The Value of Human Capital: Is Academic Performance Reflected in Academic Salaries?

Ajantha Velayutham

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Auckland University of Technology

ABSTRACT

The subject of human capital is a major issue in accounting and business research. This paper empirically investigates whether an individual's knowledge, skills and capabilities (human capital) are reflected in their compensation and is focussed on academics in the Province of Ontario, Canada. The study contributes to the body of literature by focusing on the individual level human capital and compensation.

The regression analysis performed indicates a positive association between academic human capital and academic salaries. However, this study is limited in that it measures an academic's human capital solely through their research outputs as opposed to also considering their teaching outputs.

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ATTESTATION OF AUTHORSHIP

I hereby declare that the submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning.

Ajantha Velayutham

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CHAPTER ONE: OVERVIEW OF THE RESEARCH

1.1 Introduction

"Total wealth includes all sources of income or consumable services. One such source is the productive capacity of human beings and accordingly this is one form in which wealth should be held"

Lev & Schwartz (1971, p. 1)

Economists have long theorised human capital, mostly in conjunction with economic growth, however accountants have yet to conduct empirical research into the human capital phenomena. Human capital research dates as far back as 1961 (Becker, 2009). Ted Schultz, Jacob Mincer and Milton Friedman are some academics credited with being the fathers of human capital research (Blaug, 1976). Early studies conducted by these researchers included creating awareness about human capital; specifically, investments in human capital, both on a microeconomic and macroeconomic scale, and the association between human capital and economic growth/ economic development of a country (Blaug, 1976).

Houghton and Sheehan (2000) explained how the economy has transitioned from an agricultural economy, to what it is now, an informational economy. The most important asset or form of capital, in an agricultural economy (also known as the first-wave) was that of land (Houghton & Sheehan, 2000). The industrial economy (second-wave), characterised by the rise of factories and the introduction of mass production of goods and services, began in the late 18th century and continued until the 20th century. This saw commodities (coal and iron among others) and labour as the main source of capital (Houghton & Sheehan, 2000; Godin, 2006). However, the emergence of the informational economy (third-wave), has seen the transitioning of the global economy in which knowledge and information is central to economic development. This has seen the growing importance of intellectual capital, more specifically human capital (a component of intellectual capital). (Godin, 2006). Zimmerman (2015) and Lev and Radhakrishnan (2005) state that modern, developed countries have seen a shift from industrial economies, in which tangible resources were central to development and growth, to a knowledge-based or informational economy. This has seen an increase in human capital research over the last decade or so (Lev & Radhakrishnan, 2005).

Li, Pike and Haniffa (2008); Lev, Canibano and Marr (2005) define intellectual capital (IC) as intangible assets that can provide a firm with a competitive advantage and the capacity to generate a future stream of income, such as knowledge, applied experience and organisational technology. Ordonez de Pablos (2002) defines intellectual capital as organisational knowledge put to use to create wealth. This frequently leads to confusion between the terms, intellectual capital and intangibles (CIMA, 2001). Chen, Cheng and Hwang (2005) explain that intangibles do not have a physical presence wheras intellectual capital is sourced from an individual's or organisation's knowledge (intellect) and thus, is a form of intangibles.

Whereas intellectual capital is broadly defined and characterised as organisational knowledge, human capital is a subset of the previously defined intellectual capital, and focusses on the knowledge ingrained and acquired by an individual. Stewart (2007) defines human capital as the skills, competencies and abilities of an individual. Schultz (1961) further emphasises much of what is consumed by man constitutes human capital. Those investments made in human capital by an individual/ organisation that benefits an individual's skills or competencies will give rise to an asset.

Despite the inability and insignificance of human capital in influencing the financial reporting of companies, it is contemporaneously, an important component of intellectual capital that makes up the market value of a firm (Chen, Cheng & Hwang, 2005). It has been reported by Lev, Radhakrishnan and Zhang (2009) that intellectual capital amounts to between 50% - 60% of the total market value of public-listed companies. Additionally, as specified by Macklem (1997), intellectual capital and human capital have grown at a faster rate than traditional capital, in contemporary times. This argument of the importance of human capital in the current economic environment has led many researchers (Mulligan & Sala-i-martin, 1997; Laroche & Merette, 2000; Boudarbat, Lemieux & Riddell, 2010) to attempt to measure human capital and its correlation to economic growth.

1.2 Purpose and motivation

The purpose of this research is to determine whether an individual's human capital is captured in his or her remuneration. The study is confined to the Province of Ontario, Canada and focusses on public university professors whose annual salary is greater than $100,000 Canadian dollars. The motivation of this study lies in the relative importance of human capital, as part of intellectual capital and that of the knowledge-based

economy. Barro (1999) and Coff and Raffiee (2015) have previously researched the benefits of human capital as a source of economic growth and competitive advantage. However, promoting the accumulation of human capital for improving a country's economic growth and a firm's competitive advantage needs to start at the individual level; providing an incentive for individuals to grow their human capital. Additionally, several researchers, namely Weiss (1995) and Neal (1995), have developed theories suggesting that human capital is compensated for in an individual's salary. Thus, the following research practically examines whether an individual's salary is in part reflected by their human capital (s*ee Figure 1: Outline of studies*). This may then provide an incentive to grow an academic's human capital.

1.3 Research methodology

The research methodology of this study is based on legislation passed by the Canadian government that allows for the disclosure of public-sector employees who earn greater than $100,000. Weiss (1995) and Neal (1995) state that the contributing factors of education, work experience and industry-specific skills [human capital] in part, is compensated for in an individual's income. In testing this theory; the study focusses on employees who work in public universities, specifically those who specialise in the field of management, accounting and finance within the respective business schools.

The following research investigates whether the number of publications, citations and the Hirsch index [used as proxies for human capital] among others, have an effect on salary earned. The following research does not provide an exhaustive range of an academic's human capital variables but focusses only on the aspect of their research outputs, when in actuality the source of an academic's human capital is comprised of both teaching and research. The sample collected is analysed in a quantitative software package called IBM SPSS and descriptive and regression analyses are conducted using this software. To illustrate the effect of these variables on salary, five models are regressed. Though the quantitative methodology allows the research to show a relationship between human capital and salary and draw interpretations from the relationship, it does not allow for different perspectives as to why such a relationship exists.

1.4 Contribution - methodology

The research contributes to the body of literature, previously researched, by adding to the methodology. According to De Clercq and Dakhli (2003) there are different levels to

the study of human capital; (1) cross-country analyses, (2) country-specific analyses, (3) firm-specific or industry-specific analyses and (4) individual-specific studies (*see Figure 1: Outline of studies*). There have been several previous studies done on cross-country analyses (Barro, 1999; Jeong, 2002), nationwide studies, such as in Germany (Koman & Marin, 1999) and Canada (Laroche & Merette, 2000) and industry or firm-specific studies (Neal, 1995). However, this study adds to the methodology by studying human capital on an individual basis. There exists both theoretical [e.g. Schultz, 1961; Coff & Raffiee, 2015] and quantitative literature at country and industry levels [e.g. Boudarbat et al., 2010] highlighting the benefits of human capital to a country or firm and its link to economic growth or competitive advantage. This study adds to this literature by examining the value of human capital at an individual level.

The second contribution to the methodology is with regards to the measurement of human capital. As valuable as human capital is to an individual, it is a difficult asset to measure and this makes it tough to conduct a quantitative study. Laroche and Merette (2000) and Le, Gibson and Oxley (2003) outline several distinct measurement bases; (1) the cost-based (input) method, (2) the output method and the (3) income-based method. Previous research, conducted to measure human capital, studied these methods independently of each other (e.g. using either the cost-based method, the output method or the income-based method). The following investigation uses a combination of the output-based and income-based methods, to reflect the nature of the study, which is the association between human capital and income of individuals. The output-based measures reflect the human capital of the individual whereas the income-based measures represent the income of that individual. While previous studies have sought to measure a nation's human capital in different settings [e.g. Germany, Canada]; this study seeks to test a theory and its validity in an actual real-life setting. The following report contributes to the research methodology by focussing on a quantitative study at an individual-specific level [microeconomic level], using a combination of the output-based and income-based measures, which had previously been analysed separately.

1.5 Contribution to the wider society

1.5.1 Social Contributions

This study will have global implications to both employers and employees alike and will affect the remuneration committee as well. As the study addresses the issue of whether an individual's human capital is factored into the remuneration package they

receive, employees will seek to identify whether the skills and competencies ingrained within themselves can affect their salary; whether their publications and the overall impact of their research contributions are rewarded with salary increases. On the other hand, employers and remuneration committees will seek to consider that remuneration be tied to their employees' skills and competencies given that the quality of research published not only heightens the reputation of the individual, but also the institutions to whom the individual is employed by (Blackburn, Behymer & Hall, 1978).

However, despite the direct contributions made by the above relevant parties, employers and remuneration committees may not act solely on the following research. The two parties will seek to investigate whether the greater human capital ingrained in their employees will reflect a positive effect on their productive capacity. Although, Weiss (1995), theorises that higher levels of human capital are implicitly, positively associated to productivity, this is not the primary focus of the report and was not investigated within the scope of this study. This is despite the use of variables such as citations and the Hirsch index, being used to reflect an employee's productivity.

1.5.2 Practical Contributions

While this study has a broad contribution to the employer-employee relationship within organisations, it will have a more immediate effect in Canada. Previous studies have recounted the importance of human capital in the informational economy and benefits to economic growth. This being the case, this study will create awareness about whether companies and organisations are protecting, nurturing and rewarding their employees' human capital, and simultaneously providing them incentives to invest more in human capital, by granting them better remuneration. This study, being centred in Canada, is more relevant in a Canadian context; however, it could also be applied on a global scale, barring subtle national and cultural differences.

1.6 Benefits of human capital

According to Paloma Sanchez and Elena (2006) intellectual capital has, in recent times, become more important and beneficial to a host of interest groups; governments, regulators, companies and research and educational organisations alike. As mentioned previously, human capital is beneficial at the country level, industry and organisation level and at the individual level; it is beneficial to economic growth, competitive advantage and individual remuneration respectively (the latter of which is studied in this paper).

Furthermore, Ordonez de Pablos (2002) explains that human capital measurement is slowly gaining attention and awareness throughout the business and accounting communities. According to Ordonez de Pablos (2002) human capital is of huge interest in the Middle East and Asia; firms such as Teva (Israel) and Reliance Industries Limited (India) have started reporting on human capital as part of their intellectual capital reports. The reasons for this include increased transparency for stakeholders (Paloma Sanchez & Elena, 2006), the absence of non-financial indicators in annual reports (Roslender & Fincham, 2001) and the belief that organisations will, in future, rely upon intellectual capital for a competitive advantage (Ordonez de Pablos, 2002).

Additionally, as noted in Canibano and Paloma Sanchez (2009), the Intellectual Capital (IC) framework, is used as a controlling and monitoring instrument within universities. This is due to the nature and purpose of these organisations; the production and diffusion of knowledge (Paloma Sanchez & Elena, 2006) Human capital is therefore a highly valued commodity in universities.

Paloma Sanchez and Elena (2006) note that universities are considered leading institutions in national innovation. Emphasis on this created the Lisbon Agenda in 2000 which called for university involvement in the Europe of Knowledge scheme. This called for the increase in the quality of education and research, transparency and competitiveness (Paloma Sanchez & Elena, 2006). Paloma Sanchez and Elena (2006) add that in 1999, the Austrian Research Centre (ARC) became the first research organisation in Europe to prepare an Intellectual Capital Report (ICR) comprised of structural, relational and human capital. However, human capital research is not without its criticisms, and critical perspectives on human capital are still lacking (Guthrie Riccieri & Dumay, 2012).

1.7 Criticisms of human capital

Tan (2014) is the main critique of the theory associated with human capital and its practical implications. Tan (2014) discusses this from four different perspectives of (1) methodological, (2) empirical, (3) practical and (4) moral criticisms.

Methodological Criticism: Existing theory behind human capital, such as in Weiss (1995) and early literature by Mincer (1984) and Schultz (1961), suggests that the rational nature of human beings will cause them to invest in human capital, so long as the marginal benefits (wages) exceed that of the marginal costs (investments) (Tan, 2014). That is not always the case as the accumulation of human capital tends to

increase an individual's income and not an individual's source of human capital (source of investment).

Empirical Criticism: Laroche and Merette (2000); Tan (2014) points to the fact that the signalling theory is inaccurate. Due to the imperfections of the labour market, firms look at higher educational attainment and work experience as an indicator of an employee's ability and productivity (Tan, 2014). Gans, King, Stonecash and Mankiw (2011) suggest otherwise. They suggest that human capital accumulation and productivity does not dictate a significant correlation. Tan (2014) concludes that education and human capital, as such, may increase an individual's salary without influencing their productivity.

Practical Criticisms: As mentioned in (Tan, 2014) the theory of human capital assumes that education is always good, as presumed by the positive relationship between education, productivity and income; more education, more productivity, more income as theorised by Weiss (1995). However, as Tan (2014) emphasises, the issue is whether more education is always good and always productive; whether a greater stock of human capital signifies better quality education and better productivity. Barro (1999) mentioned that human capital should not be measured based on the quantity of education (more education) but rather on the quality of that education.

Moral Criticisms: Human capital has long been associated with moral criticisms. The study of human capital views human beings as subjects - enterprises with the aim of maximising utility, rather than as objects (Tan, 2014). This argument suggests connotations of slavery as pointed out in Becker (1962). Although, moral criticisms have traditionally been a major factor in criticism of human capital, it is fast diminishing as a criticism. Given this fact, the former 3 criticisms (methodological, empirical and practical criticism) are fundamentally important.

Finally, accountants and the accounting profession have long focussed on the financial activities of businesses, so much so that they have swept aside issues addressing the inclusion of intellectual capital and human capital, in their annual reports (Roslender & Fincham, 2001). This is because much of human capital are non-market activities and cannot be accurately measured in monetary terms, thus reflecting its exclusion in financial statements (Roslender & Fincham, 2001).

1.8 Structure of the dissertation

The dissertation is divided into the following six chapters. Chapter Two (2) comprises the literature review, which provides a more in depth explanation of the points stated above. Chapters Three (3) and Four (4) consists of the hypothesis development and data sampling. This is followed by the descriptive statistics and regression analysis of the data - Chapter Five (5). The last chapter, Chapter Six (6) provides a conclusion to the research findings and cites limitations to the investigation. It concludes with suggestions for future research.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

Chapter Two (2) provides the background to this report. This Chapter reviews past studies conducted on human capital, which forms the basis of the dissertation. The chapter begins with an introduction to the rise of the informational economy and the measure of intellectual capital as the main resource. This is followed by discussions on the characteristics or distinctive features of the industrial and informational economy and physical capital and intellectual capital respectively. The literature review, then, concentrates on the study of human capital and includes a brief description of the other subsets which comprise intellectual capital. The chapter then goes on to outline early research done on human capital and the human capital theory. A detailed review of nation-wide and firm-specific human capital along with previously used measurement bases is also mentioned. The chapter concludes by recognising the gap in the research and the shortcomings of the measurement criteria employed in the current research.

2.2 The informational economy

During the industrial revolution of the 19th and 20th centuries, physical and financial capital were the main drivers and sources of competitive advantage for companies and the economy (Zimmerman, 2015). However, in recent times, the world has witnessed the introduction of the informational economy which has seen knowledge play a key component in the capital needed to maintain a competitive advantage (Akpinar & Akdemir, 1999). This has led to the introduction of the term - intellectual capital (Lev et al., 2009). The shift coincided with the start of the 21st century which saw a peak in the publication of intellectual capital literature with studies by Lev et al. (2009) and Lev (2000) to name but a few authors.

With the shift from tangible assets/capital (physical and financial capital) to intangible sources of capital (intellectual capital), human capital became prominent (Lev, 2000). While tangibles are much easier to quantify and appraise, valuation of intellectual capital is more difficult. It is therefore, the main reason why intellectual capital has thus far not been recognised in accounting financial statements. Instead many studies dealing with intellectual capital have, in the past, been studied and published by economists (Lev & Schwartz, 1971).

The evolution from an industrial economy to an informational economy is reflected in the nature of the firm. Zingales (2000) outlines the differences in characteristics of firms belonging to (1) the industrial economy and (2) the informational economy and how this has affected the theory of the firm; capital structure (source of capital), corporate governance and valuation of these firms. According to Kapás (2008), the industrial economy, characterised by the industrial revolution and witnessed by the introduction of huge factories, sought mass production and distribution of goods and services. This was therefore the catalyst for firms to invest in physical capital such as heavy equipment capable of mass production (Kapás, 2008). Zingales (2000) and Zimmerman (2015) both characterise traditional firms as:

- Highly asset-intensive (physical assets)
- Vertically integrated
- Firms with clear boundaries of control
- Firms with a lopsided concentration of power at the top and
- High degree of control over its employees

Contemporaneously, as Zingales (2000) puts it, the increase in international competition and the greater freedom for world trade through globalisation has created a greater demand for continual innovation and quality improvement. This has seen corporations focus on inputs of intellectual capital and human capital (Zingales, 2000). Furthermore, creating this shift has been the outdated importance of physical assets, which do not command large rents anymore (Zingales, 2000). As opposed to traditional firms, 21st century firms are characterised as:

- Intellectual capital intensive
- Potentially having higher growth opportunities
- Firms boundaries of control are not clear-cut
- Firms that have little or no control over its employees with assets now belonging to the employees who have the freedom to move their assets to alternative employment opportunities.

As noted above, the transfer from an industrial economy to a knowledge-based economy has shifted the complexities of the theory of the firm. The capital structure of firms has seen an increase in the number of venture capitalists, who invest in companies with high-growth potential (Zingales, 2000). The problem of corporate governance,

which focussed on preventing managers abusing their control of the business assets (agency problem) (Zingales, 2000), has shifted to addressing the issue of multiple stakeholders with controlling rights (Zingales, 2000). Moreover, valuation through book-value figures have been made irrelevant as intangibles assets, specifically human capital, cannot be accurately valued and measured (Roslender & Fincham, 2001). The next subsection introduces intellectual capital as the main characteristic of firms belonging to the informational economy. It also outlines the evolution of research into intellectual capital.

2.3 Intellectual capital research

Guthrie et al. (2012) outlined the evolution of Intellectual Capital Accounting Research (ICAR). The main study reviews research previously conducted on intellectual capital, and state that intellectual capital took hold in the 1980's and 90's and categorised future research into three stages. The first stage of raising awareness was recognising and understanding the potential of intellectual capital (IC). The second stage was establishing IC and gathering evidence to support future research (Guthrie et al., 2012). Research into these two stages was mostly carried out in the latter half of the 20th century and the beginning of the 21st century. This resulted in publications such as Mincer (1984); Lev, Radhakrishnan and Zhang (2009); and Weiss (1995) among others. Beattie and Smith (2013) and Zimmerman (2015) focussed their research on how intellectual capital created value by informing capital markets and various stakeholders of this new contribution to capital assets.

Presently, research is still on going into the second stage with studies investigating Intellectual Capital Accounting Research (ICAR) in practice (Guthrie et al., 2012). The third stage of the development of ICAR is, as Guthrie et al. (2012) states, critically examining ICAR as it is employed in practice. Tan's research partly focussed on the critical aspects of intellectual capital (Tan, 2014). Roslender and Fincham (2001) partly focussed their research on this, by broadly criticising intellectual capital as whole and explaining why it is excluded from the bulk of financial statements. However, Guthrie et al. (2012) reported that intellectual capital is still a relatively unknown concept to the wider community and past and present literature lack research on critical perspectives of ICAR.

Addressing the issue of exposure of intellectual capital to the wider community, Guthrie et al. (2012) point out two specialist journals dedicated to ICAR; the Journal of Human

Resource Costing and Accounting (JHRCA) and the Journal of Intellectual Capital (JIC). Intellectual capital covers a variety of topics, which are typical of the 21st century; therefore, researchers should consider having more specialist journals. Furthermore, ICAR has in most parts, focussed on publicly-listed companies, due to easy accessibility of information, researched geographically in Europe, Australasia and North America and used for management control/strategy (Guthrie et al., 2012). However, intellectual capital is the broad term given to capital/resources sourced from knowledge ingrained in the organisations operations and processes, and that are embedded in their employee's attitude/ behaviour.

Intellectual capital as outlined by Lev, Radhakrishnan and Zhang (2009) and Lev (2000) is broad and consists of many areas. These include:

1. Discovery/Learning intangibles (e.g. patents, copyrights and research & development)
2. Relational capital (e.g. Brands, customer networks, alliances and supply chain management)
3. Human capital (e.g. Employee skills and attributes)

In addition to these 4 areas, Lev, Radhakrishnan and Evans (2016) list the following aspects as well:

1. Values & Norms
2. Business Processes and Practices

Lev, Radhakrishnan and Zhang (2009) and Beattie and Smith (2013) classify the values and norms, business processes and practices, databases and company culture as organisational capital and structural capital respectively.

Discovery/learning intangibles and relational capital are both sourced from knowledge gained through the operations and processes of the organisation, however human capital is sourced from knowledge ingrained in its employees – skills and capabilities. Research on discovery/learning intangibles such as patent and copyrights have been in abundance and been recognised as part of a company's financial statements. There has been a lot of research carried out on relational capital; valuing company brands, such as in football with Manchester United FC and Barcelona FC (Hall, 2016). However, due to the knowledge economy (also known as the informational economy), human capital has garnered the most attention. Chen, Cheng and Hwang (2005) define structural capital as

capital that stays with the firm, and includes that of innovative capital (R&D or discovery intangibles), relational capital, organisational infrastructure and human capital).

However the individual components of relational capital, discovery capital, human capital and structural/organisational capital do not create value in themselves (Chen et al., 2005). As Chen et al. (2005) stated, a feature of human capital is that human capital will disappear once employees exit. The same goes for the other components of intellectual capital respectively. Whereas human capital, relational capital, discovery intangibles and structural capital are all forms of knowledge and enhance intellectual capital, they can only help create value for the business when combined together as intellectual capital (Beattie & Smith, 2013). As Beattie & Smith (2013) noted the business model identifies how different forms of capital (intellectual capital, physical capital and financial capital) are utilised to create value. However as Pulic (2004) stated the value created from intellectual capital needs to be measured using contemporary measures such as Value Added Intellectual Coefficient (VAIC) or Intellectual Capital Efficiency (ICE) to accurately measure whether intellectual capital is being created or destroyed, and not traditional measures of ROI and ROE. According to Nadeem, Gan and Nguyen (2017) VAIC measures the value creation by the business and contributions of each asset category towards value creation. VAIC calculates the value of assets that stem from intellectual capital efficiency.

Chen, Cheng & Hwang (2005) stated that though intellectual capital is comprised of different capital, human capital is recognised as being the central figure. Human capital research has yielded numerous publications; literature-review based (Guthrie et al., 2012), theoretical (Weiss, 1995), qualitative (Mincer, 1984) and quantitative (Laroche & Merette, 2000). Human capital is a relatively new concept, branching out from intellectual capital. It gained prominence due to the changing economy; from that of an industrial based economy to that of a knowledge based economy. Given this, human capital is a fast developing area of research. This though, does not have any contextual basis to it, as without knowing the theory behind human capital, the importance of human capital and previous studies on human capital - how it developed through time, is worthless.

Furthermore, De Clercq and Dakhli (2003) outlined studies that have been conducted at the country-level, firm-level and individual level (*see Figure 1: Outline of studies*).

Early studies used human capital as a measure of the economic growth of a specific country. This type of measurement has resulted in many quantitative studies. Narrowing it down, firm-specific studies consider investments made by the organisation to develop a competitive sustainable advantage (Coff & Raffiee, 2015) such as investments made in on-the-job training and industry-specific capital; industry know-how in terms of experience in a specific industry (e.g. Business experience). Individual-specific human capital focuses on the individuals as subjects of human capital and may consider academic education or the age of an individual, signifying their life experience whereas firm-specific capital may ignore these factors.

2.4 Human capital

2.4.1 Previous studies on human capital

The first recognisable work which focussed on human capital was done by economists. According to Nerdrum and Erikson (2001), economists were focussed on the productive effects of the quality of workers, whereas accountants have traditionally focussed on the valuation and measurement effects, which for human capital were difficult to measure and quantify.

Human capital took hold in the late 20th century with studies by Schultz (1961) and Mincer (1984). However, in fact, what was to be known as human capital, was discussed several centuries before, most notably in the 18th century with researchers William Petty and Adam Smith, followed by Alfred Marshall in 1890 (Nerdrum and Erikson, 2001).

Economists, Petty and Smith discussed the problems that arise due to the differences in labour quality and recommended measuring the value of workers (Nerdrum & Erikson, 2001). In the book, The Wealth of Nations, Adam Smith noted that an employee's wages should be determined by the (1) time, (2) effort and (3) money spent to obtain skills required for the specific work (Nerdrum & Erikson, 2001). According to (Nerdrum & Erikson, 2001), Marshall mentioned "the most valuable of all capital is that invested in human beings", however neither Adam Smith nor Alfred Marshall used the term human capital to describe this. The early half of the 20th century saw economist Irving Fisher, in his definition of capital and income, reiterate that human skills and competencies form as integral a part of capital as being something that gives rise to a stream of income (Nerdrum & Erikson, 2001).

Substantial work on human capital was not done until the latter half of the 20th century. Schultz (1961) and Mincer (1984) studied the investments made in human capital. While Schultz (1961) contributed to the literature by focussing on the macro-economic environment, Mincer (1984) examined the micro-economic environment (Nerdrum & Erikson, 2001). Schultz (1961) identified the effect of a country's policy on human capital stock whereas Mincer (1984) focussed more on investing and increasing the human capital of individuals; school education, education after schooling, and capped it off with its positive influence on economic growth.

Human capital can be measured using different criteria and has changed over time. Moreover, it is also dependent on the type of study being undertaken. Schultz (1961) and Mincer (1984) conducted theoretical studies, and were focussed on investments made in human capital whereas recent studies of Mulligan and Sala-i-martin (1997); Laroche and Merette (2000) and Boudarbat et al. (2010) have centred on empirical studies, focussing on investigating the stock of human capital in different countries at different points in time, using a quantitative based approach.

2.4.2 Human capital theory

Several researchers have attempted to develop approaches to human capital theory, and this has resulted in the following publications by Bluedorn (2002); Lucas (1988) and Mankiw, Romer and Weil (1992). Human capital was an important component of economic growth; in computing the economic growth of a country (Lucas, 1988). Lucas (1988) investigated the mechanics of an ever-increasing economic growth rate. Early research on human capital theory was in the form of the human-augmented Solow model, which contributed to the theory of economic growth (Mankiw, Romer & Weil, 1992). This model included human capital as a factor affecting economic growth, among technological change and physical capital. This was also known as the neoclassical growth model (Mankiw, Romer & Weil, 1992). Onwards from this, literature on human capital theory also included the publications of Weiss (1995) and Tan (2014). Weiss (1995) addressed human capital theory as:

"Workers with higher levels of education and more work experience tend to have higher wages"

Weiss (1995, pp. 133)

Furthermore, Weiss (1995) mentioned signalling theory as an extension of human capital theory. As stated in this theory:

> Higher levels of education and more work experience acts as a signal to firms of an individual's productivity . . . which ensues higher wages or salaries
>
> Weiss (1995, pp. 134)

Many of the theories conceived above, originated from the relationship between human capital and the economic growth of countries (Barro, 1999). Lucas (1988) states that human capital research in the late 20th century stemmed from the growing inequality between the rich and the poor. Benhabib and Spiegel (1994) also emphasised the importance of human capital as a pre-requisite for economic growth. In addition, Mincer (1984) claimed that the human capital theory was developed because:

1. The inputs of labour and capital into a productive capacity were far smaller than that of productive output in the U.S and other countries.
2. The increase in the variance (range) of labourers' incomes was the main component of personal income inequality.

Furthermore, the study by Barro (1999) analyses the contribution of different factors to a country's economic growth. Barro (1999) stated that human capital is an important part of the development process of a country. This statement was justified upon discovering a positive correlation between the years of schooling [a representation of human capital] and economic growth in a country. A more in-depth, country analysis portrayed a strong contribution of the number of years of schooling to the growth rate in advanced economies; United States [0.034] and Canada [0.019] (Barro, 1999). However, the quality of schooling mattered more than the duration (quantity). On the other hand, Benhabib and Spiegel (1994) found no, or an insignificant correlation between human capital (years of schooling) and economic growth. The data is more profound with the inclusion of African and South American countries, which depicted a negative correlation in the contribution to economic growth (Barro 1999). The exclusion of these countries did not pose a significant difference.

On comparison of what is known as the four East Asian miracles; South Korea, Taiwan, Hong Kong and Singapore, the following data was recorded (Lucas, 1988). During a 20-year span between 1960 and 1980, these countries recorded economic growth rates of between 6.5% and 7.5%. This has led Lucas (1988) to conclude that the key

component, owing to the differences in the economic growth rates of middle-income and poor countries, was human capital accumulation.

In my opinion, this finding is not surprising, as the likes of Singapore have prioritised the immigration of skilled workers, with large human capital stocks and have developed a culture of a competitive educational environment with world-class tertiary institutions. This has fostered the growth of human capital stock and the economic growth in the country.

2.4.3 Nation-wide and Firm/Industry specific human capital

Research has also been conducted at the firm level. However, unlike country-specific human capital studies which were quantitative in nature, these studies have been more theoretical based. Lazear (2009) define firm-specific human capital as those skills that makes the person, who owns the human capital, more in demand/more productive in their current or similar firm/job, but not elsewhere. This is as opposed to general human capital which enables similar levels of productivity in multiple firms (Lazear, 2009).

Neal (1995) state that previous research has focussed on human capital as being either specific to a firm, or in general, however none have focussed on human capital stocks needed for a given industry or sector. Neal (1995, pp. 654) undertook a quantitative study in demonstrating that:

> "Wages in part, reflect compensation for industry-specific skills"

The Economist (2007, pp. 1) added that:

> "In today's economy there is an income premium for higher education and training"

Neal (1995) concludes that wages significantly reflect compensation for industry-specific human capital, among those with experience. Furthermore, as Neal (1995) and Coff and Raffiee (2015) outline, people who are displaced from jobs are more likely to suffer wage losses upon working in a different industry, than those who find jobs in the same/similar industry/position. Lazear (2009) further differentiates these skills into firm-specific, industry-specific and general human capital and wages. The publications of Carmichael (1983); Neal (1995); Lazear (2009) and Raffiee and Coff (2016) reflect all-these types of human capital. They explain that wages depend on

1. The seniority and the length of service of the employee (Carmichael, 1983) and organisational routines and culture (Raffiee & Coff, 2016) (firm-specific human capital)
2. Attending seminars, reading/writing publics and interactions with colleagues and fellow academics (Lazear, 2009) (industry-specific human capital)
3. Soft skills acquired through learning/education (general human capital)

Furthermore, Coff and Raffiee (2015) explain that while industry-specific and firm-specific human capital may contribute greater to earnings, than general human capital, in a specific firm/set of firms, firm-specific human capital will constrain the mobility of employees to only that of specific firms. Thus, as Raffiee and Coff (2016) point out, firm-specific human capital encompasses knowledge that maintains advantages and allows the firm to appropriate some of the value created from this knowledge.

The university environment illustrates industry-specific skills, since it values specialised skills associated with holding the position of an academic. This research paper aims to determine whether the industry-specific skills; namely their research output, the impact of their research and the academic connections they possess (e.g. publications, citations, H-index etc.) is reflected in their wages and if so, to what extent. There should be an income premium to reflect compensation for these industry-specific skills if the theory laid out by Weiss (1995) and Neal (1995) stand.

2.5 Human capital measures

Quantitative, empirical studies of human capital have not emerged until recently; the late 1990's and the beginning of the 21st century. This is due to the fact that because investments made into human capital, in most part, are non-market activities (Mincer, 1984). However, in recent years, numerous studies have been conducted either in a cross-country or nation-wide setting. Jeong (2002) and Son (2010) conducted their sample from a cross-country perspective. Nation-wide studies have been more in abundance with studies based in Canada (Boudarbat et al., 2010; Laroche & Merette, 2000), United States (Mulligan & Sala-i-martin, 1997) and Germany and Austria (Koman & Marin, 1999). Some of this literature will be summarised below.

Most of the quantitative studies that focus on the measurement of human capital in a country context have been based on past, established measures. Laroche and Merette (2000) and Le, Gibson and Oxley (2003) characterise the measures utilised into three

different criteria – The input/cost-based measure, the output-based measure and the income-based measure.

2.5.1 Cost-based measures (input-based)

According to Kwon (2009), the input-based approach, also known as the cost-based approach to human capital is based on the measurement of the cost of those activities that give rise to the accumulation of human capital. Schultz (1961) cited examples of cost-based human capital as child rearing costs, the cost of education and health and migration costs. As reported in Le et al. (2003) Engel's research in the late 19th century (1883) was one of the first studies that used the cost-based approach.

According to Le et al. (2003), Engel's research is 1883 used the proxy of child rearing costs to measure human capital. Engel's definition of child rearing costs is those costs associated with raising and helping a child develop from birth to the age of 25. However, Dagum and Slottje (2000) mention that this method was simply the addition on historical costs on a yearly basis. Dagum and Slottje (2000) suggest a lack of accounting as a reason for the time-value of money over a period of time, depreciation and even social costs associated with the accumulation of human capital. Le et al. (2003) also mention that research by Kendrick in 1976 further divided costs associated with human capital into tangible and intangible investments. Tangible investments included that of child rearing costs, a proxy used by Engel, however Kendrick's criteria only included costs until the age of 14 (Le et al., 2003). Intangible investments included those costs spent to enhance/improve the quality and/or productivity of labour – education, training, opportunity costs et cetera (Le et al., 2003).

Son (2010), who conducted a cross-country analysis of 146 countries from data provided in the Barro and Lee study of 2010, used an input variable based on cost [using the years of schooling as a proxy], to predict its correlation with different countries diverse output levels [economic growth and GDP]. As expected, Son (2010) found that the investment (input) into human capital of low-income countries compared to that of high-income countries significantly contributed to their diverse output levels.

The advantage of using cost-based or input-based measures is that the measures used are established and can be quantified. However, as Dagum and Slottje (2000) mention, the use of historical costs brings its disadvantages – such as having to factor in time value of money and depreciation. Furthermore, it is difficult to quantify intangible investments such as the opportunity cost associated with improving an individual's

human capital. The cost of/investment made into the years of schooling is measured based on the opportunity cost of going to school (Laroche & Merette, 2000). However, the opportunity cost of going to school for a person in a middle-class household and a working-class household is subjective and an improbable measure of human capital. Laroche and Merette (2000) states this approach is dependent on the researcher's classification of expenditures between cost and investment.

The proxy measured by years of schooling represents the quantity of educational attainment, and thus the quantity of an individual's human capital stock. However, the variable in question, does not suggest the quality of human capital stock (Barro, 1999). Thus, years of schooling as a variable is made irrelevant as in many disciplines, quality matters more than quantity. Secondly, as Le et al. (2003) state, investments made into human capital (inputs) are created by the demand for those investments and therefore can inflate the true cost, thus deeming the measure inaccurate. Furthermore, the cost of inputs as a measure of human capital disregards non-market activities, which otherwise form an important component of human capital (Le et al., 2003).

2.5.2 Output-based measures

The output-based measure, unlike the input-based measure discussed above, focusses on measuring the outputs of an individual's activity or company operations or the education of a nation. The output-based measure was popular in the 1980's and 90's (Laroche & Merette, 2000). It showed the association between a nation's human capital and its economic growth and was either nation-specific or a cross-country analysis. Thus, it is the reason why examples of human capital proxies included measures of school enrolment and adult literacy rates (Kwon, 2009; Barro, 1991; Barro and Lee, 1993). The main benefit of using these measures was the easy accessibility of reports from international organisations such as UNESCO and the World Bank. Furthermore, Barro and Lee (1993) mention that proxies of educational attainment are a good measure of human capital and have great explanatory power. However, these measures were not representative of human capital and excluded a significant part of human capital accumulation. Laroche and Merette (2000) explain that school enrolment rates are a better indicator of the flow of investments into education rather than an identifier of human capital stock. Additionally, adult literacy rates only indicate basic human capital stock [reading and writing]. Adult literacy rates do not account for the

accumulation of human capital throughout the latter years of school [high school and university] (Larcohe & Merette, 2000).

A better measure of human capital stock is to average the years of schooling embodied in the labour force of a country (Psacharopoulos & Arriagada, 1992; Barro, 1999) and total the number of years of completed education (Lau, Jamison & Louat, 1991). Most of the research conducted using this method involved cross-country analysis. Psacharopoulos and Arriagada (1992) and Lau et al. (1991) sampled 99 countries and 58 countries respectively; however the focus of the latter was on developing countries. Kwon (2009), in his publication, explained the reasoning behind using the average years of schooling as a proxy in the study by Psacharopoulos and Arriagada (1992). The reasoning was that productivity increased proportionately with years of schooling [e.g. an individual with 12 years of schooling is 12 times more productive compared to an individual with a single year of schooling], thus reaffirming that average years of schooling is a suitable measure of an individual's human capital (Kwon, 2009). This output-based approach is also evident in the study by Boudarbat et al. (2010) who used experience (in terms of age) as a proxy of human capital.

Laroche and Merette (2000) explained that the years of schooling/ average years of schooling can be used as an input variable as well as an output variable, depending on how an individual perceives, years of schooling to be. Years of schooling measured using the cost-based approach [input variable] measures the investment made into those years of schooling whereas when used as an output variable, it measures the educational attainment of a person (Laroche & Merette, 2000).

As mentioned above, most of the studies and approaches to the output-based measure have focussed on output with regards to school enrolment rates, adult literacy rates and educational attainment. Le et al. (2003) explain that using education as output-based proxies disregards human capital accumulation after school [e.g. at work]. The average years of schooling is also not an accurate measure of productivity. Instead, work experience or publications, might perhaps be a better measurement. However, based on previous theories by Weiss (1995) and Neal (1995), wages or salaries reflect both productivity and industry-specific skills.

2.5.3 Income-based measures

The rationale behind income-based human capital is based on the assumption that human capital stock is based on the individual's income. Moreover, as mentioned in

Laroche and Merette (2000), there is empirical evidence that suggests that a worker's productivity [measure of human capital] increases with education and work experience and that the worker's productivity [using the income-based approach] is measured by their income. The income-based approach to human capital has been used a lot in recent studies, however the first adoption of this measure was by Jorgenson and Fraumeni in 1989 (Le et al., 2003). In calculating the human capital in the United States from 1948 – 1986 (Jorgenson & Fraumeni, 1989), the authors proposed a measure – The lifetime income approach. This was based on the assumption made by Graham and Webb (1979) that human capital (in this case represented by income or wealth) would increase at an appreciating rate until middle-age, followed by a steady depreciation until retirement age at 75 – a concave parabola. Le et al. (2003) mention that Jorgenson and Fraumeni modified this approach. The lifetime-income approach was calculated by adding a person's current annual income to the present value of their lifetime income, with their employment and survival probabilities factored in. This approach was further aided by Graham and Webb (1979) who stated that the earnings an individual aged x will receive in n years, is the same as an individual aged $x + n$ presently.

The Jorgenson and Fraumeni method, despite having been established from solid foundations and assumptions about human capital, has its drawbacks. The measurement is forward-looking. Thus, its assumptions may not always hold true. These assumptions include predicting the present value of future income which cannot be known beforehand. Moreover, in calculating the present value, the researcher(s) must determine a rate of depreciation (Le et al., 2003). Le et al. (2003) also mention some previous studies under-estimated human capital by over-depreciation; however, Jorgenson and Fraumeni over-estimated human capital in the treatment of non-market activities.

Another approach is the labour-income based measure (LIHK) as stated by Mulligan and Sala-i-martin (1997). The labour-income based measure takes the income of any individual and divides it by the income of an individual with no education. The greater the level of income left after dividing the above, the greater the level of human capital stock the individual has. The reasoning behind this is that the income of an individual is made up of (1) individual skill and (2) the aggregate stock of physical capital available to the individual (Mulligan & Sala-i-martin, 1997). The individual with no education

has access to physical capital but possesses a lower level of human capital which reflects human capital as the residual effect.

The research conducted by Mulligan and Sala-i-martin (1997) was carried out in the United States at 10 year intervals from 1940 – 1990; coinciding in part with the study by Jorgenson and Fraumeni (1989). The results of the two studies are, in majority, the same, depicting the fact that human capital decreased from 1940-1950 before increasing sharply post 1950's era, up to 1990; $92 trillion (1948) - $171 trillion in 1986 and a 52% increase from 1980-1990 alone (Le et al., 2003).

Jeong (2002) adopts a similar method to that of Mulligan and Sala-i-martin (1997); however, unlike the latter whose study was conducted in the United States, the former conducted a cross-country analysis involving 45 countries. Unlike Mulligan and Sala-i-martin who used the individual with no schooling as their baseline, Jeong (2002) used those industrial labourers as his baseline (Le et al., 2003). The variable of industrial labourers is a better measure when doing cross-country studies, as there is a universal definition, of an industrial labourer as mentioned by the International Labour Office (Le et al., 2003). Whereas an individual with zero schooling is a subjective measure and the respective definition will vary between countries. The advantages with these methods are that they both exclude the component of physical capital (Mulligan & Sala-i-martin, 1997).

Koman and Marin (1999) and Laroche and Merette (2000) adopted a different approach. Both studies measured the worker's productivity [measure of human capital] by their wage income. The study was conducted by studying human capital in Austria and Germany (Koman & Marin, 1999) and Canada (Laroche & Merette, 2000) respectively.

The income-based approach, although a valid measure, maybe both realistic and controversial. As mentioned in Le et al. (2003), the above approach is based on off market prices, as opposed to historical prices, thus it will be a better reflection of an individual's human capital stock. The information is also more easily accessible than historical prices (Le et al., 2003). However, the income approach will focus on the market activities of human capital, when in fact non-market activities are an important component of human capital (Laroche & Merette, 2000).

The income-based approach is fundamentally lacking, as productivity is not necessarily a good representation of human capital, as an individual may have a large human capital

stock, but if that stock is not fostered appropriately, productivity can be lacking. Secondly income is not a sufficient representation of human capital. Using the illustration of Jorgenson and Fraumeni, Le et al. (2003) mentioned their approach involved assuming that people those who did not work or go to school (0 - 5 years old, < 75 years old) and those who did not work but did attend school (5 – 13 years old) had zero human capital stock and only those who did work and receive income would have human capital stock. This basically translates to those who do not earn income, do not have access to human capital, which is not true. However, the major drawback, as to why this measure lacks accuracy is that there may not be a clear relationship between income and human capital and secondary factors such as age, gender, field of work and rank et cetera will have an effect on income (Laroche & Merette, 2000; Le et al., 2003).

The literature above covers the three broad quantification methods (input, output and income) commonly used and the sub measurements that different researchers employed to measure human capital. Although the current study utilises two of the above measures, the focus is different., Whereas past studies have focussed on measuring human capital in a country context, the following research aims to identify the relationship between income and human capital. Despite, Laroche and Merette (2000) stating that there may not be a clear relationship between income and human capital, Neal (1995) and Weiss (1995) had earlier theorised that such a relationship does indeed exist.

In testing this relationship, I have used the fundamentals of the income-based and output-based approaches. The income-based approach hypothesises that income is a reflection of an individual's human capital whereas the output-based approach hypothesises that an individual's output is a reflection of their human capital. The two approaches are tested against each other to determine if both approaches had a positive relationship to human capital by showing a positive relationship with each other. To illustrate this (1) if the income-based approach reflects the stock of human capital, an individual's output will reflect income and (2) if the output-based approach reflects human capital, an individual's income will reflect the output of that individual.

The income-based approach is measured by using an individual's income whereas the output-based measure uses proxies of research output; publications, citations, Research Gate scores [RG Score] and the Hirsch Index [H-Index]. Moreover, this research mitigates some of the disadvantages of each approach. It mitigates the disadvantage of

the non-inclusion of non-market activities, formerly a disadvantage of solely using the income approach, but also mitigates the disadvantage of output-based approaches of only using schooling related human capital. This approach looks at in-school and out-of-school human capital accumulation.

2.6 Aim and motivation of the study

There are several factors that motivated this study.

1. Firstly, nation-wide and firm-specific studies have focussed on the relationship between human capital and economic growth and human capital and competitive advantage in firms respectively. Therefore, this study seeks to investigate the root cause of this relationship, which may be answered in individual-specific studies (*see Figure 1: Outline of Studies*).
2. Secondly, this research tests whether past theories, namely those of Weiss (1995) and Neal (1995), can be applied through a Canadian context (*see Figure 1: Outline of Studies).*

Human capital is off particular importance to research institutions and universities, due to the role they pay in the wider society; production and diffusion of knowledge, interaction with industry and other universities and the notion of employees being their most important asset (Paloma Sanchez & Elena, 2006; Canibano & Paloma Sanchez, 2009; Becker, 2009). Furthermore, in his article “Business Schools: Creators of Essential Knowledge”, Williams (2016) notes that business schools, have previously had a significant impact on business practices and societal advancement. The proximity between business research and industry practices can strengthen the theory that wages in part reflect industry-specific skills (Williams, 2016). Thus, the human capital accumulation and published journal articles of academics in the field of business; management, accounting or finance may go a long way towards explaining the correlation between human capital and wages. Thus, the aim of this study was to determine whether business academics’ salaries, in part, compensate for their human capital stock in the universities in the Province of Ontario Canada. The study is thus conducted at the individual level.

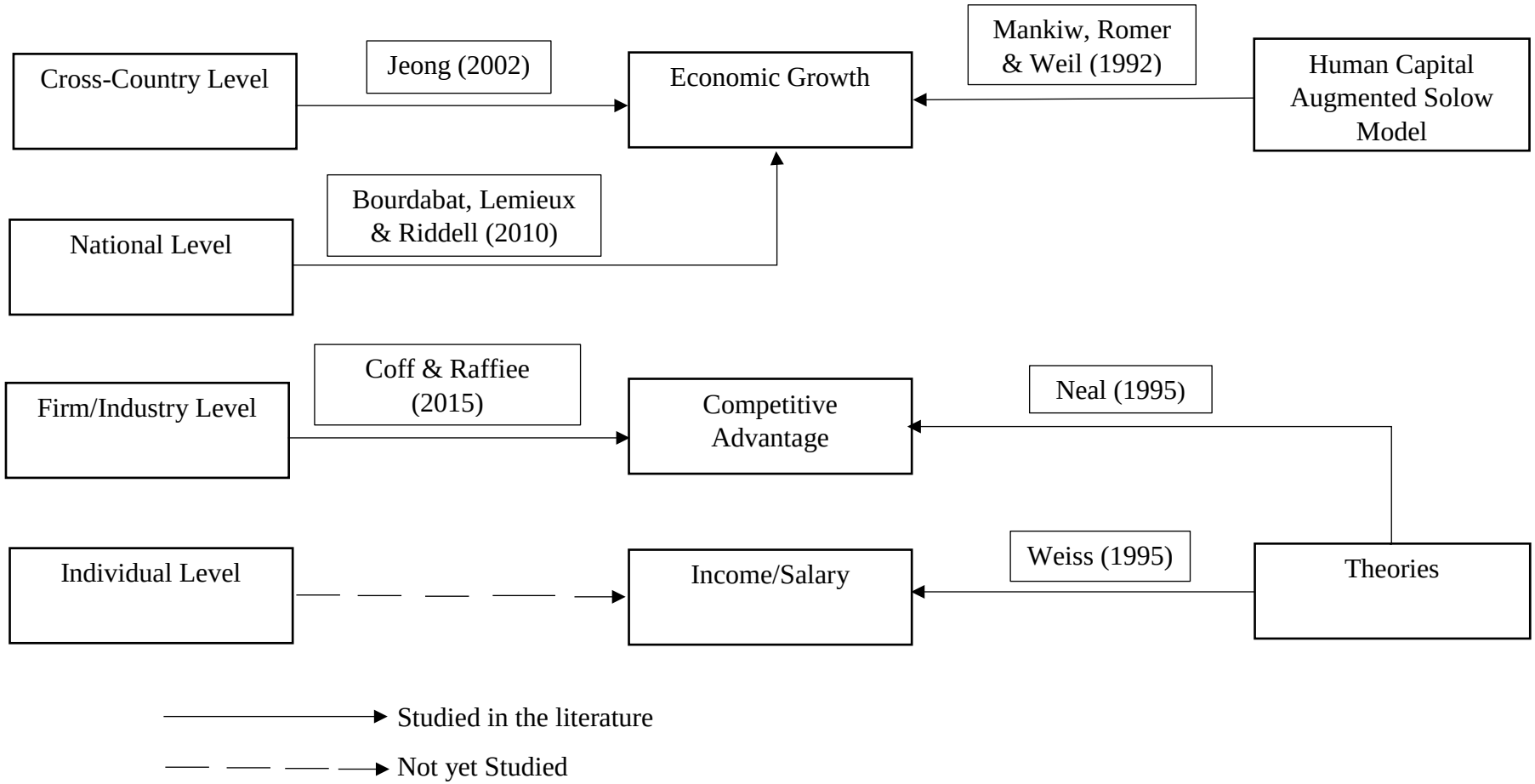

Figure 1: Outline of studies

CHAPTER THREE: HYPOTHESIS DEVELOPMENT

3.1 Introduction

Chapter Three (3) outlines the development of the hypotheses of the study, the process of data collection and the construction of the regression analysis. The following hypothesises on the relationship between the variables of human capital (publications, profile views, H-index et cetera) and salary. The hypothesis developed below is based on theories conceived by Neal (1995) and Weiss (1995) as detailed previously in chapter two (2).

3.2 Association between human capital and salary

3.2.1 Theoretical standpoint

As cited in Chapter two (2), individuals who have a higher level of education and more work experience, tend to have higher wages. This implies that an individual with more human capital would draw a greater income than another with less human capital. However, a more focussed theory that has been conceived, states that wages/income, in part reflect the amount of industry-specific skills and knowledge an individual has acquired. The later theory focusses on industry-specific human capital. These include the effective control and passing of the ball for a footballer or familiarity with the law for a lawyer. Industry-specific skills associated with the tertiary education industry include that of teaching, research productivity (number of publications) and impact of research (citations and H-index) among others. However, the extent of the compensation received will vary from industry-to-industry depending on whether it is a specialised industry and whether the skills/abilities are in high demand.

Moreover, the triangular relationship between the output-based measurement, the income-based measurement and human capital will form the hypotheses developed. Based on previous quantitative studies, an individual's income is a reflection of human capital and so is the reflection of an individual's output of human capital. Given this an individual's income and his/her output should have a positive correlation to each other.

3.2.2 Practical standpoint

De Pablos (2002) defined intellectual capital as the organisational knowledge that is utilised to create wealth for the individual or the company and as Lev, Canibano and Marr (2005) put it, knowledge which can provide a firm with a competitive advantage. Part of this knowledge is in the form of skills, competencies and abilities and is what is

known as human capital (Stewart, 2007). Human capital is a source of competitive advantage and a source of wealth creation for firms.

Practically speaking, employees contribute their skills and abilities [human capital] into producing goods and services for the firm, which is then sold to create wealth or a competitive advantage. For example, university academics (1) input their tacit knowledge [human capital] into explicit or written knowledge in the form of research articles (research) and (2) impart their personal knowledge to students [teaching]. Both are either a consumable good or service, used to create a competitive advantage on behalf of the educational institution or university. In return, the firm may receive a premium for the goods or services, which may otherwise be sold at a discounted price if there was no input into human capital. In the current scenario, students pay higher tuition fees at more reputable universities with better quality teaching and research output than in universities that are less respectable. The reputation of the university depends on the quality of its research and teaching, which are dependent on their academic staffs' human capital. Thus the firm should compensate employees for their human capital input.

The combination of the theoretical and practical standpoints mentioned above lead me to the hypothesis that:

H1: The number of publications published has a positive correlation with an academic's salary

H2: The number of citations received has a positive correlation with an academic's salary

H3: The number of reads has a positive correlation with an academic's salary

Furthermore, the strong influence of business research on industry practice as mentioned by Williams (2016), and the increasing importance of networking, both in industry and research has made for the following hypothesis:

H4: The number of profile views of an academic has a positive correlation with his/her salary

Lastly, the Research Gate score (RG score) is a score assigned to a researcher as an indication of a sum of factors including the number of publications produced, citations received, reads and profile views. The H-Index addresses the impact of the academic's

research publications in terms of the number of citations a publication has received. Thus, the two measures reflect different aspects of a researcher's profile.

3.3 Association between the H-index and salary

As explained by Bornmann and Daniel (2007), the Hirsch Index, commonly known as the H-Index, and named after Jorge Hirsch in 2005 is a measure of the visible impact of a researcher's work [publications] on the wider academic community. In its simplicity, the H-index is calculated based on the number of citations received per publication (Bornmann & Daniel, 2007). For example, an H-index of 5 implies that a researcher has received at least 5 citations for 5 of his/her publications. According to Hirsch, the "H-index measures the broad impact of an individual's work (2005, pp. 01)."

Furthermore, Hirsch (2005) and Bornmann and Daniel (2007) state that the H-index gives an indication of whether the researcher has a broad and sustained impact or whether they are inconsistent and what Bornmann and Daniel (2007) call a one-hit wonder. Hirsch (2005) also states that the H-index gives an indication of the researcher's productivity.

H5: The Hirsch index [H-Index] has a positive correlation with an academic's salary.

CHAPTER FOUR: DATA COLLECTION

4.1 Introduction

Chapter Four (4) details the process involved in gathering the data and the composition of the final sample. Since this study uses regression analyses to convert the raw data into meaningful information. This chapter, therefore, concludes with the list of variables tested, the input of data into the statistical software, IBM SPSS and the models regressed.

For this research, the data was gathered from across numerous public universities in the Province of Ontario, Canada. The focus of this study was concentrated only in the Province of Ontario because of the easy availability of publicly disclosed data with regards to academics' individual salaries, exceeding $100,000 Canadian dollars. According to The Public Sector Salary Disclosure Act of 1996, the legislation requires organisations which receive funding from the Province of Ontario [public organisations], to disclose those employees who earn more than $100,000 in an academic year (Sandals, 2015). To narrow down the data pool, the current research only focusses on university academics that are staff of the school of business at their respective universities. The data is collected at a single point in time; for the academic year ended 2015. This is the latest available data, given that the salary figures reported are as at March 31st for the previous year's earnings.

4.2 Sample selection

The database records an extensive list of all public sector employees who earn greater than $100,000 across areas such as hospitals, medical boards, municipalities and universities among others. Considering only those individuals in the university sector, the dataset produced a population size of over 15,000 academics from 35 universities across the Province of Ontario. Table 1 outlines the process involved and exclusion conditions employed in cutting down the sample size to a more manageable data pool.

As mentioned in chapter one (1), this study focuses on academics from the business school. Therefore universities that do not specialise in business (e.g. Northern Ontario School of Medicine), or do not have a business school (e.g. Saint Paul University) are excluded from the dataset. This excluded 578 academics from 15 universities. The study further excludes institutions who are university colleges as opposed to full-fledged universities. The reason for this exclusion from the sample, is because unlike

universities that offer both undergraduate and postgraduate degrees and put a large emphasis on research, university colleges only offer undergraduate diplomas and degrees and are not very research intensive (Ontario Council of Agencies Serving Immigrants, 2016). This research focusses on the research aspect of an academic's human capital. Thus, it would be inappropriate to combine academics of universities and university colleges into a single sample. Three (3) universities in the population do not have university status, thus excluding another 142 academics are excluded. Additionally, subject data was unavailable for Lakehead University, leading to the exclusion of 300 more academics from the dataset.

This left a sample size of 16,044 academics from across 16 universities who have university status and active business schools. The sample size was further narrowed by only including those individuals who specialise in management, accounting or finance. The data was gathered from the academic's respective university websites, and only those academics who fit the above criteria were shortlisted. The number of exclusions as a result of this could not be determined due to the unavailability or insufficient information on an academic's subject disciplines on the population dataset.

Furthermore, this research uses Research Gate to collate information on an academic's raw human capital data (publications, citations, reads, profile views, RG score and H-index). For the purpose of standardisation, Research Gate was the only source used to gather this information. Thus, academics who do not possess a Research Gate account were excluded. Once again, filtering through all academics in the field of management, accounting and finance, to determine whether they have a Research Gate account, would have been impractical. Due to this reason, the current research is unable to determine the number of academics who do not have an account with Research Gate.

	Academics	Universities	Academics	Universities
Total population:			17,064	35
Less exclusions: Universities				
- Do not specialise or have a business school	578	15		
- Are not full universities (university colleges)	142	3		
- Data of academics on the company website publicly unavailable	300	1		
University exclusions:			1,020	19
Population less the above exclusions			16,044	16
Less exclusions: Academics				
- Academics who do not specialise in (1) management, (2) accounting and (3) finance	Number of academics excluded is not known			
- Academics who are not on Research Gate	Number of academics excluded is not known			
Final Sample			187	16

Table 1: Table of exclusions

The final dataset gathered, after the above exclusions, amounted to 187 academics from 16 universities. These academics were categorised into the universities by whom they were employed. The data is depicted Table 2 below:

Name of University	Sample	% of Total
Brock University	12	6.42%
Carleton University	13	6.95%
Laurentian University of Sudbury	08	4.28%
McMaster University	11	5.88%
Nippising University	03	1.60%
Queen's University	14	7.49%
Ryerson University	08	4.28%
University of Ottawa	18	9.63%
University of Guelph	11	5.88%
University of Ontario Institute of Technology	04	2.14%
University of Toronto	21	11.23%
University of Waterloo	18	9.63%
University of Western Ontario	11	5.88%
University of Windsor	13	6.95%
Wilfred Laurier University	09	4.81%
York University	13	6.95%
Total	**187**	**100%**

Table 2: University composition of the sample

Note: For the sensitive nature of the following research, the names of academics, and their salary will not be mentioned anywhere in this research.

4.3 Construction of the regression analysis

The construction of the regression analysis, commenced with the development of the control variables, independent variables [also known as the test variables] and the dependent variable. The regression examines the effect of a combination of test variables on one or more dependent variables. In this study the regression analysis assesses the proxy variables of human capital (test variables) and their effect on salary (dependent variable). The regression analysis signifies how much the test variables(s) dictate the variability in the dependent variable(s). However, control variables, may have a significant effect on this relationship, and must be accounted for in any regression analysis. Table 3 lists the relevant variables which are included in the current study.

The raw human capital data, gathered through Research Gate is comprised of an academic's publications, citations, reads, profile views, RG Score and H-index. These variables were obtained directly from Research Gate and were not adjusted in any way. The latter two independent variables (the regression factor scores) reflect a score factored by IBM SPSS. REGR Factor Score_Pub_Cit_Re_PV incorporates the data of an academic's publications, citations, reads and profile views into a single factorised

score. REGR Factor Score_RG_H-index incorporates the data of an academic's RG Score and H-index into a single factorised score.

Independent (test) Variable(s)	**Dependent Variable(s)**	**Control Variable(s)**
• Publications	• Salary	• Management
• Citations		• Accounting
• Reads		• Finance
• Profile Views		• Rank
• RG Score		• Gender
• H-index		
• REGR Factor Score_Pub_Cit_Re_PV		
• REGR Factor Score_RG_H-index		

Table 3: List of variables

The above human capital variables indicate the productivity of an academic, by way of the number of publications; the impact of those publications on the wider academic community, through the number of citations, reads and the Hirsch Index (H-index); and the interaction with fellow university academics – profile views. The Research Gate score is the score, given to academics, internally calculated by Research Gate itself. The RG score, as it is known in shorthand, comprises the academic's research outcomes, the academic's interaction with other members, and reputation of the researcher's peers [publications, citations, reads and profile views]. On the other hand, the H-Index addresses the impact of the academic's research publications in terms of the number of citations a publication has received. Thus, the two measures reflect different aspects of a researcher's profile.

However, the research would lack robustness without control variables. This research controls for the sub-discipline of academics within the school of business where the academic is either in management, accounting or finance. The study also controls for the gender of the academic and the rank (status) of the academic. The control variables are represented as dummy variables:

- Management [1: #management; 0: #accounting; 0: #finance]
- Accounting [1: #accounting; 0: #management; 0: #finance]
- Finance [1:#finance; 0: #management; 0: #accounting]
- Gender [0: Male; 1: Female]

- Rank [1: Dean/Head of Department; 2: Professor; 3: Associate Professor; 4: Assistant Professor]

Table 4 shows the composition of the control variables in the sample size of 187 academics.

Control Variable(s)	Sample	Total
1. Gender		
- Male (0)	109 **(58.3%)**	
- Female (1)	78 **(41.7%)**	**187**
2. Rank		
- Dean/Head of Department (1)	6 **(3.2%)**	
- Professor (2)	61 **(32.6%)**	
- Associate Professor (3)	80 **(42.8%)**	
- Assistant Professor (4)	40 **(21.4%)**	**187**
3. Sub-discipline		
- Management	72 **(38.5%)**	
- Accounting	65 **(34.8%)**	
- Finance	50 **(26.7%)**	**187**

Table 4: Composition of the sample

The following are the regression models run against salary [dependent variable] on IBM SPSS

Salary = $\alpha + \beta_1 \, Publications + \beta_2 \, Citations + \beta_3 \, Reads + \beta_4 \, Profile \, Views + \beta_5 \, Control \, Variables + \varepsilon$

(Model 1)

Salary = $\alpha + \beta_1 \, RG \, Score + \beta_2 \, Control \, Variables + \varepsilon$

(Model 2)

Salary = $\alpha + \beta_1 \, H - index + \beta_2 \, Control \, Variables + \varepsilon$

(Model 3)

Salary = $\alpha + \beta_1 \, REGR \, Factor \, Score\_Pub\_Cit\_Re\_PV + \beta_2 \, Control \, Variables + \varepsilon$

(Model 4)

Salary = $\alpha + \beta_1 \, REGR \, Factor \, Score\_RG\_H - index + \beta_2 \, Control \, Variables + \varepsilon$

(Model 5)

CHAPTER FIVE: DATA ANALYSIS

5.1 Introduction

Chapter Five outlines the findings of the study and seeks to provide evidence that there is a relationship between human capital and income, and that the relationship is positive. The findings below seek to answer the question of whether the hypothesis developed in Chapter three (3) is acceptable, thus rejecting the null hypothesis that there exists no relationship between human capital and income. The structure of this chapter is divided into the univariate analysis, bivariate analysis and multivariate analysis. The univariate analysis (descriptive statistics) outlines the composition of the sample with regards to the control variables and the fundamental measures of the independent variables. The bivariate analysis and the regression analysis (multivariate analysis) describe the correlation or interrelationship between the independent and dependent variables.

5.2 Descriptive statistics and univariate analyses

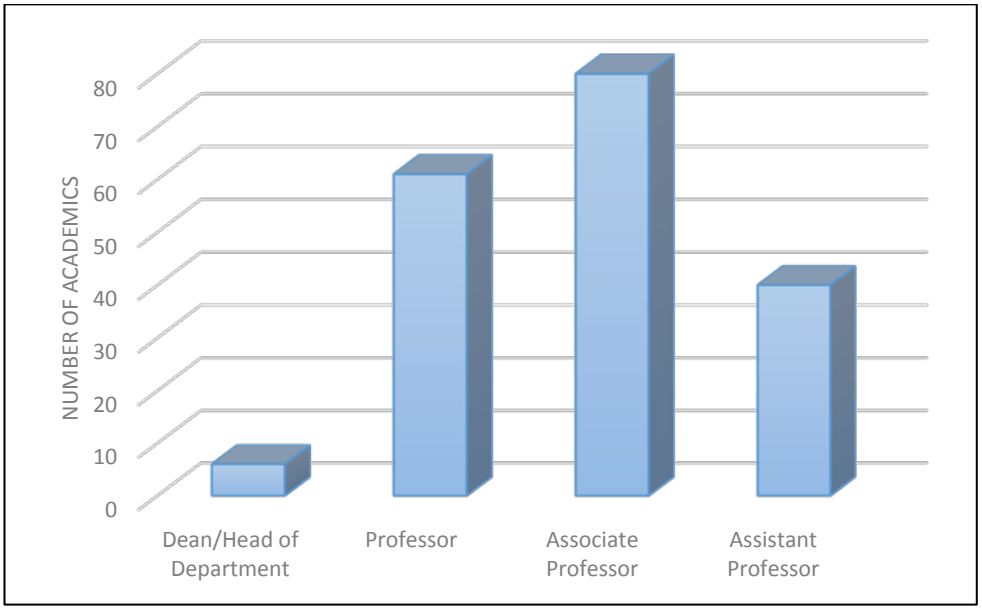

Figure 2: Position held by the academics sampled

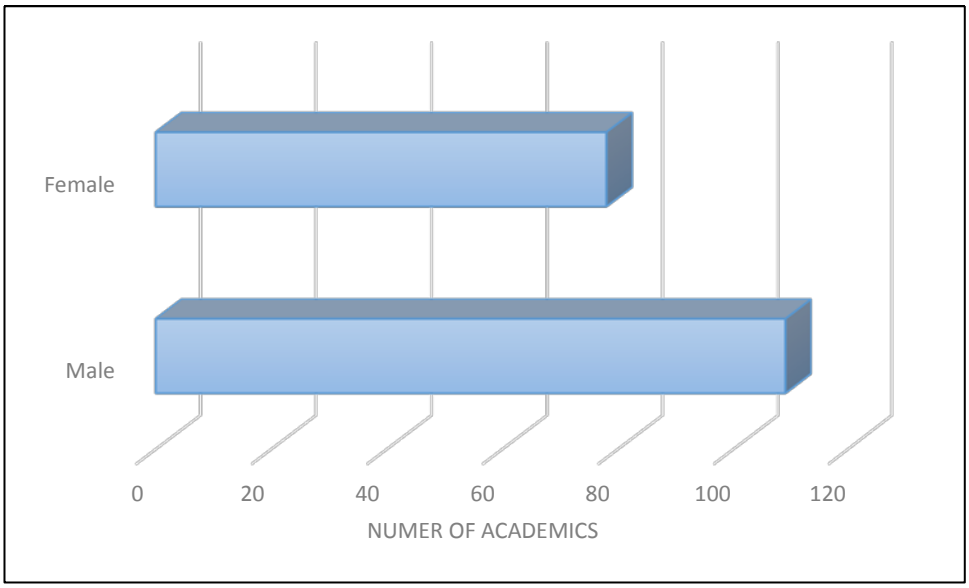

Figure 3: Gender of the academics sampled

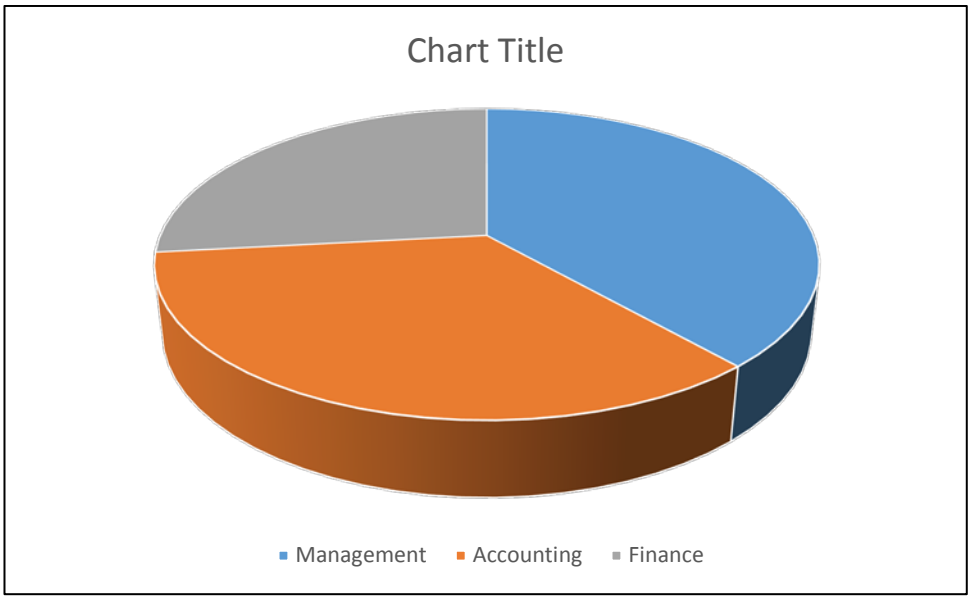

Figure 4: The subject discipline of the academics sampled

	Sample	Minimum	Maximum	Mean	SD (σ)	Skewness
Publications	187	1	264	29.47	36.39	3.50
Citations	187	0	10,989	605.98	1,347.89	5.13
Reads	185	6	66,967	2,461.01	5,948.94	7.65
Profile Views	185	2	1,438	221.16	201.91	2.68
RG Score	178	0.16	41.57	13.96	8.46	0.68
H-Index	172	1	54	8.60	8.42	2.50
REGR Factor Score_Pub_Cit_Re_PV	185	-0.78	8.46	0.00	1.00	4.72
REGR Factor Score_RG_H-index	172	-1.29	4.43	0.00	1.00	1.51
Salary	187	$101,691.80	$346,831.44	$188,284.91	$53,765.66	0.92

Table 5: Human capital statistics

	Publications	Citations	Reads	Profile Views	RG Score	H-Index	REGR Factor Score_Pub_Cit_Re_PV	REGR Factor Score_RG_H-index	Salary
Publications	1.00								
Citations	0.678**	1.00							
Reads	0.614**	0.727**	1.00						
Profile Views	0.590**	0.577**	0.712**	1.00					
RG Score	0.729**	0.696**	0.547**	0.561**	1.00				
H-Index	0.785**	0.905**	0.708**	0.639**	0.891**	1.00			
REGR Factor Score_Pub_Cit_Re_PV	0.837**	0.871**	0.892**	0.836**	0.737**	0.884**	1.00		
REGR Factor Score_RG_H-index	0.779**	0.826**	0.650**	0.623**	0.972**	0.972**	0.837**	1.00	
Salary	0.405**	0.467**	0.328**	0.395**	0.559**	0.573**	0.469**	0.586**	1.00
N = 200									

Table 6: Correlation matrix

** 2 significant figures (0.01)

* 1 significant figure (0.05)

Table 5 along with Figures 2, 3 and 4 show the descriptive statistics for the variables of human capital tested in this study. The range seen in the variables is large, thus the sample cohort of 187 consists of academics with small stocks of human capital and large stocks of human capital. Given this the standard deviation of the variables is unreasonably large. The mean values recorded also suggest that some academics are noticeable outliers in regards to their stock of human capital, in comparison to the population. As these characteristics of the sample could potentially affect the research, skewness tests were done. The skewness of the population showed that all the variables were significantly skewed to the left allowing for some outliers with very large stocks of human capital. These characteristics were reflected in the academic's salary; shown by a maximum value of $346,831.44, but with a mean value of $187,984.66. Furthermore, this trend can be seen in the characteristics of an academic's rankings (Figure 2). An explanation for the skewness of the data is due to the fact that more than 50% of the academics sampled are either of assistant professor or associate professor status, who earn lower salaries than that of Deans or Head of Departments (HoD's) (Figure 2).

Figure 3 and Figure 4 above show the gender of academics sampled and the subject discipline of the academics respectively. As can be observed, more male academics than female academics were sampled, but this did not affect the effect of gender on income. Figure 4 portrays that there are more academics in management, followed by those in accounting and finance respectively.

5.3 Bivariate analysis

5.3.1 The multicollinearity problem

Table 6 shows the correlations of the test variables against salary. Bivariate analyses show the correlation between two different variables; whether it be two independent variables or one independent and one dependent variable. When plotted against each other, the correlations show to what degree one variable will move in conjunction with another variable, and in what direction this movement will take. The correlation matrix is an important step in conducting an effective and useful regression analysis. It allows the researcher to detect problems of multicollinearity, which may otherwise give a misrepresentation of the regression analysis.

This is a key issue, in the current study as identified in Table 6. According to AnnMaria (2012) multicollinearity is when one or more independent variables have a high

correlation to the other independent variable(s) of the research. Furthermore, AnnMaria (2012) mentions that if two test variables have a correlation of 0.70 or above, such is the case with the correlation between citations and the H-index, they should not be included in the same regression equation. This is also the case with many other correlations (*see Table 6)*. Thus, separate regression models exist for the RG Score (model 2), H-index (model 3), REGR Factor Score_Pub_Cit_Re_PV (model 4) and REGR Factor Score_RG_H-index (model 5) and are not combined with any of publications, citations, reads and profile views.

Another important statistical observation of multicollinearity is the tolerance level and the Variance Inflation Factor (VIF). These measures identify whether a problem of multicollinearity exists (AnnMaria, 2012) after a regression analysis is done. In the above case, the level of tolerance for an independent variable #1 (e.g. number of publications) will explain the amount of variance of the number of publications explained by the other control, test and dependent variables (R-squared value). Thus, as stated by AnnMaria (2012), the tolerance level has a perfectly inverse relationship to the R-squared value. It is mentioned that a tolerance level below 0.20, giving an R-squared value of above 0.80 (1 – 0.20) or 80%, means that a multicollinearity problem exists within the data. A Variance Inflation Factor (VIF) of above 3 or 5 also influences multicollinearity (AnnMaria, 2012). The problem of multicollinearity can be identified before conducting a regression analysis by using the correlation matrix or after, by observing the tolerance level and VIF (AnnMaria, 2012).

5.4 Regression analysis/multivariate analysis

Variables	Model 1:	Model 2:	Model 3:	Model 4:	Model 5
Step 1: Predictors					
Publications	0.026				
Citations	0.360**				
Reads	-0.161				
Profile Views	0.224				
RG Score		0.537**			
H-Index			0.507**		
REGR Factor Score_Pub_Cit_Re_PV				0.376**	
REGR Factor Score_RG_H-index					0.559**
Step 2: Controls					
Management					
Accounting	0.202*	0.255**	0.200*	0.211*	0.231**
Finance	0.136	0.208**	0.179	0.136	0.199
Rank	-0.297**	-0.122	-0.177	-0.308**	-0.119
Gender	0.024	0.013	0.024	0.038	0.021
Total R^2	0.374	0.389	0.394	0.340	0.408
Adjusted R^2	0.346	0.371	0.376	0.322	0.390
F-Statistic	13.170**	21.902**	21.601**	18.451**	22.883**
N = 200					

Table 7: Regression analysis of the variables of human capital against salary

** 2 significant figures (0.01)

* 1 significant figure (0.05)

In contrast, to Table 6, Table 7 shows the correlation between many independent variables and one dependent variable, given the presence and inclusion of other independent and/or dependent variables, thus the name multivariate analysis. The table describes the relationship between the control variables, independent variables and the dependent variable. The total R-squared (R^2) signifies the strength of the model in predicting the income received by academics (salary). The 5 models regressed above show that 37.4% (Model 1), 38.9% (Model 2), 39.4% (Model 3), 34.0% (Model 4) and 40.8% (Model 5) of the variance in salary can be predicted and is dictated by the human capital variables tested in each model. Additionally, of importance is that the models are significant to 2 significant figures, as illustrated by the F-Statistic.

Model 1 illustrates the association between the variables of human capital excluding the RG score, H-Index and factorisation scores against salary. Model 1 shows that publications, citations and profile views, expectantly have a positive correlation with an individual's salary, however only the number of citations received by a researcher is significantly correlated to two significant figures. This may suggest that in the research field, the quality of the research produced has a greater impact on human capital stock than the quantity of research produced (characterised in this study by the number of publications). Thus, the quality of research dictates a researcher's salary more so than the quantity of research. The number of profile views, despite being positively correlated is not significant.

A surprising relationship arising from this study is the negative correlation between the number of reads and an academic's salary. According to Bengsch (2015) the number of reads is counted when someone accesses, downloads or reads the research summary or full text of an academic's publication. The wide scope of the criterion allows for a variety of intentions for accessing, downloading or reading the research. Despite, showing the popularity of the piece of research, it is not an accurate measure of human capital, as downloading of the research can be either accidental, used as a starting reference, or can be used as a citation. The inaccuracy of this measure and the lack of control in counting the number of reads may have resulted in this negative correlation in predicting an academic's salary.

Models 2, 3, 4 and 5 all show a strong positive association to an academic's salary, which are significant to two significant figures. For a single dollar ($) increment in salary, the RG Score contributes 0.537 points, whereas the H-index contributes 0.507 points. A similar conclusion can also be drawn with the factorisation scores in Models 4 and 5. No strong conclusions can however be drawn between the effect of the RG Score on the salary and the effect of the H-index on salary as the two models (Models 2 and 3) show similar results. Models 4 and 5 closely depict that of previous models regressed. The reason for this is that the factored scores are closely linked and correlated to the previous variables regressed. REGR Factor Score_Pub_Cit_Re_PV is comprised of variables regressed in Model 1, whereas REGR Factor Score_RG_H-index is comprised of variables regressed in Models 2 and 3. However Model 4, which combines publications, citations, reads and profile views into a factored score, is less reflective of an academic's salary than the 4 variables regressed individually as in Model 1. Model 5

which combines the RG score and H-index into a factored score is more reflective of an academic's salary than when the RG score and H-index are regressed individually. Overall, the results above indicate that the RG Score and the H-index are more effective human capital variables than publications, citations, reads and profile views, in predicting the variability of an academic's salary.

Conclusions can also be drawn from results regarding the control variables. Firstly, the academic ranking of an individual has a negative correlation to his/her academic salary. This is due to the categorisation of the academic ranking system, previously outlined in Chapter four (4). The ranking system was organised as '1' being that of a Dean and a Head of Department and '4' being that of an Assistant Professor. Those individuals of higher academic standing, and positions of higher responsibility and accountability receive greater salaries thus as the dummy variable increases from that of a Dean to that of an Assistant Professor, the income he/she receives decreases.

Furthermore, it can be interpreted that the human capital variables regressed against salary are more relevant to academics in the field of accounting than in finance. It can therefore be concluded that the salaries of those academics in accounting may be more greatly influenced by publications, citations, reads, profile views, RG score and the H-index than that of finance academics. Accounting is significantly positively correlated in all 5 models as compared to finance which is only significantly positively correlated in Model 2 (Table 7).

5.5 Discussion

All the five (5) models regressed confirm the hypotheses developed in Chapter three (3), in that the proxy variables of human capital (publications, citations, H-index et cetera) correlate positively to an academic's salary. However, this is not without an exception, as the number of reads negatively correlates to salary. In hindsight, this is probably because of the inaccuracy of the measure. Furthermore, the results conform to the theories conceived by Neal (1995) and Weiss (1995). This study is however more closely linked to Neal's (1995) theory as the study only tests whether industry-specific skills are compensated for in an academic's remuneration.

The results could have been more conclusive if the study included variables of human capital incorporating an academic's teaching expertise, education and work experience. In this way, the study would have been more reflective of an academic's teaching and

research responsibilities in higher institutions and thus more closely linked to the theory developed by Weiss (1995).

The results also lead to some very interesting dilemmas. The results strengthen the debate between the quantity and quality of human capital. Through the results, it has been seen that the quality of human capital has more emphasis than the quantity of human capital when associated with salary, and supported by the fact that citations is significantly correlated to an academic's salary. However, the parameters of the study do not allow the research to conclude if more human capital is better than better quality human capital. Furthermore, the results show that productivity may be reflected in an academic's salary using the H-index which reflects an individual's productivity as talked about by Bornmann and Daniel (2007). Despite this, the use of only one measure to compute measure productivity (not its stated purpose) is insufficient to draw conclusions from.

Given the interpretations that can be drawn from the above results, the current study, as well as proving the theories by Neal (1995) and Weiss (1995), gives context to the criticism by Barro (1999) and Tan (2014). Barro (1999) and Tan (2014) talked about the tug-of war between more human capital and higher quality human capital whereas Weiss (1995) and Tan (2014) mentioned human capital as a reflection of productivity, which translates to an individual's salary.

Additionally the dynamic nature of the relationship between an academics human capital and their remuneration limits this study from accurately testing this relationship, and whether an increase in an academics human capital actively motivates the employer to reward that academic financially (remuneration) and whether this then actively motivates the academics to further develop their human capital. Similar to the study by Nadeem et al. (2017), who used the Generalised Methods of Moments (GMM) estimator to estimate the dynamic nature of the relationship between intellectual capital and firm performance, this study and most definitely future studies, can use GMM to estimate the dynamic nature between human capital and remuneration. Nadeem et al. (2017) noted that GMM will allow for an improvement in an academic's human capital to be affected by their previous years difference in remuneration as well as analysing the effect of past relationships between human capital and remuneration to account for the dynamic nature of the relationship. However in the study by Nadeem et al. (2017), they collected data across 10 consecutive years. Thus future studies could gather data on

human capital and academic remuneration each year for consecutive years in order to accurately analyse the dynamic nature of this relationship using the GMM estimator.

CHAPTER SIX: CONCLUSION

6.1 General findings

Human capital is not a particularly recent phenomenon, having started in the late 20th century. Although there are many theoretical and empirical articles on cross-country/nation-specific and industry/firm-specific studies, research on individual-specific cases is thus far limited. The present study was aimed at determining if an academic's knowledge, skills and abilities [human capital] are reflected in his/her salary. It is a complex study which can lead to numerous outcomes because of country characteristics.

This study focuses on intellectuals in the Province of Ontario, Canada. The research sampled 200 academics across the business schools of public universities located in Ontario. Based on prior research; many researchers, namely Neal (1995) and Weiss (1995), have theorised a positive relationship between an individual's human capital and their projected income; more education, work experience and industry-specific skills are compensated for in an individual's salary and therein lies a premium for one's human capital. Previous research has also outlined measurement techniques; cost, output and income based, as a reflection of an individual's human capital (Laroche & Merette, 2000). This implicitly suggests that a reflection exists between the three measurement approaches.

In determining if human capital impacted on income, a regression analysis was conducted with the variables of human capital against that of academic staff annual salaries. The human capital of an academic was measured by the individual's research output; publications, citations, reads, profile views, Research Gate score (RG score) and Hirsch index (H-index). The regression analysis included a step-down approach which consisted of five models (chapter three).

As hypothesised, the results suggested a positive correlation between an academic's stock of human capital and the individual's income. Although some measures of human capital (e.g. gender) proved insignificant, the Hirsch index and the Research Gate score proved to be highly significant in their positive correlation to income. This is most probably due to the scope of the measure and their effectiveness in measuring human capital. The number of publications and profile views of an academic, though positively correlated, were insignificant in their relationship. In hindsight, the result is best

explained by the quality versus quantity debate. The findings clearly show that the quality of an academic's research output carries more weight that the quantity of research output with regards to their stock of human capital.

However, this research has the problem of multicollinearity, owing to the high correlations between the test variables. The effect of multicollinearity is seen between the number of citations and its correlation with the Hirsch index and RG score. A problem, therefore, arises when constructing the regression analysis, as the variance of the regressed variable is only explained by that test variable that has a very highly correlation to the regressed variable. For example, the variance in the Hirsch index or RG score would only be explained (in majority) by the number of citations.

6.2 Contributions of this research

This research will hopefully have practical implications to universities and other industries alike beyond the borders of Canada. This research can influence employers to more effectively reward employees by linking salaries/income to the individual's output of human capital (research output). The study is, however, probably more relevant to service industries and knowledge-intensive industries. This is as opposed to performance-based incentives, frequently used as a management technique in manufacturing and retail industries. Thus, as performance-based incentives are used to incentivise employees to meet targets, inducements coupling income to human capital can help nurture, foster and improve an individual's human capital stock.

On the other hand, human capital is a component of organisational capital, thus the above incentive based on human capital, will not only be beneficial to individuals such as academics but also to organisations such as universities as well.

6.3 Limitations

Regardless of how significantly positively correlated the results are in proving that human capital (research output) is reflected in an academic's income, there remain limitations to the current study. The main limitation, of this study, is the sample size, as a reflection of the population. The exclusion of those academics outside of management, accounting and finance and those without current Research Gate accounts, provide the major limiting factors. These exclusions remove a big portion of the population. Thus, the characteristics of the sample may not accurately reflect the characteristics of the population. Moreover, the human capital considered in this study is that of an

academic's research output, while in fact an academic's salary may be influenced by their teaching output and their past academic/industry experience as well, which were not factored into in the current study.

Furthermore, the current research was undertaken in the Canadian context, specifically in the Province of Ontario. Thus, the findings cannot be generalised to the global population. As Barro (1999) mentioned, human capital contributes more to economic growth in developed countries and continents (North America, Australasia) than in less developed parts of the globe (South America, Africa). Thus, in developed countries, to ensure the growth of human capital, income might act as an incentive for an individual to grow their stock of human capital, more so than in less developed countries. Therefore, while in Canada the positive relationship may hold true, in other countries, this relationship may not exist or not be as clearly defined.

6.4 Future research

This leads to the areas for future research and gaps that can be further researched. Larcohe and Merette (2000); Mulligan and Sala-i-martin (1995) and Son (2010) have all quantitatively carried out research into the cross-country analysis, while nation-specific human capital has simultaneously been qualitatively researched by Schultz (1961) and Lucas (1988). Similar quantitative and qualitative research has been done on firm-specific human capital, as portrayed in the studies by Neal (1995) and Coff and Raffiee (2015). Although the current study conducted quantitative research into individual-specific human capital, there needs to be further research into the reason why employees are being rewarded for greater human capital. Future research needs to be carried out to answer the research question: Why is there a positive relationship between an individual's human capital and their remuneration?

Secondly, a positive relationship may only exist due to the perspectives of Canadian employers, industry-specific differences, industry-specialisation et cetera. The result may have been heavily influenced by the industry, in which universities are in the business of providing education and disseminating information. Other industries which are not heavily human capital intensive and education intensive industries may result in different findings. Furthermore, the discipline of management and more so accounting and finance are specialisations, thus the rate at which human capital is compensated for may be greater than in disciplines that do not require specialisations (e.g. salesperson, labourer). Moreover, employers make the final decision on salary/income in

negotiations with employees thus varying perspectives of human capital from different employers may have a significant influence on this relationship, Future research can study the effect of these differences on the relationship between salary and human capital.

Lastly, as Guthrie, Riccieri and Dumay (2012) have discussed, research on the criticisms of human capital have been lacking. In my opinion, research on creating awareness and understanding of intellectual capital/human capital and the practical implications of human capital have been thoroughly studied, examples being the articles of human capital previously researched in chapter two (2). However, the same cannot be said for the criticisms of human capital. Although Roslender and Fincham (2001) and Tan (2014), among others, have attempted to criticise human capital, there are few articles that evidence this body of research. Thus, more research needs to be conducted on the criticisms of using human capital as a measure of an individual's implicit wealth.

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APPENDICES

Publications	Number of research articles an academic has published.
Citations	Total number of occurrences an academic has been cited, though their publications
Reads	The number of occurrences where someone has read or downloaded an academic's publications.
Profile Views	The number of occurrences where someone has viewed an academic's profile on Research Gate
RG Score	An internally-generated score (calculated through Research Gate) given to an academic based on their number of publications, citations, reads and profile views.
Hirsch Index (H-index)	A calculation based on an academic's citations received per research article, which is an indication of their research productivity
REGR Factor Score_Pub_Cit_Re_PV	A factored score (calculated through IBM SPSS) based on an academic's number of publication, citations, reads and profile views
REGR Factor Score_RG_H-index	A factored score (calculated through IBM SPSS) based on an academic's RG Score and Hirsch Index

Table 8: Definition of independent variables

	Sample Size		Academics earning over $100,000		Student Enrolments	
University	**No.**	**% of total sample**	**No.**	**% of total sample**	**No.**	**% of total sample**
Brock University	12	6.42%	583	3.63%	18,250	3.66%
Carleton University	13	6.95%	778	4.85%	30,130	6.05%
Laurentian University of Sudbury	8	4.28%	385	2.40%	9,510	1.91%
McMaster University	11	5.88%	1,137	7.09%	31,630	6.35%
Nippising University	3	1.60%	104	0.65%	5,200	1.04%
Queen's University	14	7.49%	995	6.20%	27,170	5.45%
Ryerson University	8	4.28%	1,046	6.52%	41,900	8.41%
University of Ottawa	18	9.63%	1,400	8.73%	42,700	8.57%
University of Guelph	11	5.88%	830	5.17%	29,620	5.94%
University of Ontario Institute of Technology	4	2.14%	194	1.21%	10,230	2.05%
University of Toronto	21	11.23%	3,288	20.49%	89,350	17.93%
University of Waterloo	18	9.63%	1,295	8.07%	37,800	7.58%
University of Western Ontario	11	5.88%	1,298	8.09%	38,030	7.63%
University of Windsor	13	6.95%	546	3.40%	15,670	3.14%
Wilfred Laurier University	9	4.81%	556	3.47%	18,940	3.80%
York University	13	6.95%	1,609	10.03%	52,250	10.48%
	187		16044		498,380	

Table 9: Sample size as reflective of the population