Auteur: Denise Groeneveld

3.3. Research design

The research design of a study is a general strategy of how the research question will be answered. It is the process that changes the research question into a research project and consist of four components: the definition of the type of study, the research strategy, the methodology choice and the time horizon. (Saunders, et al., 2008)

3.3.1 Type of study

The research question is the starting point of the research design. To answer a research question properly, it is important to define the type of study. According to Saunders, et al. (2008), three types of studies exist. Firstly, the exploratory study which consist of literature review, interviews with experts or conducting focus group interviews. Secondly, the descriptive study which describes data, persons or situations whitout drawing conclusions. Lastly, the explanatory study which investigates a situation or problem in order to explain the relationship between variables. (Saunders, et al., 2008)

This research is an explanatory study because we have investigated and explained the relationship between the dependent variable: a company's value and the independent variable: a company's IC.

3.3.2 Research strategy

The research strategy is essential to answer the research question and to meet the research objectives. One or more strategies can be used in one study. (Saunders, et al., 2008) Saunders, et al. (2008) define seven different research strategies:

- Experiment strategy: investigates causal links between two variables and the relative importance of variables. This strategy owes much to natural science.
- Survey strategy: questionnaires, structured observations and structured interviews.
- Case study strategy: often used in empirical research where the context is important.
- Action research strategy: concentrates on action especially the promotion of change in an organisation.

- Grounded research strategy: builds a theory with a combination of inductive and deductive research.
- Etnographic research strategy: describes and the explaines how the research subjects interpretate their world. This strategy is often used in the field of antropologyes.
- Archival strategy: makes use of administrative records and documents as the principle source of quantitative data.

The research strategy of this study is archival because we have used data extracted from publicly available financial statements of companies. The data we have used is secondary data because the information available in the financial statements of a company is originally collected to meet official accounting standards and disclose information for stakeholders and the company itself. We have downloaded the data from the database CompuStat of Wharton Research Data Services (WRDS). WRDS is a research platform and business intelligence tool and provides users over 200 terabytes of data (WRDS, 2016). Some examples of the sources of WRDS are S&P global market intelligence, NYSE, Thomson Reuters, BoardEX and GSIOnline (WRDS, 2016). We have chosen CompuStat because this database contains data of all listed companies in the U.S. and in Canada (WRDS, 2016). In addition, the database is also used by other researchers who investigate IC. However, we are constrained by three limitations of the database CompuStat. The database provides the ability to download data only quarterly or annually. We have used annual data in our research because not all the data we need for our research is available quarterly. Furthermore, CompuStat does not provide date to date data. Date to date data is a search instruction to download data of one day or a period different from a fiscal year. This search instruction provides very little data relevant to our sample. So if we download date to date data, it reduces our sample considerably. For example, when we downloaded the data from June 2015 until May 2016 we could only download less than 50% of the total data needed. This problem does not exist if we use fiscal year data which is the reason for using fiscal year data. Lastly, data of U.S. companies is in US($) and data of Canadian companies in CA($). We can only compare the data if all data is in a single currency. Therefore, we have converted manually all the data in CA($) into US($) using the then prevailing exchange rate. We accept that this imposes a limitation on our data but there is no other practical way around this problem.

3.3.3 Methodology choice

The results obtained are affected by the data collection technique and the procedures used in the study. Saunders, et al. (2008) distinguish two types of data collection techniques: quantitative and qualitative. The quantitative technique uses numerical data and the qualitative technique uses non-numerical data (Saunders, et al., 2008). Saunders, et al. (2008) also identify two types of procedures: mono method and multimethod. The mono method procedure combines a single quantitative data collection technique like a questionnaire with a quantitative analysis procedure like statistics. Or the mono method procedure combines a single qualitative data collection technique like an in depth interview, with a qualitative (non-numerical) analysis procedure. (Saunders, et al., 2008) The multimethod procedure is a method that combines the quantitative and qualitative data collection technique but the procedure related to each technique cannot be changed. Quantitative data needs to be analysed with a quantitative procedure. And qualitative data needs to be analysed with a qualitative procedure. (Saunders, et al., 2008)

This study uses a single quantitative data collection technique and a mono method procedure. We have downloaded quantitative data from the database CompuStat and we have analysed this data with the statistics software SPSS. We have used regression analysis in order to test the relationship between the dependent variable: a company's value and the independent variable: a company's IC.

3.3.4 Time horizon

The time horizon of a study is a point in time or a period over time that is analysed and depends on the research question. Saunders, et al. (2008) recognize two types of horizons: cross-sectional studies and longitudinal studies. The cross-sectional study is a research that investigates a specific phenomenon at a specific point in time. This time horizon is often used in studies that adopt a survey strategy or a case study strategy. The longitudinal study is often used in research that investigates a change or the development of a phenomenon over time. This time horizon is often used in studies that adopt the action research strategy or the archival strategy. (Saunders, et al., 2008)

This study investigates the relationship between a company's IC and its value over a time period of three years, 2013 to 2015. We have downloaded the data we need for this study over the last ten years in order to test the availability of the data. Every year after 2015, the observable data decreased because not all data is available in CompuStat and some companies that are part of our sample didn't exist a few years ago. In order to keep the sample as large as possible and to obtain at least 150 measurement points in the regression analysis, we have chosen a time frame of three years. Furthermore, the market capitalization of companies is influenced by factors like investors' future expectations of a company and the economy (CIMA and Granfield university, 2007). In order to reduce these influences, we have decided that the results will be more reliable if we measure the relationship between a company's IC and its value over a period of time. We have chosen for the time period 2013 to 2015 because we want to analyse the most recent data. The data of 2016 is not available yet. It can be concluded that the time horizon for this research is longitudinal.

3.4 Data collection

Data collection is the process of collecting the relevant data per variable so that the analysis can be performed. In this study it relates to the data we need in order to determine a company's IC and a company's value in the IT and computer service sector and IONG sector in the U.S. and in Canada.

3.4.1   The sample

3.6.1.1 The information technology (IT) and computer services sector
Technology companies are companies that create technology hardware, storage and peripherals sub-Industry (MSCI, 2014). The technology sector can be divided into three main categories: low-technology, medium-technology and high-technology. Low technology companies employ a relatively high number of employees because the majority of the value creation processes is based on tangible production activities. This results in relatively low R&D expenditures (Cooper & Finkelstein, 2015).

Medium technology companies have traditional large scale production processes and employ a high number of workers in relation to high technology companies (Cooper & Finkelstein, 2015). High technology companies emphasize invention through extensive R&D expenditures. The majority of the value creation processes are based on intangible assets (Cooper & Finkelstein, 2015). High technology companies have a relatively high level of intangible assets and R&D expenditures which are characteristics of IC intensive companies (Steward, 2003). The employment rates in the high technology sector in the U.S. and in Canada are the highest in the ITCS sector (Tech America, 2015) (Government of Canada, 2014). IT is the use of physical devices, infrastructure and processes to create, process, store, secure and exchange all forms of electronic data (Search data center, 2016). IT includes several layers of physical equipment (hardware), virtualization and management or automation tools, operating systems and applications (software). The relatively high employment rates in the ITCS sector indicates that a relatively large number of companies are operating in this sector. This gives the possibility to construct a relatively large sample. Hardware companies are excluded from the sample since hardware is invariable and includes physical devices (Search data center, 2016). Table 1 and table 2 below show the employment statistics of the high technology sector in the U.S. and in Canada in 2014.

United States technology sector employment 2014	
Tech manufacturing	17.5%
Telecommunications and internet services	19.6%
Software products	4.7%
IT services	32.3%
R&D, testing and engineering services	26%

Table 1 Employment statistics high- tech sector in the U.S. Source: Cyberstates (2015)

Canada technology sector employment 2014	
ICT wholesaling	9.8%
ICT manufacturing	7.0%
Communications services	20.2%
Software & computer services	63.0%

Table 2 Employment statistics high-tech sector in Canada. Source: ISED Canadian ICT statistical overview (2014)

3.6.1.2 The independent oil and gas sector

Oil and natural gas are classified as commodities. Commodities are tangible/physical assets that have an intrinsic value. The commodity sector can be divided into two main categories: hard commodities and soft commodities. Hard commodities are typically mined from the ground (IG Group, 2016). The production and supply can be predicted fairly accurately and are often used as an indicator of global economic health (Cross, 2016). Soft commodities are usually weather dependent and natural growing cycles create seasonal fluctuations in prices which result in a relatively high level of volatility (Cross, 2016). Due to the volatility, soft commodities will not give reliable results for this research and therefore are excluded from the sample. Figure 6 below shows the different subcategories within the commodities sector.
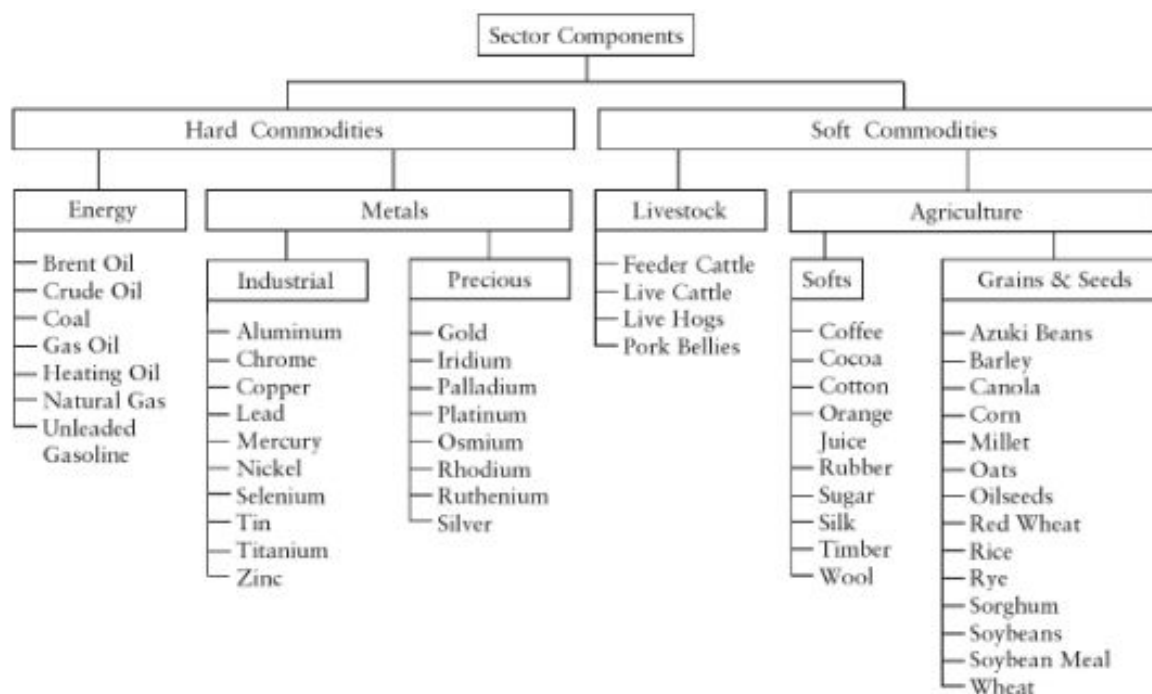

Figure 1 The subcategories of commodities. Source: Cross (2016)

The majority of the hard commodity market consists of energy goods like oil and natural gas (Cross, 2016). Oil is the first source of primary energy in the world and one of the most exported commodities in the U.S. and in Canada (Export Gov, 2016) (Minister of natural resources, 2014). Data from the international trade centre shows that 7.1% of the total exports in the U.S. and 19% of the total exports of Canada in 2015 was oil (International trade center, 2016). Consequently, a relatively large number of companies are operating in this sector which gives the possibility to construct a large sample of IONG companies for this research.

Many companies that explore and produce oil are also involved in the exploration and production of natural gas (IPAA, 2016). The companies operating in the IONG sector exclusively explore and produce oil and gas with no marketing or refining within their operations (IPAA, 2016). As a result, the level of physical assets in this sector is relatively high which is a characteristic of companies with a relatively low level of IC (Fabozzi, et al., 2008) (Steward, 2003).

3.6.1.3 The United States and Canada

The sample of this study consists of companies in the ITCS sector and IONG sector in the U.S. and in Canada. We have chosen this sample because of two reasons. Firstly, the U.S. and Canada are developed economies (MSCI, 2014). Secondly, the U.S. and Canada have combined a relatively large ITCS sector and IONG sector (Bloomberg, 2015) (EIA, 2014). As a result, the amount of available data of both sectors is considerable in the U.S. and in Canada. This makes it possible to construct a relatively large sample of the two sectors compared to the size of the sample that can be constructed in other countries. A relatively large sample size is important since it reflects more reliably the population mean which increases the chance of finding significant differences. It also limits the influence of outliers or extreme observations and reduces the margin of error (Unite for sight, 2015). Furthermore, the distribution of a sample will approach a normal distribution as the sample size increases. The central limit theorem states that a relatively large sample consist of more than 30 observations (Field, 2011). Other theories argue that the sample size should consist of the number of variables used in a research times 30 (Jong, 2016). Following this theory, the sample for this research should consist of 90 observations. However, the sample size of this research is larger: 243 companies in the ITCS sector and 254 companies in the IONG sector.

The ITCS sector is relatively large in the U.S. and in a lesser extent in Canada because investments in innovation done by companies together with the public support for innovation have been relatively high in both countries (OECD, 2014). As a result of these investments and public support, the U.S. became the country with the most high-technology companies in the world in 2015 (Bloomberg, 2015). This is the reason why the ITCS sample is heavily dominated by companies from the U.S. Figure 7 below visualizes the total public support for innovation per country.
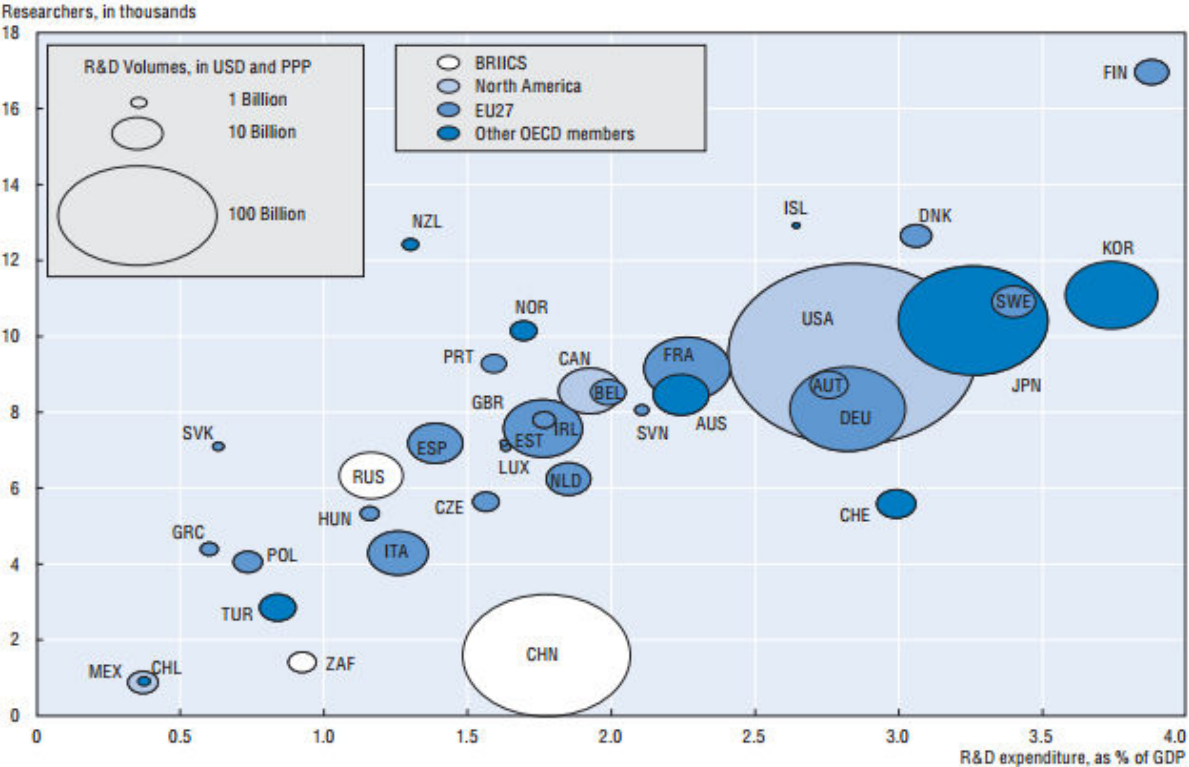

Figure 2 Public support for innovation per country. Source: OECD science, technology and industry 2012, OECD Science and industry scoreboard 2011, OECD MSTI database (2012)

The U.S. and Canada are also important countries in the world's IONG sector. Together they produced 4,831,840 thousand barrels of petroleum and other liquids a year and 31,066 billion cubic feet natural gas per year in 2014 (EIA, 2014). These are relatively large numbers compared to other countries that heavily produce oil and natural gas like Russia which produces only 2,820,220 thousand barrels of petroleum and other liquids a year and 20,437 billion cubic feet natural gas per year in 2014 (EIA, 2014). Due to the high production in oil and natural gas there are a relatively high number of listed IONG companies in the U.S. and in Canada.

3.4.2 Proxies for IC

IC is a variable that cannot be measured directly. In order to determine the value of a company's IC a different variable is used, as a proxy. The concept of a proxy is explained in detail in section 1.2.2. This study determines the value of IC with five different proxies that can be categorized as MC methods and ROA methods (Sveiby, 2010). We have opted for MC and ROA methods because these methods use publicly available and standardized information which allows inter- and intra-company and inter- and intra-sector comparisons (Sveiby, 2010) (CIMA and Granfield university, 2007). As mentioned before, we adopt the philosophy positivism because objectivity and facts are important to us. We want to be transparent about the data used in this research in order to make replications of this study possible. Therefore, we have translated the proxies into operational terms and we have specifically explained which data we have downloaded.

3.6.2.1 Proxy 1: the invisible balance sheet

The invisible balance sheet is the difference between the market capitalization and the equity book value of a company (Sveiby, 2010). Table 3 below shows the data downloaded from CompuStat.

Operational term:

Invisible balance sheet = market capitalization – equity book value

*Market capitalization = number shares * the share price*

Equity book value = book value total assets – (book value total liabilities + book value intangible assets)

Look up code CompuStat	Definition	Yearly
MKVALT	Market Value Total Fiscal	Y
CEQL	Common equity liquidation value	Y

Table 3 Data downloaded CompuStat, invisible balance sheet. Source: CompuStat (2016)

3.6.2.2 Proxy 2: Tobin's Q

Tobin's Q is a company's market capitalization relative to the replacement costs of a company's assets (Tobin, 1969). Table 4 below shows the data downloaded from CompuStat.

Operational term:

$$Q\ ratio = \frac{Market\ capitalization}{Total\ replacement\ value\ of\ a\ company's\ assets}$$

Look up code CompuStat	Definition	Yearly
MKVALT	Market Value Total Fiscal	Y
AQPL1	Assets level 1 (quoted price)	Y
AOL2	Asset level 2 (observable)	Y
AUL3	Asset level 3 (unobservable)	Y

Table 4 Data downloaded CompuStat, Tobin's Q. Source: CompuStat (2016)

3.6.2.3 Proxy 3: intangible assets

Intangible assets are assets such as brands, mastheads, publishing titles, and customer lists, which are purchased externally or acquired in a business combination. These assets are mentioned on the balance sheet (Deloitte, 2016). Table 5 below shows the data downloaded from CompuStat.

Look up code CompuStat	Definition	Yearly
INTAN	Intangible Assets	Y

Table 5 Data downloaded CompuStat, intangible assets. Source: CompuStat (2016)

3.6.2.4 Proxy 4: economic value added (EVA)

Economic value added (EVA) provides a measurement method of a company's performance that focuses on the drivers that create shareholder's wealth (O'Hanlon & Peasnell, 1998). Table 6 below on page 34 shows the tax rates used in the formula. Table 7 below on page 34 shows the data downloaded from CompuStat.

Operational term:

$$Economic\ Value\ Added$$
$$= (adjusted\ operating\ profit * (1 - tax\ rate)) - (invested\ capital\ * WACC)$$

$$Adjusted\ operating\ profit$$
$$= gross\ profit - (advertisement\ expenses + \ R\&D\ expenses$$
$$+ selling\ and\ administration\ expenses)$$

$$WACC = \frac{Ke}{D + E} + \frac{Kd(1 - T)}{D + E}$$

$WACC = weighted\ average\ cost\ of\ capital$

$Ke = cost\ of\ equity\ (dividend)$

$Kd = cost\ of\ debt\ (interest)$

$T = tax\ rate$

$D = long\ term\ debt$

$E = equity$

Year	Tax rate Canada	Tax rate U.S.
2015	26	40
2014	26.5	40
2013	26.5	40

Table 6 Tax rates over the period 2013 to 2015 in the U.S. and Canada. Source: KPMG (2016)

Look up code CompuStat	Definition	Yearly
GP	Gross profit	Y
XAD	Advertising expenses	Y
XSGA	Selling, general and administration expenses	Y
XRD	R&D expenses	Y
ICAPT	Invested capital total	Y
DVC	Dividend Common/Ordinary	Y
INTPN	Net interest paid	Y
CEQ	Common/Ordinary Equity	Y
DLTT	Long term debt total	Y

Table 7 Data downloaded CompuStat, EVA. Source: CompuStat (2016)

3.6.2.5 Proxy 5: calculated intangible value (CIV)

Calculated intangible value (CIV) allows a company to place a monetary value on intangible assets (Sundac & Krmpotic, 2009). All information is based upon the average value of three years, from 2013 to 2015. CIV reflects the value of intangible asset of a company or in other words, its IC. Table 8 below shows the data downloaded from CompuStat.

CIV can be calculated in seven steps (Sundac & Krmpotic, 2009):

Step 1: the average pre-tax profit is determined.

Step 2: the average year-end tangible asset value is gathered.

Step 3: the earnings are divided by assets so as to get the return on assets (ROA).

Step 4: The sector ROA is determined. Table 9 below shows the ROA of the high-tech and the oil sector over the period 2013 to 2015.

Step 5: the sector average ROA (from 2013 to 2015) is multiplied by the company's average tangible assets. Subtract the result of step 5 from the company's pre-tax profits obtained in step 1.

Step 6: the average income tax rate over the time period is calculated and multiplied by the excess return. Subtract this result from the excess return to get the after-tax premium.

Step 7: Divide the after-tax premium by a company's WACC to get the net present value pf the after-tax premium, or in other words CIV.

Look up code CompuStat	Definition	Yearly
PI	Pre-tax Income	Y
AT	Assets Total	Y
INTAN	Intangible Assets	Y
NI	Net income	Y
DVC	Dividend	Y
INTPN	Interest paid net	Y
CEQ	Equity	Y
CEQL	Book value	Y
MKVALT	Market value	Y

Table 8 Data downloaded CompuStat, CIV. Source: CompuStat (2016)

Year	Tech industry	Energy industry
2015	6.6%	1.8%
2014	10.7%	6.3%
2013	10.3%	6.9%

Table 9 ROA of the high-tech sector and oil sector. Source: CSIMarket (2016)

3.4.3 The market to book ratio

The value of a company in this study is determined by the market to book ratio. The market to book ratio is in depth explained in section 1.2.3. Table 3 on page 32 shows the data downloaded from CompuStat.

Operational term:

$$Market\ to\ book\ ratio = \frac{Market\ capitalization}{A\ company's\ equity\ book\ value}$$

*Market capitalization = number shares * the share price*

Equity book value = book value total assets – (book value total liabilities + book value intangible assets)

3.5.4.1 CIV market to book value

As mentioned before, CIV is calculated on the basis of an average value of three years: from 2013 to 2015. Therefore, the market to book ratio used in the regression analysis with the proxy CIV is also the average value over three years: from 2013 to 2015. Table 3 on page 32 shows the data downloaded from CompuStat.

Operational term:

CIV market to book ratio

$$= \frac{(Market\ capitalization\ 2013 + market\ capitalization\ 2014 + market\ capitalization\ 2015)/3}{(A\ company's\ equity\ book\ value\ 2013 + equity\ book\ value\ 2014 + equity\ book\ value\ 2015)/3}$$

3.5 Data analysis

Data analysis is the process of observing, cleaning, transforming and modelling data. This process gives insight into how the data is distributed, whether there are outliers that will influence outcomes and whether or not data is kurtotic or skewed (Field, 2011). A normal distributed data set implies that the data is bell-shaped. Most of the values are in the middle of the range and the rest of the data decreases symmetrically toward extreme values. A normal distribution has a kurtosis of 0 and a skewness of 0. (Field, 2011) In this research we have tested the relationship between a dependent and an independent variable. The significance test of this model is only accurate if the sample is normal distributed. However, there exist tests that allow for non-normal distributions but we do not use these tests in this study. Kurtosis and skewness are known phenomena in financial data and can distort significance tests. Kurtosis means that the distribution has too many scores in the tails and that the tails are too peaked, or that distribution has very low scores in the tails making the tails relatively thin (Field, 2011). Skewness means that frequent scores are clustered at the lower or upper end of the distribution and that the tail points are clustered to positive or negative scores (Field, 2011). Figure 8 below visualizes the phenomena skewness and kurtosis.
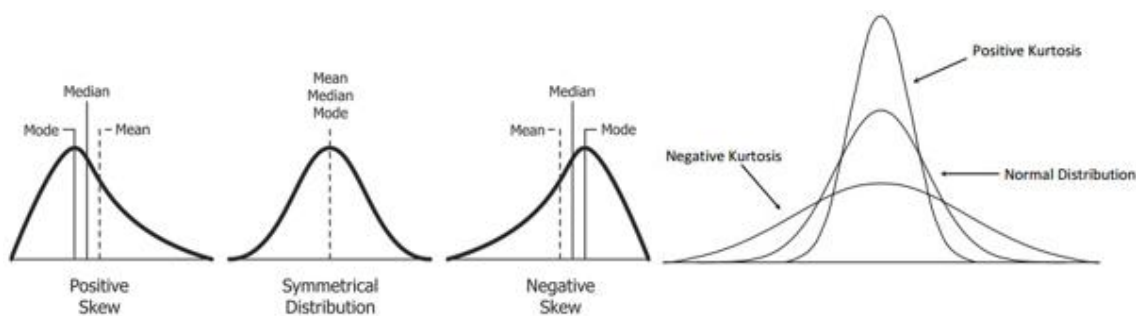
Figure 3 Skewness and kurtosis. Source: Cross Validated (2014) and Safari (2016)

The data set per proxy for IC differs because not all data is available in CompuStat. Some companies didn't exist a few years ago and we have taken out extreme outliers. An outlier is an extreme value compared to the rest of the data. Outliers bias estimates of parameters such as the mean, affect the sum of squared errors and reduce the power of significant tests (Field, 2011). Outliers can be divided into mild outliers and extreme outliers.

A data set can be divided into four quartiles where every quartile represents the data point below which 25% of the observations sit (Field, 2011). The interquartile range (IQR) is the distance between the first quartile and the third quartile. A mild outlier is every value smaller than the IQR of the data set times 1.5 plus the value of the first quartile. And every value larger than the IQR of the data set times 1.5 plus the value of third quartile (Field, 2011). An extreme outlier is every value smaller than the IQR of the data set times 3 plus the value of first quartile. And every value larger than the IQR of the data set times 3 plus the value of third quartile (Field, 2011). In this study we have taken out the extreme outliers so that they will not bias our results. However, the mild outliers have not been taken out because that would have reduced the number of observations too much.

Table 10 below shows the statistical description of the ITCS sample. We have marked the missing data and extreme outliers as missing values. This has reduced the number of observations per proxy. The row valid shows the number of observations per proxy. All data have positive kurtosis which means that many scores are in the tails, this phenomenon is also called fat tails. Furthermore, all data is positively skewed which means that frequent scores are clustered at the lower end of the distribution and the tail points are clustered towards positive scores (Field, 2011). The row minimum and maximum show the minimum and maximum scores of the data set. In order to reduce skew and kurtosis we have used the square root transformation. Table 11 on page 39 shows the descriptive statistics using the square root transformation of the ITCS sample. The square root function has a bigger effect on large values compared to small values. Taking the square root of each score brings large scores closer to the centre of the data set (Field, 2011). This transformation is used in order to reduce positive kurtosis and positive skew. However, this transformation causes problems with negative numbers or a value of zero which has reduced the samples of some proxies.

	MBR	Inv. balance sheet	Tobin's Q	Intangibles	EVA	CIV MBR	CIV
Valid	630	549	370	417	476	167	150
Missing	99	180	359	312	253	13	30
Skewness	0,90	1,52	1,44	1,56	0,10	1,23	0,41
Kurtosis	1,75	1,59	1,96	1,95	0,98	0,69	1,95
Minimum	-9,23	-328,43	0,78	0,00	-101,50	0,13	-146,30
Maximum	17,52	4243,78	44,06	193,92	81,87	13,10	123,29

Table 10 Statistical description ITCS sample

	MBR	Inv. balance sheet	Tobin's Q	Intangibles	EVA	CIV MBR	CIV
Valid	611	370	417	417	144	167	51
Missing	118	359	312	312	585	13	129
Skewness	0,65	0,62	0,63	0,41	0,29	0,65	0,90
Kurtosis	-0,18	-0,06	-0,04	-0,53	-0,92	-0,30	-0,44
Minimum	0,30	0,58	0,89	0,00	0,16	0,36	0,41
Maximum	4,19	65,14	6,64	13,93	9,05	3,62	11,10

Table 11 Square root transformation ITCS sample

The square root transformation has reduced kurtosis and skewness of the data set of each proxy. However, in all cases positive kurtosis has changed into negative kurtosis which means that the tails have become relatively thin. The square root transformation reduces the sample of the proxies EVA and CIV considerably. This is the reason why we have used the square root transformation for all the proxies except the proxies EVA and CIV.

Table 12 below shows the statistical description of the IONG sample. Equal to the data description of the ITCS sample, the missing data and extreme outliers are marked as missing values which has reduced the number of observations per proxy. The row valid shows the number of observations per proxy. All data has positive kurtosis which means that many scores are in the tails. Only CIV is negatively skewed, which means that frequent scores are clustered at the higher end of the distribution and the tail points are clustered towards negative scores (Field, 2011). Table 13 on page 40 shows the statistical description using the square root transformation of the IONG sample.

	MBR	Inv. balance sheet	Tobin's Q	Intangibles	EVA	CIV MBR	CIV
Valid	676	366	228	578	397	185	152
Missing	86	396	534	184	365	12	45
Skewness	0,81	0,08	1,58	5,61	0,73	0,81	-1,25
Kurtosis	1,48	1,16	1,71	33,66	0,94	0,08	1,49
Minimum	-2,66	-165,10	0,00	0,00	-75,12	0,25	-415,98
Maximum	5,33	161,94	88,54	5,54	96,95	3,94	241,12

Table 12 Statistical description IONG sample

	MBR	Inv. balance sheet	Tobin's Q	Intangibles	EVA	CIV MBR	CIV
Valid	648	183	228	578	186	185	23
Missing	114	579	534	184	576	12	174
Skewness	0,38	0,55	0,77	4,33	0,19	0,27	0,99
Kurtosis	-0,21	-0,68	-0,29	18,57	0,18	-0,56	0,69
Minimum	0,30	0,41	0,02	0,00	0,18	0,50	0,61
Maximum	2,31	12,73	9,41	2,35	9,85	1,99	15,53

Table 13 Square root transformation IONG sample

The square root transformation has changed the data of the proxy CIV into positive skew and the data of the measurement methods market to book ratio, invisible balance sheet, Tobin's Q and CIV market to book ratio into negative kurtosis. The square root transformation reduces the data set of the proxies invisible balance sheet, EVA and CIV considerably. This is the reason why we have used the square root transformation for all the proxies except for the proxies invisible balance sheet, EVA and CIV.

It can be concluded that the data we have used in this study is kurtotic and skewed which have influenced the significance tests of this research. In order to increase the reliability of this investigation we have used a confidence interval of 95% as well as a confidence of 99% in the regression analysis. A confidence interval shows the probability that the value of the constant and the gradient lies between two values. The regression analysis, the constant and the gradient are in depth explained in chapter four: Results.