1995 | 4911 | IPALCO Enterprises Inc. | 4911 | KU Energy Corp. |
| 1995 | 2711 | Knight-Ridder Inc. | 2711 | Tribune Co. |
| 1995 | 3571 | Sequent Computer Systems Inc. | 3571 | Stratus Computer Inc. |

[33] Named executives are a firm's five most highly paid executives. Firms are required to disclose the names and total compensation values from these managers in their proxy statements (Balachandran 2006).

| | | | | |
|---|---|---|---|---|
| 1996 | 2520 | Kimball International | 2531 | BE Aerospace Inc. |
| 1996 | 3350 | Olin Corp. | 3311 | Allegheny Technologies Inc. |
| 1996 | 1400 | Vulcan Materials Co. | 1400 | English China Clays Plc. |
| 1996 | 3350 | Tredegar Corp. | 3350 | Oregon Metallurgical Corp. |
| 1996 | 3140 | K-Swiss Inc. | 3140 | Barry (R G) Corp. |
| 1996 | 2911 | Quaker State | 2911 | Tesoro Corp. |
| 1996 | 3825 | Tektronix | 3825 | Teradyne Inc. |
| 1996 | 3661 | ADC Telecommunications | 3661 | Tellabs Inc. |
| 1996 | 3826 | Hach Co. | 3825 | LTX Corp. |
| 1996 | 4213 | KLLM Transport | 4213 | Heartland Express Inc. |
| 1996 | 2750 | Donnelley & Sons | 2750 | Quebecor Inc. |
| 1996 | 2761 | New England Business Services | 2761 | Ennis Inc. |
| 1997 | 2834 | Bausch & Lomb Inc. | 2834 | Alza Corp. |
| 1997 | 2520 | Miller-Herman Inc. | 2510 | La-Z-Boy Inc. |
| 1997 | 7510 | Ryder System Inc. | 7510 | Rollins Truck Leasing |
| 1997 | 7359 | Xtra Corp. | 7359 | Weatherford Enterra Inc. |
| 1997 | 4955 | Safety Kleen Systems Inc. | 4955 | OHM Corp. |
| 1998 | 4931 | Montana Power Co. | 4931 | Allete Inc. |
| 1998 | 2750 | Banta Corp. | 2750 | Paxar Corp. |
| 1998 | 3861 | Eastman Kodak Co. | 3861 | Fujifilm Holdings Corp. |
| 1998 | 2540 | Knape & Vogt MFG Co. | 2540 | Interlake Corp. |
| 1998 | 3310 | National-Standard Co. | 3310 | Steel Technologies Inc. |
| 1998 | 5311 | J C Penney Co. | 5311 | Macy's Inc. |
| 1998 | 3555 | Baldwin Technology Co. | 3560 | Zebra Technologies Corp. |
| 1999 | 3612 | SPX Corp. | 3674 | LSI Corp. |
| 2000 | 3721 | Boeing Co. | 3720 | United Technologies Corp. |
| 2000 | 5661 | Genesco Inc. | 5661 | Finish Line Inc. |
| 2000 | 3743 | Trinity Industries | 3743 | Wabtec Corp. |
| 2000 | 6141 | Credit Acceptance Corp. | 6159 | Financial Federal Corp |
| 2000 | 2670 | Lydall | 2670 | Nashua Corp. |
| 2001 | 5093 | Schnitzer Steel | 5093 | Newpark Resources Inc. |
| 2002 | 3390 | Harsco Corp. | 3312 | Carpenter Technology Corp. |
| 2004 | 7830 | Marcus Corp. | 7841 | Hollywood Entertainment Corp. |
| 2005 | 2670 | Playtex Products | 2670 | Cenveo Inc. |

I control for industry effects because prior research shows RI-systems are heavily concentrated in the manufacturing industry (Kleiman 1999). Industry is therefore considered to be of influence in the decision to adopt RI-based compensation.
Size is controlled for because larger firms are considered more likely to be aware of stockholders' expectations regarding return on equity, and are therefore considered more likely to adopt RI-based executive compensation. Firm size is measured by total assets.
The definitive sample of adopting firms and matched peers is shown in table 4.1.

## 4.2 Variables

Filling in the independent and control variables was the next step in acquiring the data needed for this research. For that I used the Compustat and Center for Research in Security Prices (CRSP) databases. Compustat was used to obtain the relevant information from financial statements of the sample firms. CRSP was used to calculate the abnormal returns, in order to be able to determine the correlation between historical abnormal returns and historical residual incomes of the sampled firms.

### 4.2.1 Strategy

In order to measure whether strategy is a determinant in the choice to adopt residual income, a strategy score is computed. Following Ittner et al. (1997), I use three ratios to proxy for strategy: Research and Development (R&D) expenditures-to-sales, market-to-book-assets and employees-to-sales. I then aggregate these ratios into one strategy score per firm observation in which each ratio is weighted equally. I do this by calculating the average of the (equally weighted) individual factors.

The ratio of *R&D expenditures to sales* is a measure for a firm's tendency to search for new products. Because prospector firms are involved in more innovative actions, they are expected to spend more on R&D than defender firms (Hambrick 1983).

According to Adam and Goyal (2008), the *market-to-book assets* ratio is the best proxy for growth or investment opportunities. Since prospector firms are considered to have better growth opportunities than defender firms, their market-to-book assets ratio should be higher (Said et al. 2003).

The *employees-to-sales* ratio is included because defender firms are highly efficiency-orientated. Therefore, they are assumed to have less employees per dollar of sales (Ittner et al. 1997).

It was important to be as sure as possible that the way by which the strategy score was computed did not influence the results. I used a pragmatic approach to verify this, namely by computing the strategy score in different ways and checking whether my results changed. This did not appear to be the case.

## 4.3 Control variables

In addition to controlling for industry and size effects by matching firms, three control variables are added to the regression model: prior RI performance, leverage and the correlation between prior five-year residual income and prior five-year abnormal stockholder returns.

The first control variable concerns *prior RI performance*. Wallace (1997) finds that the adage 'what you get is what you measure and reward' holds with RI-based compensation. Firms adopting RI-based measures significantly improve their RI compared to a matched sample of firms that don't adopt RI-systems. Assuming firms are aware of this, low RI performance could be a motive to adopt RI-based compensation. Therefore, prior RI performance is expected to be negatively associated with RI adoption.

*Leverage*, measured as total debt divided by total assets, is expected to be negatively associated with the likelihood of RI adoption. For more highly leveraged firms, a larger fraction of capital costs consist of interest payments. This decreases the need for an additional charge on equity (Garvey and Milbourn 2000).

Jensen (1989) furthermore argues a high level of debt provides its own incentives to manage capital efficiently as the high interest payments can be seen as a forced way of distributing (free) cash flow. This counteracts managers' incentives to retain too large a proportion of free cash flow, which is also one of the effects of a RI adoption (Wallace 1997). More highly leveraged firms would therefore not benefit from RI adoption as much as less highly leveraged firms would.
Garvey and Milbourn (2000) find that a firm's decision to adopt an EVA incentive system is contingent on the degree to which EVA explains stock prices (relative information content). Assuming this finding holds for the more general RI measure as well, I include a measure for *relative information content* in the regression model computed as the correlation between residual income and abnormal stock returns in the five years prior to RI adoption.

## 5. Results

### 5.1 Preliminary tests

Before testing whether the hypothesis can be accepted or rejected, I conduct two preliminary analyses. The first is to see whether my method of using three ratios to measure strategy is correct, the second is to exclude outliers in my sample.
One of the underlying assumptions in my research is that the three ratios I use to measure strategy actually measure strategy. Although the same method has been used by various researchers in the past (Ittner et al. 1997; Said et al. 2003), I perform a factor analysis test to see how the three individual ratios are correlated. If all three ratios measure the same thing (strategy), their scores should be closely related.
The correlation matrix of the individual strategy scores is shown in table 5.1. The findings indicate employees-to-sales does not correlate well with the other two ratios. In fact, the correlation is negative, although the results are not significant. The correlation between R&D expenditures-to-sales and market-to-book-assets ratios is stronger, and proves significant at the .000 level.

**Table 5.1 Strategy score correlation matrix**

| | | R&D / Sales | Market to book assets | Employees / Sales |
|---|---|---|---|---|
| *Correlation* | R&D / Sales | 1.000 | .556 | -.177 |
| | Market to book assets | | 1.000 | -.143 |
| | Employees / Sales | | | 1.000 |
| *Sig. (1-tailed)* | R&D / Sales | - | .000 | .123 |
| | Market to book assets | | - | .174 |
| | Employees / Sales | | | - |

These results are confirmed by the principle component analysis shown in table 5.2. Two components are extracted, as opposed to the hypothesized one component: strategy. The

first component is well correlated with R&D-to-sales and market-to-book-assets, whereas the second component is based mainly on a high correlation with employees-to-sales.
The relevant question, then, is what these results mean for my research. If we assume the first component (the component closely related to R&D-to-sales and market-to-book-assets) is corporate strategy, apparently employees-to-sales measures something else.
With this in mind, I decide to run my tests two times: one time including the employees-to-sales ratio and one time excluding it.

**Table 5.2 Strategy score component matrix[a]**

| | Component | |
|---|---|---|
| | *1* | *2* |
| R&D / Sales | .858 | .195 |
| Market to book assets | .846 | .260 |
| Employees / Sales | -.429 | .903 |

Extraction Method: Principal Component Analysis.

a. 2 components extracted.

As is the case in linear regression models, logistic regression can be significantly influenced by outliers. To prevent these outliers from distorting my results I chose to exclude them from the sample. A complicating factor specific to my type of research is the fact that my sample consists of 40 matched firm couples. Outliers should therefore not be identified by means of analysis of the absolute numbers (strategy scores), but as the relative difference between the strategy scores of two matched firms.
This difference is calculated by measuring the strategy score of the adopter firm as a percentage of the strategy score of it's matched control firm. This way I identify outliers by couple instead of by firm. Considering the difference in characteristics between the strategy scores calculated with and without employees-to-sales ratios, outliers are determined separately.
Strategy scores calculated including employees-to-sales ratios are less spread out than those excluding employees-to-sales. A smaller difference between two matched firms is therefore tolerated for the analysis including employees-to-sales than for the analysis without employees-to-sales. For the former, outliers are defined as firm couples for which the adopter firm has a strategy score that is either less than 40%, or more than 250% (two and a half times in both directions) of the strategy score of it's matched peer. Six firm couples, or twelve firms are identified as outliers. In the analysis excluding employees-to-sales the percentages are at 25% and 400% (four times in both directions). Here, eight firm couples, or sixteen firms are identified as outliers.

**Table 5.3 Descriptive statistics for compounded strategy scores**

| | Full sample | | | Adopting firms | | | Control firms | | |
|---|---|---|---|---|---|---|---|---|---|
| *Strategy score* | *Mean* | *Std. Dev.* | *Median* | *Mean* | *Std. Dev.* | *Median* | *Mean* | *Std. Dev.* | *Median* |
| Including employees-to-sales | 1.38 | .91 | 1.19 | 1.28 | .64 | 1.22 | 1.49 | 1.11 | 1.12 |
| | N = 68 | | | N = 34 | | | N = 34 | | |
| Excluding employees-to-sales | 1.34 | 1.40 | 0.88 | 1.15 | .94 | 0.89 | 1.52 | 1.73 | 0.85 |
| | N = 64 | | | N = 32 | | | N = 32 | | |
| *Control Variables (N = 80)* | | | | | | | | | |
| Prior RI performance | -42.26 | 136.04 | -15.73 | -32.56 | 135.16 | -15.07 | -51.97 | 137.93 | -16.44 |
| Leverage | 0.27 | 0.20 | 0.24 | 0.24 | 0.17 | 0.22 | 0.29 | 0.23 | 0.27 |
| RI - Stock price correlation | 0.24 | 0.51 | 0.34 | 0.23 | 0.55 | 0.34 | 0.25 | 0.48 | 0.32 |

The outlier identification process described before has resulted in the descriptive statistics presented in table 5.3.

## 5.2 Binary logistic regression

The most important test used to test the relation between RI adoption and firm strategy is the binary logistic regression. Logistic regression is used to predict the likelihood of the occurrence of an event by fitting the data in a logistic curve[34]. Binary (or binominal) logistic regression is used when the dependent variable is dichotomous, as is the case in this study. The idea to use this technique came from reading research comparable to mine (Garvey and Milbourn 2000; Said et al. 2003; Hogan and Lewis 2005).

[34] Source: Wikipedia. http://en.wikipedia.org/wiki/Logistic_regression (Accessed on July 19, 2008).

**Table 5.4 Binary logistic regressions for compounded strategy scores**

| | Predicted sign | Strategy *including* employees-to-sales ratio | | Strategy *excluding* employees-to-sales ratio | |
|---|---|---|---|---|---|
| | | Coefficient | Odds ratio | Coefficient | Odds ratio |
| Strategy | - | -.388<br>(.209) | .678 | -.289<br>(.184) | .749 |
| *Control variables* | | | | | |
| Prior RI performance | - | .001<br>(.469) | 1.001 | .001<br>(.487) | 1.001 |
| Leverage | - | -1.440<br>(.287) | .237 | -1.349<br>(.337) | .260 |
| RI – Stock price correlation | + | -.403<br>(.423) | .669 | -.052<br>(.919) | .949 |
| Constant | | 1.084<br>(.112) | 2.956 | .791<br>(.183) | 2.206 |
| Chi-square | | 3.590<br>(.464) | | 2.720<br>(.606) | |
| Pseudo R-square (Nagelkerke) | | .069 | | .055 | |
| Sample size | | 68 | | 64 | |

*, **, *** Significant at 0.10, 0.05 and 0.01 levels, respectively (one-tailed).
P-values between brackets.
For an extensive discussion of the included variables see chapter four.

The results, displayed in table 5.4, generally suggest the model is weak. The chi-square goodness-of-fit results indicate the step to include all four variables (from the constant-only model) is not justified at a significant level (indicated by a p-value lower than .05)[35]. The Nagelkerke pseudo R-squared measures of 6.9% and 5.5% also indicate weak models. Nagelkerke's R-square is comparable to the R-square in a linear regression model. It ranges from 0 to 1 and loosely indicates the percentage in the dependent variable explained by the four independent variables (Pelsmacker, De and Van Kenhove 2006).
When looking at the results on the individual variable level, the image of a weak model persists. Although the direction of the strategy coefficients is negative as predicted, these coefficients are significant for neither of the two strategy constructs.
Interpretation of the logistic coefficients is difficult. Therefore I include the odds ratio in table 5.4. Odds ratios are computed as the natural log base, e, to the exponent, b, where b is the logistic coefficient[36]. What remains after this calculation is the factor by which the

[35] Source: David Garson: Logistic Regression. http://www2.chass.ncsu.edu/garson/pa765/logistic.htm (Accessed on July 19, 2008).

[36] Idem.

likelihood of the occurrence of the dependent variable changes with a single-unit change in the independent variable. For example, if strategy (excluding employees-to-sales) would increase by one unit, the likelihood of the firm being an adopter firm decreases by the factor .749. Thus, the lower the odds ratio, the more likely a firm is to be a non-adopter when the strategy score increases by one. In this example, an increase of one in the strategy score would lower the odds of that firm to adopt RI by 25.1% (1 - .749).

**Table 5.5 Wilcoxon signed-rank test for compounded strategy scores**

| Control firm strategy – Adopter firm strategy | | | |
|---|---|---|---|
| Strategy *including* employees-to-sales (n = 34*) | | Strategy *excluding* employees-to-sales (n = 32*) | |
| *Z* | *P-value* | *Z* | *P-value* |
| -.932 | .351 | -.374 | .708 |

* Defined as firm *couples*

### 5.3 Wilcoxon signed-rank test

I then perform a test to compare medians of the adopting and non-adopting sample. Because the strategy scores in my sample are not normally distributed, I have to turn to the Wilcoxon signed-rank nonparametric test (Aczel and Sounderpandian 2002). The Wilcoxon test does not assume a normally distributed sample is only slightly weaker than the t-test, which is normally used when comparing the means or medians of two samples (Aczel and Sounderpandian 2002). It is often used when comparing two populations with paired observations. The test assesses the null hypothesis that the medians of two populations do not differ[37].

Results from the Wilcoxon test are summed up in table 5.6. The results are, like the binary logistic regression, insignificant. The medians of the two populations can not be concluded to differ.

## 6. Discussion

### 6.1 Summary

This study aims to answer the question whether the choice to adopt RI is an endogenous one in general, and whether corporate strategy is a factor affecting this choice in particular. The motivation behind this research question primarily came from a study by Wallace (1997), who found firms adopting RI noticed observable behavioral effects of this adoption. RI adopters seemed to (1) decrease investments, (2) increase divestments, (3) increase payouts to shareholders, and (4) increase asset turnover in the years following RI adoption, compared to a matched sample of firms who did not adopt RI. I argue from an informativeness point of view these behavioral consequences fit a defender-type strategy better than a prospector-type strategy.

[37] Source: David Garson: Significance Tests for Two Dependent Samples: McNemar, Marginal Homogeneity, Sign, and Wilcoxon Tests. http://www2.chass.ncsu.edu/garson/pa765/mcnemar.htm (Accessed on July 21, 2008).

The research methodology used in this study is equal to that used in comparable research (Wallace 1997; Ittner et al. 1997; Kleiman 1999; Said et al. 2003). From the *LexisNexis*® proxy statement database I identify 40 firms that have adopted RI as their primary measure of performance for top executives in the past 13 years. These firms are matched to an equally large sample of 40 peer firms. These matches are based on standard industry classification (SIC) code, and on total assets, which I use to proxy for firm size.
For these 80 firms, I compute a strategy score as an equally-weighed average of three ratios, measured over the five years prior to RI adoption: (1) R&D expenditures-to-sales, (2) market-to-book-assets, and (3) employees-to-sales. These strategy scores form a continuum ranging from defenders (low scores) to prospectors (high scores). Additionally, three control variables are measured which are hypothesized to influence the choice to adopt RI. Each of these are also measured as an average over the five year prior to RI adoption: (1) prior RI performance, (2) leverage, and (3) the correlation between prior RI's and prior abnormal stock returns. All financial data used in this study was obtained through the *Compustat North-America annual* database.
After taking a closer look at the strategy construct, I had to conclude employees-to-sales might be measuring something different than the other two ratios do. Therefore, all tests are conducted twice: one time with a strategy score as explained earlier, and one time with a strategy score excluding the employees-to-sales ratio. The empirical results for both of these models show the image of a weak model, with no significant results any of the individual variables.

### 6.2 Conclusions

The results in this research ask for an explanation, of which I will present a couple here. Despite the fact that my hypothesis cannot be confirmed by my findings, I do not believe a conclusion is appropriate that states no relation exists between corporate strategy and RI adoption. A very conservative outlier policy has significantly reduced my sample size[38]. It is my belief that a larger sample size would have yielded results on which stronger conclusions could have been drawn.
Another possible explanation can be found in the assumptions I made in this study. One of these assumptions is that firms act rational. I mean by this that I assume firms that adopt RI do not do this for it's proclaimed (and proved wrong, Biddle et al. 1997) correlation with stock prices. This assumption is critical in the argumentation there are other advantages of adopting RI, mainly in the area of behavioral consequences.
After seeing the results of this study, we can question whether my assumption of the rational firm was correct. The absence of a significant relation between corporate strategy and the choice to adopt RI can be explained if firms do adopt RI for the expected correlation with stock returns. Firms may also choose to adopt RI for other non-rational reasons such as imitational reasons or because of the influence of consultants. Behavior of imitation would also explain the strong wave-like structure of RI adopters in my sample. RI adoption seems to decrease strongly in the later years of my sample (after 2000).
Malmi and Ikäheimo (2003) confirm in a field study that increasing shareholder value is often mentioned as the primary motive for RI adoption. Nonetheless, contrary to my

[38] From n = 80 to n = 68 (n = 64 for the model excluding employees-to-sales). A reduction of 15% (20%).

hypothesis, they observe that firms adopt RI to foster two different strategic orientations. Two of the six firms they investigated considered themselves to follow a growth strategy, comparable to the prospector strategy in my study. These firms see RI as an aid in their creation of value through growth. For the other four firms, efficient asset utilization was mentioned as the primary motive for RI adoption. These findings are inconsistent with my hypothesis that growth firms do not benefit from RI adoption.
Remarkably, both growth firms in the Malmi and Ikäheimo (2003) study explicitly state that they have switched to RI after having experienced the drawbacks of ROI as they are discussed in paragraph 2.3 of this paper. This observation is consistent with the results of a study by Balachandran (2006), who discovered firms switching from ROI to RI showed a different change in managerial behavior than firms switching from earnings-based measures to RI. Whereas Wallace (1997) finds *all* firms adopting RI generally increase focus on efficient asset utilization, Balachandran (2006) finds this observation does not hold for firms switching from ROI-type of measures to RI.
The combination of these three studies gives rise to a new explanation for the lack of significant results in my study. I hypothesize, inspired by the statements of the two growth firms in the Malmi and Ikäheimo (2003) study, that the limitations of using ROI as a performance measure are much more relevant for growth (prospector) firms than for firms emphasizing efficient asset utilization (defender firms). Therefore I mainly expect prospector firms to switch from ROI to RI. Had I had the chance to redo my research, I would have altered my hypothesis to incorporate the effect of previous performance measures. The hypothesis would, then, look more like this: "Prospector firms are more likely to make the switch from ROI to RI measures than are defender firms".
With hindsight we can conclude that in Wallace's (1997) sample, firms switching from ROI to RI were under-represented compared to firms switching from earnings-based measures to RI. If my reformulated hypothesis is confirmed, we can also say *prospector* firms were under-represented in Wallace's (1997) sample. In other words: Wallace's (1997) findings may turn out to be contingent on strategy.

### 6.3 Limitations

It is important to note that there are limitations to the results of this research. The first being the way in which strategy is measured. Although the method is used quite widely among management accounting researchers, it remains an approximation of strategy. There may furthermore be a difference in *realized* and *intended* strategies (Snow and Hambrick; 1980), with the method used by me only measuring realized strategy.
This research furthermore does not fully take into account the weight of the RI-system incentives relative to total compensation. Although I explicitly selected only those companies for which RI is the primary performance measure, the proportion of RI incentives to total compensation isn't taken into account. One might argue any consideration (including strategy), when adopting a RI-based incentive system, is more critically assessed when larger proportions of executives' compensations depend on the measure. The main motive behind the choice not to include RI incentive's proportions of total compensation into account is that total compensation is difficult to extract from firms' external reports. Especially the part of the compensation package that is paid in stock options is hard to express in dollar amounts.

## 6.4 Directions for future research

My research gives rise to a number of directions for future research. The low explanatory power of the models indicate either endogenous factors are missing, or RI adoption is not endogenous at all. Future research can be conducted to see whether RI adoption is an endogenous choice and sequentially which are the factors that affect the decision to adopt RI. My suggestion would be to conduct exploratory research on firms' motives behind RI adoption. Potential imitational behavior should not be ignored in these studies.
Following the line of reasoning in the concluding paragraph of this chapter, I have formed a new (and improved) hypothesis concerning the endogenous character of RI adoption. I argue firms that switch from ROI to RI are more likely to be identifiable as following a prospector strategy than as following a defender strategy. Unfortunately the process of writing a master thesis does not allow me to actually conduct this research. Nonetheless, I believe my research has contributed to existing RI adoption literature in that it forms a part of the 'academic circle', hoping my results will open doors for future research to refine this research.
In the process of identifying RI adopters I experienced that only a remarkably small number of firms have adopted RI in the recent years. The list of adopters I identified furthermore suggests a negative trend of RI adoption can be noticed. Future studies can try to concretize this preliminary observation and find an explanation for this apparent decreasing practical interest in RI-based compensation systems. This can, again, be linked with possible behavior of imitation.

## References


Aczel, A.D. and J. Sounderpandian. 2002. *Complete business statistics (fifth edition)*. New York, NY: McGraw-Hill Irwin.

Adam, T. and V.K. Goyal.2008. The investment opportunity set and its proxy variables. *The Journal of Financial Research* 31(1): 41-63.

Balachandran, S.V. 2006. How does residual income affect investment? The role of prior performance measures. *Management Science* 52(3): 383-394.

Berk, J. and P. Demarzo.2007. *Corporate Finance*. Boston, MA: Pearson Addison Wesley.

Biddle, G.C., R.M. Bowen and J.S. Wallace.1997. Does EVA beat earnings? Evidence on associations with stock returns and firm values. *Journal of Accounting and Economics* 24: 301-336.

Bouwens, J.F.M.G. and L.A.G.M. van Lent. 2000. *Financiële prestatiemeting door EVA*. Deventer, The Netherlands: Kluwer.

Bouwens, J.F.M.G. and R.F. Speklé, 2007. Does EVA add value? In: T. Hopper, R.W. Scapens and D. Northcott: *Issues in management accounting (third edition)*. Harlow, England: Prentice Hall.

Easton, P.D., T.S. Harris and J.A. Ohlson. 1992. Aggregate accounting earnings can explain most of security returns. *Journal of Accounting and Economics* 15: 119-142.

Eisenhardt, K.M., 1989. Agency theory: An assessment and review. *Academy of Management Review* 14(1): 57-74.

Govindarajan, V., and A. K. Gupta. 1985. Linking control systems to business unit strategy: Impact on performance. *Accounting, Organizations and Society* 10: 51–66.

Hambrick, D.C.. 1983. Some tests of the effectiveness and functional attributes of Miles and Snow´s strategic types. *Academy of Management Journal* 26(1): 5-26.

Hogan, C. and C. Lewis. 2005. Long-run investment decisions, operating performance, and shareholder value creation of firms adopting compensation plans based on economic profits. *Journal of Financial and Quantitative Analysis* 40(4): 721-745.

Ittner, C.D. and D.F. Larcker. 2001. Assessing empirical research in managerial accounting: a value-based management perspective. *Journal of Accounting and Economics* 32: 349-410.

Ittner, C.D., D.F. Larcker and M. V. Rajan. 1997. The choice of performance measures in annual bonus contracts. *The Accounting Review* 72(2): 231–255.

Jensen, M.C. 1989. Eclipse of the public corporation. *Harvard Business Review* 67(5*)*: 61-75.

Jensen, M.C. and W.H. Meckling.1992. Specific and general knowledge, and organizational structure. In: L. Werin and H. Wijkander: *Contract Economics*. Oxford, England: Basil Blackwell.

Kaplan, R. S. en D. P. Norton.1992. The balanced scorecard: Measures that drive performance. *Harvard Business Review* 70(1): 71–79.

Kleiman, R.T. 1999. Some new evidence on EVA companies. *Journal of Applied Corporate Finance* 12(2): 79-91.

Lev, B. 1989. On the usefulness of earnings and earnings research: lessons and directions from two decades of empirical research. *Journal of Accounting Research* 27 (supplement): 153-192.

Malmi, T. and S. Ikäheimo. 2003. Value-based management practices – some evidence from the field. *Management Accounting Research* 14(3*)*: 235-254.

Merchant, K.A. and W.A. Van der Stede. 2007. *Management control systems (second edition)*. Harlow, England: Prentice Hall.

Miles, R.E., C.C. Snow, A.D. Meyer and H.J. Coleman, Jr. 1978. Organizational strategy, structure and process. *Academy of Management Review* 3(3): 546-562.

O'Hanlonn, J. and K. Peasnell. 1998. Wall Street's contribution to management accounting: the Stern Stewart EVA financial management system. *Management Accounting Research* 9: 421-444.

Otley, D.T. 1980. The contingency theory of management accounting: achievement and prognosis. *Accounting, Organizations and Society* 5(4): 413-428.

Pelsmacker, P. de, and P. van Kenhove. 2006. *Marktonderzoek: methoden en toepassingen*. Amsterdam, The Netherlands: Pearson Education Benelux.

Said, A.A., H.R. HassabElnaby and B. Wier. 2003. An empirical investigation of the performance consequences of nonfinancial measures. *Journal of Management Accounting Research* 15: 193-223.

Simons, R. 1987. Accounting control systems and business strategy: an empirical analysis. *Accounting, Organizations and Society* 12(4): 357-374.

Snow, C.C. and D.C. Hambrick. 1980. Measuring organizational strategies: some theoretical and methodological problems. *Academy of Management Review* 5(4): 527-538.

Stewart III, G.B. 1991. *The Quest For Value*. New York: Harper Business.

Wallace, J.S. 1997. Adopting residual income-based compensation plans: Do you get what you pay for. *Journal of Accounting and Economics* 24: 275-300.